The most quoted and referred capacity manual in the transportation community worldwide is the United States Highway Capacity Manual (US-HCM) first developed in 1950. Since then, this manual has undergone significant improvements with major restructuring and rewrites in 1965, 1985, 2000 and the recent publication in 2010. Unfortunately, these piece meal research efforts have not culminated in the development of Indo - HCM and hence this important research study has been undertaken as a part of 12th Five Year Plan by Planning Commission, Government of India.

Indo-HCM is being executed by CSIR-CRRI in coordination with some of the reputed academic institutes in the country which includes IIT-R, IIT-B, IIT-G, SPA-D, SVPNIT, BESU and AU-Chennai.

**Indo-HCM’s Contribution to the Nation**

The models, once validated, can be used to study the traffic flow characteristics over a wide range of the associated variables which would enable to get more acceptable results and thus could be useful for assessing the effectiveness of traffic management measures all over the country. Outputs derived from the appropriate traffic flow simulation models would be used to construct fundamental diagrams of traffic flow thereby making it possible to estimate the capacity of a facility. The developed manual is expected to serve as a practical tool for the practicing engineers and planners to mitigate the traffic and infrastructural problems as the models developed in this study would have been calibrated and validated for conditions prevailing on varying road widths including plain, rolling and hilly terrains.

**Research Endeavour**

The main hypothesis behind conceiving the project is that Indian traffic characteristics are fundamentally different from those in the developed countries and even the driver behaviour is vastly different from even the developing economies like China and Indonesia. Consequently, the development of Indian Highway Capacity Manual (Indo-HCM) has been undertaken on priority in the form of a mission mode project by considering the various categories of Indian roads, intersections and pedestrian facility. There are a number of work packages undertaken.

**Work Packages**

**A. Capacity of Road**

**WP-1: Roadway Capacity Estimation of Two Lane, Intermediate and Single Lane Carriageways**

In this work package, the mid block sections considered under the single, intermediate and two lane bidirectional carriageway are studied. The lane widths are considered on the typical inter-urban corridors located preferably in the vicinity of the cities like Delhi, Mumbai, Kolkata, Chennai, Surat, Dehradun and Guwahati to ensure a balanced geographical distribution across the country representing plain, rolling and hilly terrains.
WP-2: Roadway Capacity Estimation of Multi-lane Inter City Highways

In addition to the factors listed under WP-1, factors like lateral clearance, width of median, number of lanes, auxiliary lanes, width and type of shoulders would be considered in the test sections in the vicinity of the cities mentioned earlier.

WP-3: Roadway Capacity Estimation of Inter - Urban and Urban Expressways

In addition to the factors listed under WP-2, the capacity of expressway sections are examined considering the adequacy of ramp provision, weaving sections and merge / diverge sections. The test sections on expressways will be selected in accordance with the availability of the same in the vicinity of the cities mentioned earlier.

WP-4: Urban Roadway Capacity Estimation for Arterials / Sub- Arterials / Collectors

For determining the roadway capacity of urban roads classified under Arterial, Sub-Arterial, and Collector Street category, typical test sections located in the cities like Delhi, Mumbai, Kolkata, Chennai, Surat, Dehradun and Guwahati are chosen.

B. Capacity of Intersection

WP-5A: Capacity Estimation of Controlled Intersections

Intersections are the critical nodal points of any road network, where normally delay is caused to traffic, it is imperative to study the intersections to arrive at the various LOS and capacity norms under different operating conditions. In this work package the signalized intersections are studied to estimate capacity and level of service.

WP-5B: Capacity Estimation of Roundabouts

The main objective of this work package is the development of capacity and level of service determination procedure and evolving guidelines for roundabouts including quantification of the impacts of various roadways, traffic and other influencing factors on the capacity of the different types of Roundabouts. SPA-D is the key player to accomplish this task.

WP-6: Capacity Estimation of Uncontrolled Intersection

As different types of uncontrolled intersections generally exist on all types of Indian inter-urban roads, the various factors listed under WP-5A would be considered except the traffic signal related parameters while collecting the data for roadway capacity of typical uncontrolled intersections. The scope of the work package is confined to the major uncontrolled intersections located on the inter-urban roads catering to the sizable proportion of sub-urban and peri-urban traffic.

C. Pedestrian Infrastructure

WP-7: Capacity Estimation of Pedestrian Facility

LOS is a term used to describe existing operating conditions (or suitability) for a mode of travel in the transportation system. LOS of varying types of roads is primarily based on speed; travel time and intersection delay whereas the calculation of Pedestrian LOS is more
complex because it represents the operating condition of pedestrian facilities and level of comfort pedestrians experience in using these facilities. In this work package, the pedestrian facility is studied for various selected road sections including at CBD area and metro station area in the earlier mentioned cities.

**WP-9: Development of Reliability as a performance measure**

Travel Time Reliability (TTR) is increasingly recognized as an important mobility performance measure. Therefore, the objective of this work package is mainly focused on the development of TTR as a surrogate performance measure for expressways and multi lane highways.

**SPA’s Contribution**

The institute is contributing to all the work packages. SPA is team member for WP 5A, WP 5B and WP 6 for final methodology, analysis and chapterization. Also for WP-5B, SPA is the coordinating team. The main objectives of the study are to determine the critical gap for different types of vehicles at roundabouts and to develop a procedure for determination of capacity at roundabout and level of service under varying traffic conditions.