

## 2.4 PASSENGER CAR UNIT

Passenger Car Unit (PCU) is a vehicle unit or car unit used to measure the rate of traffic flow on highway. In other words, PCU is a measure of number of vehicles moving on a highway at a given point of time. In some instances, PCU is referred to as Passenger Car Equivalent (PCE).

Traffic flow is a measure of flow of vehicles on a road from one point to another point at a given point of time. The flow of traffic on highway consists of different classes of vehicles that are classed as follows:

Cars

Buses

Heavy Commercial Vehicles

Light Commercial Vehicles

Auto-Rickshaws

Two-wheeler automobiles etc..

The movement of different class of vehicles of highway is termed as mixed traffic flow. In developing countries like India, the traffic stream consists of mixed traffic flow.

### PASSENGER CAR

To describe the entire traffic flow on a highway per unit time, the flow of various vehicle classes must be converted into a single standard vehicle type, such as Passenger Car. As a result, Equivalency factor known as passenger car unit (PCU) is allotted to each vehicle type.

Unless the various vehicle classes are converted to a single common standard vehicle unit, estimating the traffic volume of roadway facilities under mixed traffic flows is difficult.

The different vehicle classes have a wide range of static and dynamic properties, such as length, width, and so on. Apart from that, the driver behavior of various vehicle types is found to differ significantly. As a result, mixed traffic flow characteristics are far more complex than homogeneous traffic consisting solely of passenger cars.

## PCU VALUES FOR DIFFERNT CONDITIONS

PCU per hour per lane width or PCU per hour for the full roadway are used to describe the capacity of various types of roadway facilities with mixed traffic flow, such as highways in rural areas and roads in urban areas.

For different types of fast and slow moving vehicles on rural roads, The Indian Road Congress (IRC) has proposed a range of PCU values in India for different types of vehicles on roads in rural areas.

Sl. No.	Vehicle Class	Equivalency Factor
<b>Fast Vehicles</b>		
1	Motor cycles and scooter	0.5
2	Passenger car, Pick-up van and auto-rickshaw	1.0
3	Agricultural tractor and light commercial vehicles	1.5
4	Single unit Truck and Bus	3.0
5	Truck-trailer and agriculture tractor - trailer	4.5
<b>Slow Vehicles</b>		
6	Pedal Cycle	0.5
7	Cycle Rickshaw	2.0
8	Hand Cart	3.0
9	Horse drawn vehicle	4.0
10	Bullock cart	8.0

***PCU Values recommended by the IRC 064: 1990 for different types of vehicles on roads in rural areas***

### Rural

PCU Values recommended by the IRC 064: 1990 for different types of vehicles on roads in rural areas

Equivalency factors will differ depending on the terrain, such as rolling/hilly sections. Since the influence of terrain in the design of service volumes for traffic in various terrains has been accounted for in a consolidated way. Therefore, IRC has proposed a range of PCU values in India for different types of vehicles on urban roads.

## Urban

PCU Values recommended by the IRC 106: 1990 for different types of vehicles on roads in urban areas

Sl. No.	Vehicle Class	Equivalency Factor	
		Percentage composition of vehicle type in traffic stream	
Fast Vehicles		5%	10% & Above
1	Two wheelers - motor cycle, scooter, etc.	0.5	0.8
2	Passenger car, Pick-up van	1.0	1.0
3	Auto-rickshaw	1.2	2.0
4	Light Commercial vehicle	1.4	2.0
5	Truck or Bus	2.2	3.7
6	Agricultural Tractor - trailer	4.0	5.0
Slow Vehicles			
7	Pedal cycle	0.4	0.5
8	Cycle rickshaw	1.5	2.0
9	Tonga (Horse drawn vehicle)	1.5	2.0
10	Hand cart	2.0	3.0

*PCU Values recommended by the IRC 106: 1990 for different types of vehicles on roads in urban areas*

## METHODS OF ESTIMATING PCU

The different types of methods mostly used to determine the different vehicle classes of PCU values are:

Homogenous Coefficient Method

Headway method

Multiple Linear Regression Method

Walker's Method

Simulation Technique

Simultaneous Equations Method

Huber Method

Speed Based Method

## FACTORS AFFECTING PCU VALUES

Several factors influence the PCU values of different vehicle types. Such as

Dimensions of vehicle i.e. Length and width

Dynamic characteristics of the vehicle – speed, acceleration, etc.

Environmental and Climatic conditions

Traffic regulation and control

Roadway characteristics such as gradient, curves, intersections, geometrics, etc.

Characteristics of traffic stream

There should be enough space between the moving vehicles.

The PCU value of a specific vehicle may not be as consistent as commonly believed.

The PCU value of a vehicle class is found to fluctuate based on a number of factors. As a result, the PCU of a certain vehicle class is a dynamic changeable value that rarely remains constant.

