INTERSECTION ANALYSIS:  
Traffic Volume Studies and Characteristics

INTRODUCTION:

1. Intersections are of critical importance to the transportation system because of their influence on the movement and safety of traffic flow. The place of intersection is determined by design, and the act of intersecting is modified by regulation and control. While in the vicinity of an intersection, drivers must co-adjust their performance by reduced speed or change of path to avoid collision with each other. In the area of intersection the individual driver may
   a. transfer from the route on which he has been traveling to a route in another direction, or
   b. Cross the lanes of another stream which flows between him and his destination.

2. Volume – The number of vehicles passing a given point during a specified period of time, (usually, veh/hr, or vph).

3. Purpose – Traffic volume studies are made to obtain factual data concerning the movement of vehicles and/or persons at selected points on the street or highway systems. Specifically, intersection counts and turning movements are used in designing channelization, planning turn prohibitions, computing capacity, analyzing high accident intersections, evaluating congestion, etc.

4. Hourly Traffic in vehicles per hour is used for:
   a. Determining length and magnitude of peak periods.
   b. Evaluating capacity deficiencies.
   c. Establishing traffic control for: installation of signs, signals, and markings; designation of through streets, one-way streets, etc; prohibition of parking, stopping and turning.
   d. Geometric design or redesign of streets and intersections.

5. Short term counts (covering 5, 10 or 15 min. intervals) are usually expanded into hourly flow rates and are primarily used to analyze: maximum flow rates; flow variation within peak hours; capacity limitations on traffic flow; characteristics of peak volumes.

6. Peak Hour Factor (PHF) – A ratio of the volume occurring during a given peak hour to the maximum rate of flow during a given time interval within the peak hour (such as 5, 10 or 15 mins.) expanded to veh/hr. It is a measure of peaking characteristics, with a maximum attainable value of unity.
ASSIGNMENTS:

1. Draw a schematic diagram of the intersection to which you have been assigned, show all the lanes on each approach, directions of movement, islands, curbs, etc.

2. On each approach to the intersection count the number of arriving vehicles, in one-minute intervals, for one complete hour. Classify vehicles according to type (passenger car unit, commercial, truck, bus) and direction of movement (straight, right, left).

3. Calculate the hourly flow volumes and draw two types of intersection flow diagrams:
   (a) A block diagram and
   (b) A band-flow diagram (see attached sketch).

4. Calculate the peak-hour-factor on each approach for the following peak-flow intervals: 15, 10 and 5 minutes.

5. Measure (approximately) the signal timings on each approach for several cycle times and draw a timing pattern for the intersection.

6. Draw a frequency histogram of the number of arrivals per minute, on each of the four approaches, for grouping of 2 or 3 vehicles.
Figure 5.4—Hourly patterns of traffic-volume variation by day of week.
(Source: Nashville Metropolitan Area Transportation Study)