TRAFFIC COUNTING

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There Was A Time In This Town
When Traffic Didn’t Really Matter.
Traffic Data Collection Program

• Studies carried out at regular intervals to MONITOR system performance and trends
• Studies to analyze specific problems
Types of Studies

• Inventories
• Traffic Observance Studies
  • traffic volumes
  • speed
  • parking
  • others
• Safety Studies
• Interview Studies
• Experimental Studies

Study Components

• Data Collection
• Data Reduction (Summarizing)
• Data Analysis (Interpretation)
References

- **Manual of Transportation Engineering Studies**, Institute of Transportation Engineers/Prentice-Hall, 1994

Institute of Transportation Engineers (ITE)

- the professional society of traffic and transportation engineers
- founded in 1930
- over 15,000 members worldwide
- [www.ite.org](http://www.ite.org)
Traffic Volume Studies

• TRAFFIC VOLUME – the number of vehicles that pass a point during a specified time period
• DEMAND VOLUME – the number of vehicles that want to, are expected to, or would pass . . .
• CAPACITY – the maximum number of vehicles that can or could pass . . .
Capacity Analysis

• Primary Reference in U.S. for capacity analysis and level of service analysis is the **HIGHWAY CAPACITY MANUAL (HCM2000)**, Transportation Research Board, Washington, DC, 2000

• Software: **Highway Capacity Software (HCS2000)**

Traffic Volumes

• The number of vehicles (or pedestrians) that pass a point during a specified time period (year, day, hour, or less than a hour)
Annual Traffic Volumes

• The number of vehicles that pass a point in a year

Daily Traffic Volumes

• The number of vehicles that pass a point in a day (veh/day, vph)
• any day
• Average Daily Traffic (ADT) – the number of vehicles that pass a point in x days divided by x days
• it is often necessary to compare volumes on different roads
• for comparison, one must adjust an ADT count for day of week and month to get the average day
• **Annual Average Daily Traffic (AADT)**

  - ADT x adjustment factor = AADT
  - Check with State DOT for adjustment factors

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**Monthly Traffic Volume Variations**
Daily Traffic Variations

Recreational access route MN 168, North-Central Lake Region, AADT 7,803, 7 lanes, 1981.
Sectional freeway, four freeways in Minneapolis-St. Paul, AADT 150,000-130,000, 6-8 lanes, 1981.
Average day.
Workshop Problem

- total annual traffic = 290,800 veh/yr.
- to get AADT divide annual traffic by 365 = 797, say 800 vpd
- find average daily traffic in each month (MADT)
- January: 19,800/31 = 640 vpd
- determine Monthly adjustment factor for January: AADT/MADT = 800/640 = 1.25

For August: 30,000/31 = 970
- Monthly adjustment factor = 800/970 = 0.90
- Pattern?

For October: 26,400/31 = 850
- Monthly adjustment factor = 800/850 = 0.94
• ADT count taken on Tuesday in October
  • Daily Factor = 1.12
  • Monthly Factor = 0.94
• AADT = 1000 (1.12)(0.94) = 1052.8 vpd
• round off
  • 0-1,000 nearest 10
  • 1,000-10,000 nearest 100
  • over 10,000 nearest 1,000
Workshop Problem

• DOW Factor for a Wednesday in July (Pattern 4) = 0.7181
• ADT = 2000 vpd
• AADT = 2000 x 0.7181 = 1436.2
• round off – say 1400 vpd

• Government agencies often publish AADT data – tables and maps
• many publish AAWDT, SADT, WADT and other daily volume data
• example: Michigan DOT publishes a traffic count map on the internet at www.michigan.gov/mdot
• Annual Traffic Volume = AADT x 365

• Annual Vehicle Miles Traveled (AVMT)
  • Average volume on a specific road segment multiplied by the length of the segment
  • AVMT = AADT x 365 x segment length

Crash Rates

• Section/Segment of Road
  Crashes per million vehicle miles traveled

• Intersection
  Crashes per million entering vehicles
Workshop Problem

- Annual Traffic on Mackinac Bridge
  - 15,000 x 365 = 5,475,000
    say 5.5 million

- Annual vehicle miles traveled (AVMT)
  - 5.5 million x 5 miles = 27 million AVMT
Hourly Traffic Volumes

- The number of vehicles that pass a point in an hour (veh/hr, vph)
- Peak Periods and Peak Hours
- Relationship between Peak Hour Volume and Daily Volume

Hourly Traffic Variations

[Graph showing traffic variations for different routes and days]
Short Term Counts

- The number of vehicles that pass a point in, say, 15 minutes (5 minutes, 10 minutes)
- Volume will be expressed as vehicles per hour (Flow Rate)
- Flow Rate helps to identify peaking with a hour
- Peak Hour Factor (PHF)

Peak Hour Factor (PHF)

- Counts are often done of grouped in 15 minute intervals

- PHF = hourly volume divided by 4 x volume in the peak 15 minutes
Workshop Problem

Count Location 1
• Flow Rate = 200x4 = 800 vph
• PHF = 800/(4)(200) = 1.0

Count Location 2
• Flow Rate = 500x4 = 2000 vph
• PHF = 800/(4)(500) = 0.40
Volume Studies

- street/highway count (total, both directions)
- directional count
- classification count
- occupancy count
- turning movements/intersection count
- pedestrian count
- cordon count
- screenline count
**Screenline** – an imaginary line between two areas
Example: Wisconsin-Michigan border
AADT = 50,000 vpd

**Cordon Line** – an imaginary line around an area
Example: UP
Wisconsin-Michigan  50,000
Mackinac Bridge    15,000
International Bridge 10,000
Total AADT         75,000 vpd

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**Counting Techniques**

- Determine appropriate locations and times for counts
- Identify appropriate method for collecting the data
- Organize the field effort
- Develop data reduction, analysis, and presentation techniques
Methods for Counting Traffic Volumes

(1) Machine/Automatic Count
   ATR – Automatic Traffic Recorder
(2) Manual/Observation Count
Machine Counts

Two functions:

(1) Detect or sense the traffic
   - pneumatic (rubber) road tube
   - piezoelectric strips
   - induction loops
   - others

(2) Make a record of the traffic that has passed the point

Permanent Counter

- count continuously, typically for the whole year
- induction loop used to detect the traffic, and the recording device is often in an office location
- used at control stations
- data can be used to develop adjustment factors
Permanent Count Location
Portable Counter

- counter is installed for a shorter time period – a day, two days, a week
- typical installation will use a road tube to detect the traffic and a portable unit will be used to record the data
- several types of recording equipment
  - Accumulating Counter (Junior Counter)
  - Printed Tape
  - Data File for Computer Processing
Installing an ATR
ATR Manufacturers

- Diamond  www.diamondtraffic.com
- IRD  www.irdinc.com
- Jamar  www.jamartech.com
- Metro Count  www.metrocount.com
- Nu-Metrics  www.nu-metrics.com
- TimeMark  www.timemarkinc.com
- many others

Manual Counts

- A person observes or counts the traffic and records the information
  - classification count
  - occupancy count
  - pedestrian count
  - intersection count
Tips for Conducting Field Studies

• Choosing a Study Method
• Preparations
• Conducting the Study
• SAFETY
Manual Count Equipment

- lumber tally method
- tally counters
- electronic counterboards
- laptop computers
- videotape
Intersection Counts

• also called Turning Movement Counts or Driveway Counts
• used in intersection design, intersection control, signals warrants and signal timing
• in addition to counting vehicle movement, may also classify the vehicles and count pedestrians
• Intersection Turning Movement Diagrams
Workshop Problems

- **Good and Dusty Intersection**
  Peak Hour: 3:30 – 4:30 pm
  \[ \text{PHF} = \frac{281}{4 \times 77} = 0.91 \]

- **Somewhere Intersection**
  Peak Hour: 4:45 – 5:45 pm
  \[ \text{PHF} = \frac{2764}{4 \times 726} = 0.95 \]
“Dr. Sprouts, may I be excused? My brain is full.”