TRAFFIC ENGINEERING

Civil Engineering Department

Lecturer Sady Abd Tayh
Lecturer Rana Amir Yousif

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Adjustment For Periodic Counts

Expansion factors, used to adjust periodic counts, are determined either from continous count or from control countstations.

1. Hourly expansion factor (HEF) = $\frac{\text{total volume for 24 hr period}}{\text{volume for particular hour}}$

These factors are used to expand counts of durations shorter than 24 hr to 24-hr volumes, by multiplying the hourly volume for each hour during the count period by HEF, for that hour.

2. Daily expansion factors (DEF) = $\frac{\text{average total volume for week}}{\text{average volume for particular day}}$

These factors are used to determine weekly volumes from counts of 24 hr duration by multiplying the 24-hr volume by DEF.

3. Montly expansion factors (MEF) = $\frac{\text{AADT}}{\text{ADT for particular month}}$

The AADT for a given year may be obtained from ADT for a given month by multiplying this volume by MEF.

Example: A traffic engineer urgently needs to determine the AADT on rural primary road that has the volume distribution characteristics shown in Table 1, 2 and 3 and she collected the data shown in Table(4) on a Tuesday during the month of May. Determine the AADT of the rural road using expansion factors.

Hour	Volume	HEF	Hour	Volume	HEF
6:00-7:00 a.m.	294	42	6:00 - 7:00 p.m.	743	16.62
7:00-8:00 a.m.	426	29	7:00 - 8:00 p.m.	706	17.49
8:00-9:00 a.m.	560	22.05	8:00 - 9:00 p.m.	606	20.38
9:00-10:00 a.m.	657	18.8	9:00 - 10:00 p.m.	489	25.26
10:00-11:00 a.m.	722	17.1	10:00 - 11:00 p.m.	396	31.19
11:00-12:00 a.m.	667	18.52	11:00 - 12:00 p.m.	360	34.31
12:00-1:00 p.m.	660	18.71	12:00 - 1:00 a.m.	241	51.24
1:00-2:00 p.m.	739	16.71	1:00 - 2:00 a.m.	150	82.33
2:00-3:00 p.m.	832	14.84	2:00 - 3:00 a.m.	100	123.5
3:00-4:00 p.m.	836	14.77	3:00 - 4:00 a.m.	90	137.22
4:00-5:00 p.m.	961	12.85	4:00 - 5:00 a.m.	86	143.6
5:00-6:00 p.m.	892	13.85	5:00 - 6:00 a.m.	137	90

Total daily volume = 12350

Table(2): Daily expansion factors for rural primary road

Day of week	Volume	DEF
Sunday	7895	9.515
Monday	10714	7.012
Tuesday	9722	7.727
Wednesday	11413	6.582
Thursday	10714	7.012
Friday	13125	5.724
Saturday	11539	6.510
Total weekly Volume = 75122		

Table(3): Monthly expansion factors for a rural primary road.

Month	ADT	MEF	Month	ADT	MEF
Jan.	1350	1.756	Oct.	2500	0.948
Feb.	1200	1.975	Nov.	2000	1.185
Mar.	1450	1.635	Dec.	1750	1.354
Apr.	1600	1.481			
May	1700	1.394			
June	2500	0.948			
July	4100	0.578			
Aug.	4550	0.521			
Sept.	3750	0.632			

Total yearly volume = 28450
Mean Average daily volume = 2370

Table(4)

Hour		Volume
7:00 - 8:00	a.m.	400
8:00 - 9:00	a.m.	535
9:00 - 10:00	a.m.	650
10:00 - 11:00	a.m.	710
11:00 - 12:00	a.m.	650

Solution:

estimate the 24 hr volume for Tuesday using factors in Table (1) :

$$= \frac{400 \times 29 + 535 \times 22.05 + 650 \times 18.8 + 710 \times 17.1 + 650 \times 18.52}{5}$$

$$= 11959 \text{ vpd}$$

adjust the 24-hr volume for Tuesday to an average for the week using the factor given in Table (2)

$$\text{Total 7-day volume} = \frac{11959 * 7.727}{7} = 13201 \text{ vpd}$$

Since the data were collected in May, use the factor shown for May in Table (3) to obtain AADT :

AADT = 1320 × 1.394 = 18402 vpd

Traffic Volume Forcast

The design should include the expected future traffic for period range (15-20) years.

$F = (1 + \text{growth rate})^{\text{no. of years}}$

$F = (1 + i)^{n}$

Future = present * F

$\text{Future} = \text{present} \times (1+i)^{n}$

n : analysis period (design and construction life)

present : current volume.

i : growth factor rate (3-12)% in decimal.

Example : Design data is required for the improvement of two-way highway with central reverse. The current traffic 3000 veh/day in both directions. The improved road with a design life of 20 years, annual growth rate of traffic is (8%) and the construction periods is 5 years, K = 12% , D = 55%

Solutions:

$$\text{Future} = \text{present}\,(1 + \text{growth rate})^{\text{no. of years}}$$

$$= 3000\,(1 + 0.08)^{25} = 20400 \text{ veh/day.}$$

$$DHV = 20400 * 0.12 * 0.55 = 1346 \text{ veh/day}$$