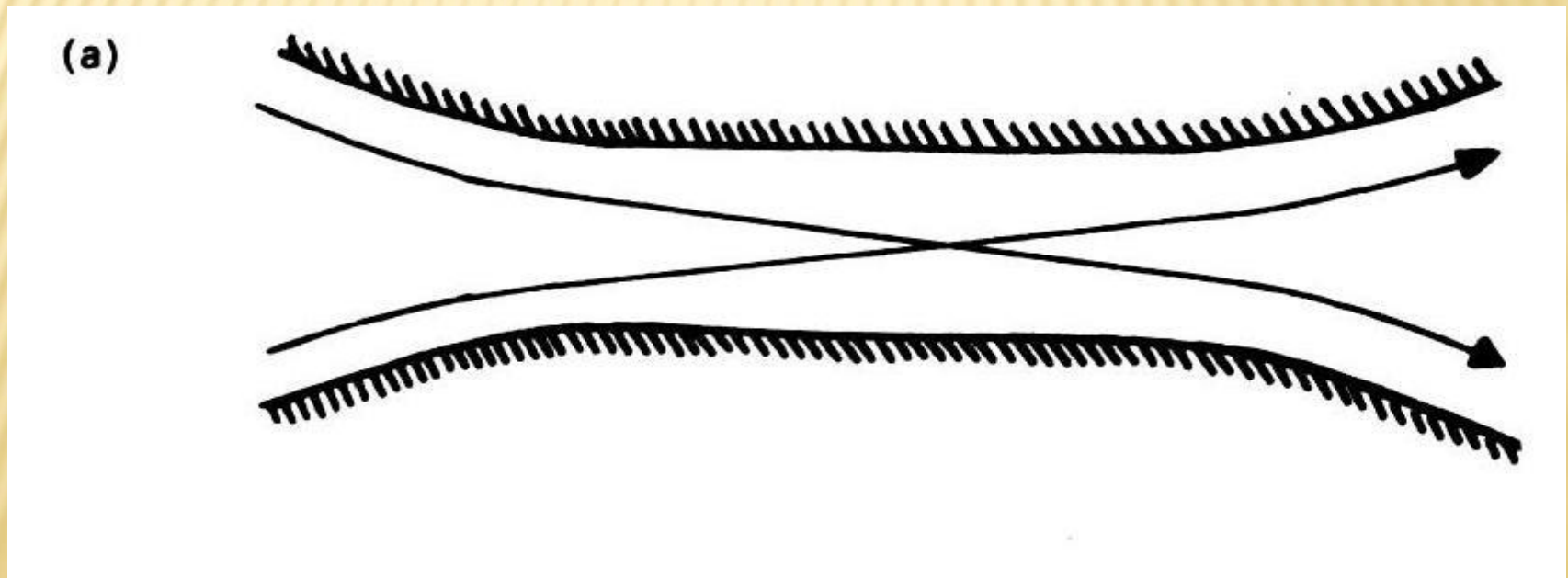


WEAVING ACTION OF HIGHER SPEED WEAVING SECTIONS

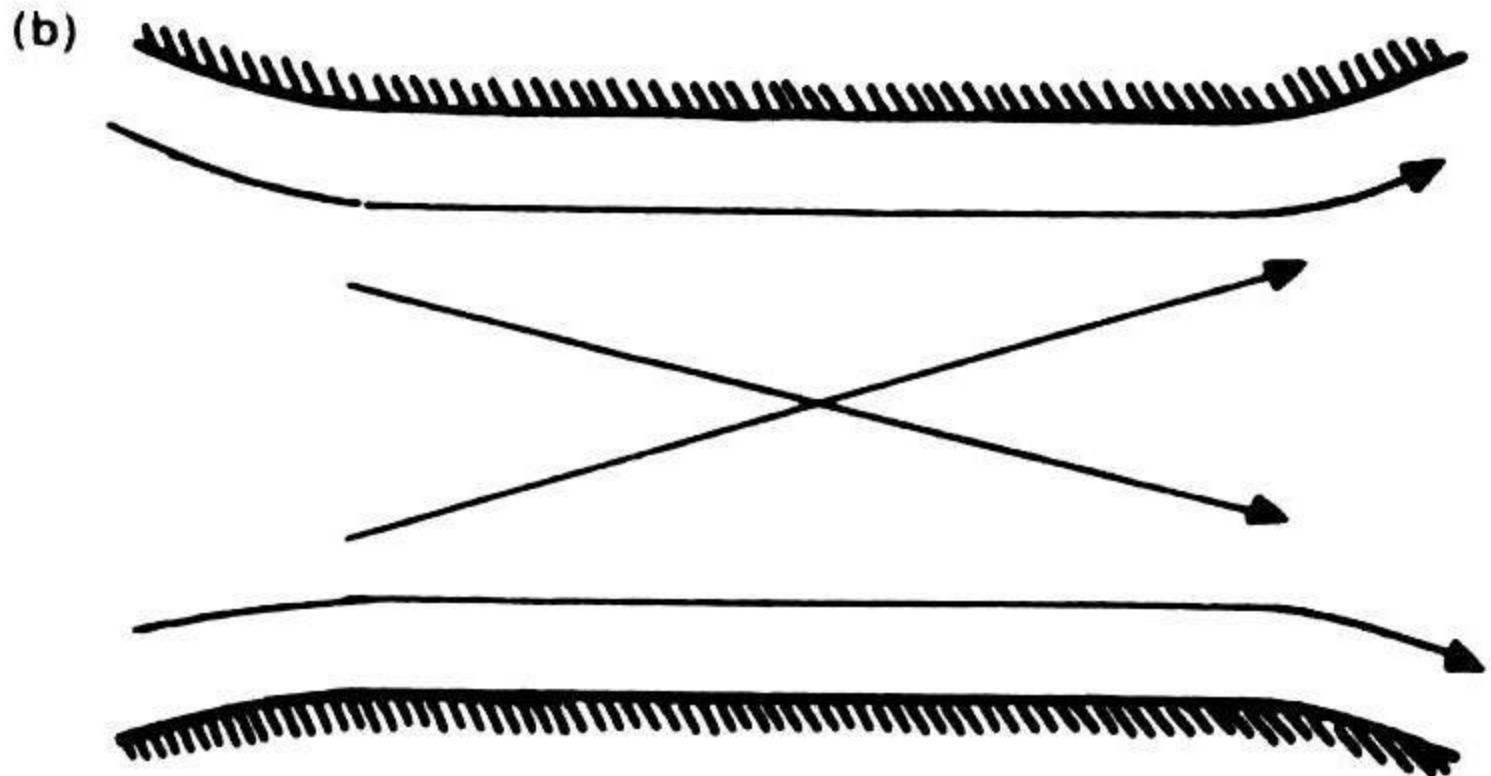
- Weaving is an action occurred when there are two or more streams of traffic merge / diverge at some length of the road then they diverge / merge at the end of that length. Such action take place in many highway situations in addition to rotary intersection. Also it is apparent in the staggered intersections, interchanges, and freeway sections. Therefore it is of considerable importance and should be carefully studied.

- ✘ There are several forms of weaving as defined by the Highway Capacity Manual
- ✘ (H. C. M) these are as follows:
- ✘ a) Simple weaving.



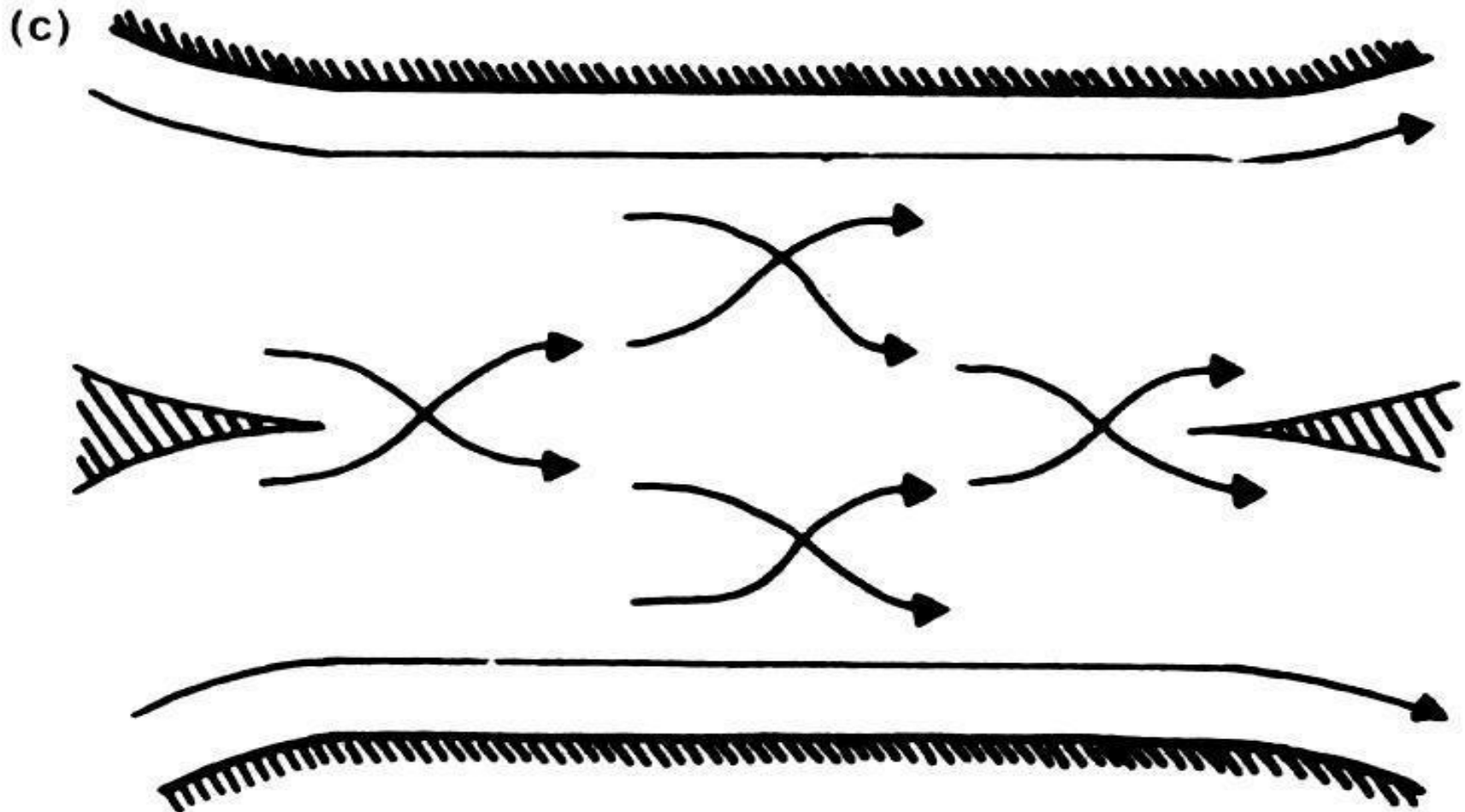
DUAL – PURPOSE WEAVING
WHEN TRAFFIC THROUGH A WEAVING SECTION
CONSISTS OF WEAVING TRAFFIC AND NON-WEAVING
TRAFFIC STREAMS.

B) DUAL – PURPOSE



C) MULTIPLE WEAVING.

TRAFFIC THROUGH A WEAVING SECTION
CONSISTS OF DIFFERENT WEAVING TRAFFIC
AND NON-WEAVING TRAFFIC.



The graph plots Total weaving traffic (p.c.u.) on the Y-axis (0 to 4000) against Length of weaving section (feet) on the X-axis (0 to 8000). A secondary X-axis at the top shows length in metres (0 to 2250). Curves are labeled I through V, corresponding to k values of 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 2.9, 3, and $k=3$. An inset diagram shows a weaving section of length L with N lanes. It defines traffic variables V_{01} , V_{w1} , V_{w2} , and V_{02} for different traffic flows.

- **Quality of flow**

- **Description of Operation**

- **I** Operating conditions and speeds approach those normally found under free-flow conditions without weaving. The effect of weaving is slight, if any. Speeds of 80 K. P. H or more are feasible.
- **II** Operating conditions and speeds are only slightly more restricted than under free-flow conditions. The effect of weaving is slight to normal. Speeds of 75 – 80 K. P. H. can be achieved.

- **III** Drivers affected by other vehicles in the stream to a greater extent than normal under free-flow conditions .
- Speeds of 65 – 75 K. P. H. can be maintained by weaving vehicles. Suitable for approach roads with operating speed of 80 K. P. H.
- **IV** Weaving vehicles can maintain operating speeds of about 50 – 60 K. P. H. Occasional slowdowns and restriction of maneuverability. Suitable for operating speeds not exceeding 65 K. P. H.
- **V** This level represents the capacity of the weaving section.

HOW TO GET THE NUMBER OF WEAVING LANES?

✗ the number of lanes required to accommodate the non-weaving flow is $(V^{o1} + V^{o2}) / SV$, where SV is the lane service volume. The formula for the total number of lanes thus becomes:

✗
$$N = \frac{V_{W1} + K.V_{W2} + V^{o1} + V^{o2}}{SV}$$

✗
$$SV$$

✗ If $V_{W1} + V_{W2} + V^{o1} + V^{o2} = V$ (the total volume),

✗ Then the above formula can also be written as:

✗
$$N = \frac{V + \sum(k-1) \times V_{W2}}{SV}$$

✗
$$SV$$

- For the weaving flow, the number of lanes is calculated using the same value of lane service volume, but the flow is taken as $V_w^1 + K.V_w^2$, where V_w^1 is the larger weaving volume, V_w^2 is the smaller weaving volume and K is a factor (weaving influence factor) having values from 1.0 to 3.0. These values are indicated in the family of curves in Fig. (8). The maximum value (3.0) is applicable to the shorter weaving sections.

Volume Weaving (Passenger cars per hour)	Minimum length of section (M)
500	300
1000	750
1500	1200
2000	1800

✖ Table (2) Values of Service Volume (S.V) for various quality flow levels

✖ Quality of flow Maximum lane SV value

✖ (Passenger cars / hr.)

✖ I 2.000

✖ II 1.900

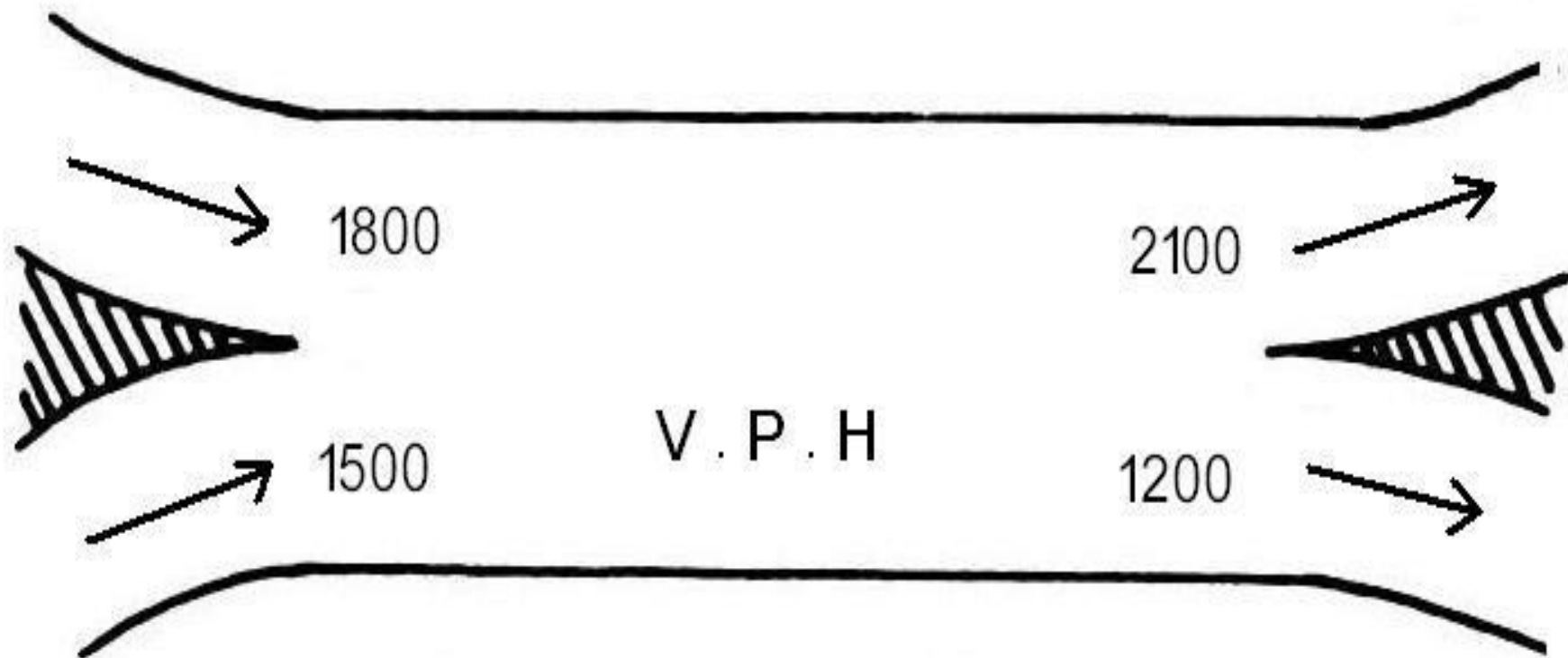
✖ III 1.800

✖ IV 1.700

✖ V 1.600

EXAMPLE (1)

- ✗ AB and CD are two rural sections of a highway intersecting with a weaving section. It is desired to provide a level of service B for traffic volumes indicated in the diagram below. The maximum service volume is 1000 passenger cars per hour per lane. Determine the minimum length and width of the weaving section.



$$\begin{array}{r}
 \text{Vo1} \quad 1400 \\
 \hline
 \text{V} \rightarrow 700 \\
 \text{V} \rightarrow 400 \\
 \hline
 \text{Vo2} \quad 800
 \end{array}$$

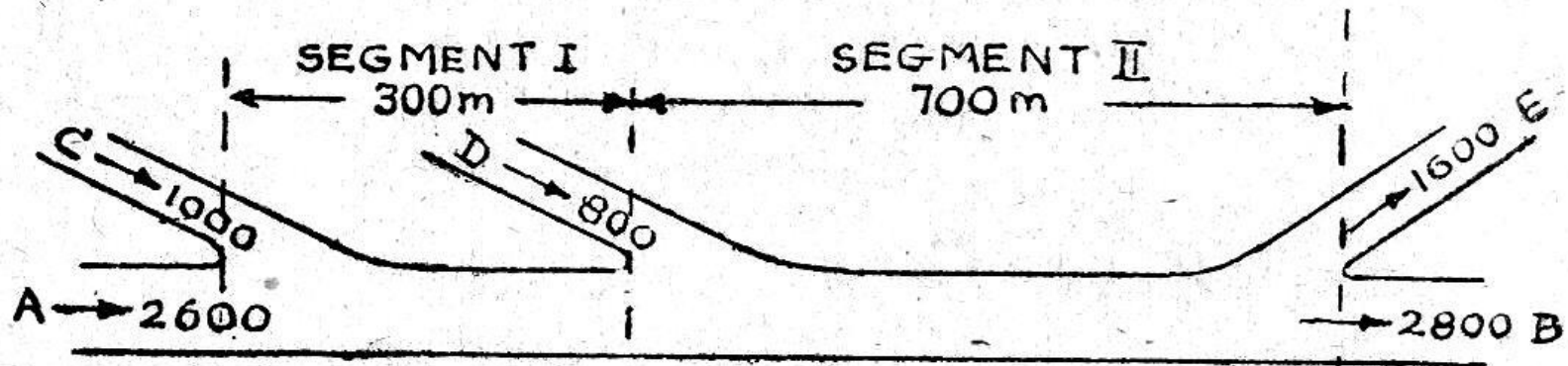
Solution. From Table (2) the level of service B corresponds to the quality of flow II.

- Total weaving volume
- = 700 + 400 = 1100 V.P.H.
- From Fig. (8), for a weaving volume of 1100 V. P. H. and Value of flow II, length of weaving section required is 450m.
- No. of lanes = $V + \sum (K - 1) V_w^2 / S.V$
- = $\frac{3300 + (2.6 - 1) 400}{1000}$
- = $(3300 + 640)/1000 = 3940/1000 = 3.94$
- Use 4 lanes.

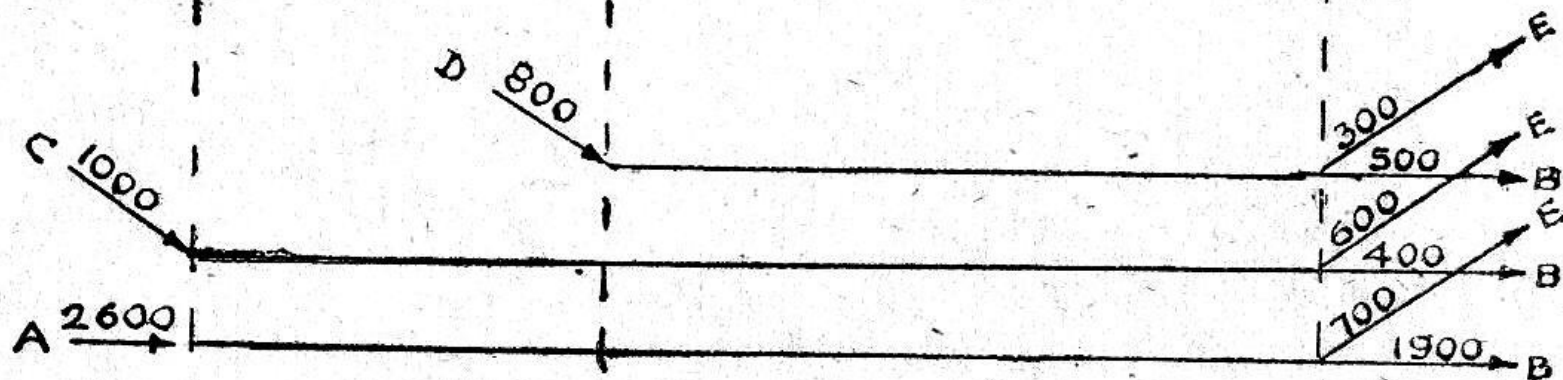
EXAMPLE (2)

- ✖ The following indicates the layout of a freeway having two entry ramps followed by an exit ramp. The weaving lengths of segment I and segment II are 300 and 700 m respectively. It is required to determine the number of lanes required for the weaving sections in segment I and segment II on the basis of level of service C and service volume of 1200 vehicles per hour per lane

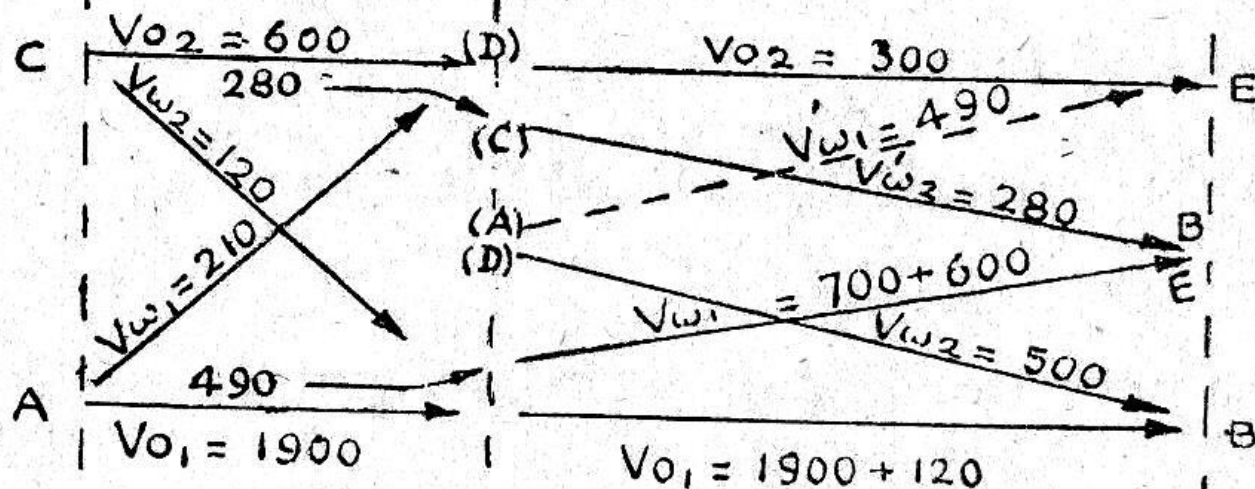
PLAN



OVERALL
WEAVING
DIAGRAM



INCREMENTAL
WEAVING
DIAGRAM



- **Solution:** The volume of weaving that can take place in both the segments is apportioned between the segments on the basis of their weaving lengths.
- The total weaving movement CB is 400 vehicles per hour and the total weaving movement AE is 700 vehicles per hour. These are apportioned between segments I and II as follows:
 - Segment I
 - Weaving movement CB
 - $= 400 \times 300/1000$
 - $= 120 \text{ V. P. H.}$
 - Weaving movement AE
 - $= 700 \times 300/1000$
 - $= 210 \text{ V. P. H.}$
 - Segment II

- ✖ Weaving movement CB
- ✖ $= 400 - 120$
- ✖ $= 280$ V. P. H.
- ✖ Weaving movement AE
- ✖ $= 700 - 210$
- ✖ $= 490$ V. P. H.
- ✖ The above weaving movements are indicated in the incremental weaving diagram in Fig. (9)
- ✖ It should be noted that in Segment II, the traffic which weaves with DB (500 V.P.H.) is $700 + 600$ V.P.H., 700 from A and 600 from C. This volume of 700 V.P.H. already contains 490 V.P.H.

From Table (12) level of service C corresponds to either II or III of quality of flow. From Fig. (8) For a total weaving volume of 330 V.P.H. (in Segment I), the length of the weaving section should be about 60 m for quality of flow II, which is satisfied. For a weaving length of 200 m and a weaving volume of 330 V.P.H., from the same figure $k = 1.8$

- No. of lanes,
$$N = \frac{V + \sum (k - 1) V_w^2}{SV}$$

- $= \frac{3600 + 0.8 \times 120}{1200}$

- $= \frac{3696}{1200}$

- $= 3.1 \text{ lanes.}$

- $= 3.1 \text{ lanes.}$

- $= 3.1 \text{ lanes.}$ Use 4 lanes.

- For Segment II, the total weaving volume is $700 + 600 + 500 + 280 = 2080 \text{ V.P.H.}$ From Fig. (8) For quality of flow II, the length of weaving should be at least 900 m, and for quality of flow III the minimum length should be 400 m, The available length of 700 m will

- therefore, give a quality of flow inter-mediate between II and III and is satisfactory. From the same Fig. (8) for a length of weaving 700 m and a weaving flow of 2080, $k = 2.9$. Similarly for a weaving flow of $490 + 280 = 770$ VPH and length of 700 m, $k = 1.0$.
- Total number of lanes =
$$\frac{V + \sum (k - 1) V_w^2}{SV}$$
-
- $$= \frac{4400 + 1.9 \times 500 + 0 \times 280}{1200}$$
-
- $$= \frac{5350}{1200} = 4.5$$

Provide 5 lanes