Problems:

AUTOMATED TRAFFIC MEASUREMENTS

1. If the vehicle 10% time occupied by loop M and 32% time occupied by loop N, the distance between two loops are 4.22 m find the spot speed of the vehicle. Also find the length of the vehicle if time occupancy for M - loop is 0.26sec and 0.32 for N-loop,
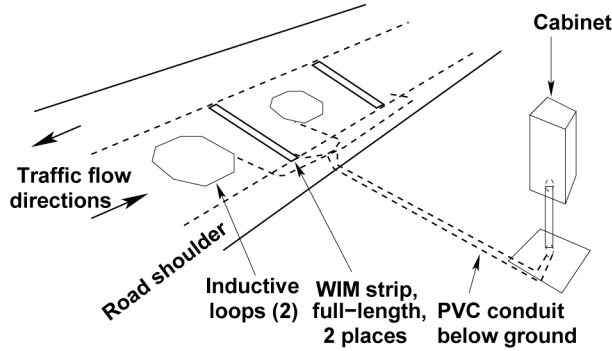

Figure 9:8: WIM installation with full-length piezoelectric sensors Source: FHWA vehicle detection manual [9]

Solution: Length is 4.22 m and occupancy times are 0.32 and 0.1

$$Speed = \frac{l_{dist}}{t_2 - t_1}$$
$$Spotspeed = (4.22)/(0.32 - 0.1) = 19.18 m/sec$$

For length calculation, the speed is 19.18 m/sec and occupancy times are 0.26 and 0.32

$$L_{vehicle} = \frac{Speed(ot_2 + ot_1)}{2}$$
$$L_{vehicle} = \frac{19.18(0.26 + 0.32)}{2} = 5.56m$$

2. The average length of vehicle is 4.25 m and the length of loop detector zone is 1.85 m. The time occupancy in the loop is 32 percentages, find the spot speed of the vehicle?

Solution: The average vehicle length is 4.25 and detector zone length is 1.85 m and t0 is 0.32

$$s = \frac{EVL}{t_o}$$
$$Spotspeed = \frac{4.25 + 1.85}{0.32} = 19.06 m/sec$$

3. In freeway 1500 vehicles are observed during 120 sec interval. The lane occupancy is 65 percentage and the average length of vehicle observed as 6.55 m. Find the space mean speed on the freeway section?

Solution: The number of vehicle N is 1500 vehicles; observation period is T= 120 sec. The lane occupancy O is 0.65 and average length is 6.55, so g is (40.9/6.55) substitute

$$
\begin{aligned}
s &= \frac{N}{T \times O \times g} \\
spacemeanspeed &= \frac{1500 \times 6.55}{120 \times 0.65 \times (40.9)} \\
&= 3.08 m/sec
\end{aligned}
$$