

①

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Question # 1

Given data :-

$$PHF = 0.92$$

$$\text{Target } V/c = 0.90$$

$$\text{All lanes} = 20 \text{ ft}$$

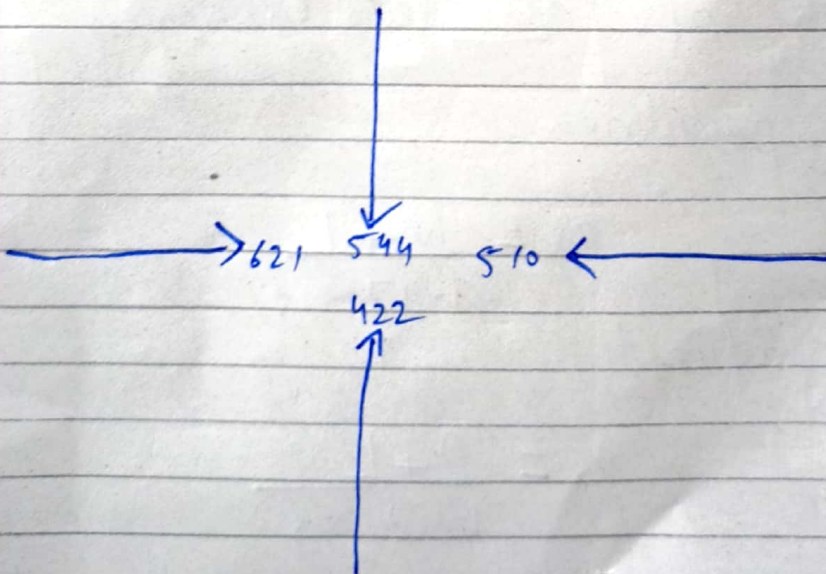
$$\text{Avg Speed} = 35 \text{ mph}$$

Level grades

$$\text{Crosswalks} = 10 \text{ ft}$$

$$\text{Driver reaction time} = 2.0 \text{ s}$$

$$\text{Deceleration rate} = 10 \text{ ft/s}^2 - 5 \text{ g}$$



2

Sol:

Determine yellow interval

$$Y = t + \frac{1.47 S_{85}}{2.9 + (64.4 \times 0.01G)}$$

As

$$S_{85} = 35 + 5 = 40 \text{ mph}$$

$$S_{15} = 35 - 5 = 30 \text{ mph}$$

$$Y = t + \frac{1.47 S_{85}}{2.9 + (64.4 \times 0.01G)}$$

$$Y = 2.0 + \frac{1.47 \cancel{S_{85}} \times 40}{2(10) + (64.4 \times 0.01 \times 0)}$$

$$Y = 4.945$$

Length of all red clearance

① No pedestrian

$$a_r = \frac{w + L}{1.47 S_{15}}$$

② Significant

$$a_r = \frac{P + L}{1.47 S_{15}}$$

③ Some pedestrian

$$a_r = \max \left[\left(\frac{W+L}{1.47 S_{15}} \right), \left(\frac{P}{6.45 S_{15}} \right) \right]$$

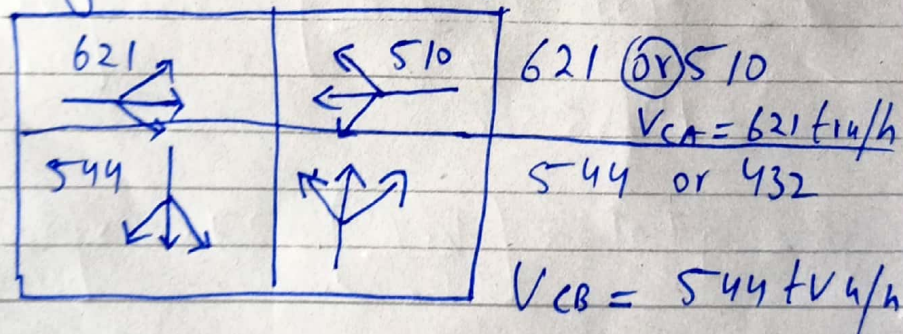
$$S_{85} = 35 + 5 = 40 \text{ mph}$$

$$S_{15} = 35 - 5 = 30 \text{ mph}$$

$$a_r = \frac{W+L}{1.47 S_{15}} = \frac{35+15}{1.47 \times 30} = 1.133 \text{ sec}$$

$$a_r = \frac{P}{1.47 S_{15}} = \frac{40}{1.47 \times 30} = 0.90 \text{ sec}$$

Ring 1 - Ring 2



$$V_c = 621 + 544 = 1165 \text{ ft/h}$$

$$Y = Y + a_r = 4.94 + 1.133 = 6.07 \text{ sec}$$

$$l_2 = Y - e = 6.07 - 2.0 = 4.07 \text{ sec}$$

$$l_c = l_2 + l_1 = 4.07 + 2.0 = 6.07 \text{ sec}$$

$$L = 6.07 + 6.07 = 12.14 \text{ sec}$$

4

Cycle length

$$C_{des} = \frac{L}{1 - \left(\frac{V_c}{1615} \times PHF \times V/C \right)}$$

$$= 12.14$$

$$1 - \left(\frac{1165}{1615 \times 0.92 \times 0.9} \right) = 94.26 = 95\% \text{ sec}$$

Also

$$g_i = g_{TOT} + \left(\frac{V_{ci}}{V_c} \right)$$

$$= 40 - 12.14$$

$$= 27.86 \text{ sec}$$

$$g_A = g_{TOT} \times \left(\frac{V_{cA}}{V_c} \right) = 27.86 \times \left[\frac{621}{1165} \right]$$

$$= 14.85 \text{ sec}$$

$$g_B = g_{TOT} \times \left[\frac{V_{cB}}{V_c} \right] = 27.86 \times \left[\frac{544}{1165} \right]$$

$$= 13.00 \text{ sec}$$

Check

$$14.85 + 13.00 + 12.14 = 39.995$$

is cycle length.

Question # 2

Discuss and draw different types of traffic signs?

Ans.)

Traffic Signs :-

The MUTCD provides specifications and guidelines for the use of literally hundreds of different purposes, in general, traffic signs fall into one of three major categories:

* Regulatory Signs :-

Regulatory signs convey information concerning speed traffic regulations. Regulations may relate to right-of-way, speed limits, lane usage, parking or a variety of other functions.

* Warning Signs :-

Warning signs are used to inform drivers about upcoming hazards that they might not see or otherwise discern in time.

to safely react.

* Guide Signs :-

Guide Signs provide information on routes, destinations, and services that drivers may be seeking.

Regulatory Signs :-

* Regulatory Signs Affecting right of way.

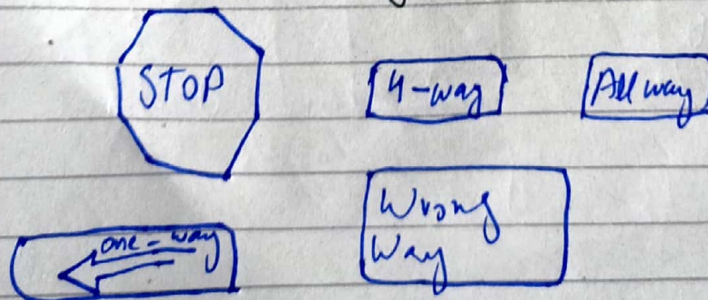
* Speed limits signs.

* Turn prohibition sign.

* Lane - Use Signs.

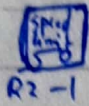
* Parking Control Signs.

Regulatory Signs Affecting right of way :-



7

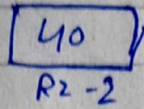
Regulatory Signs :- (Speed Limits Signs)



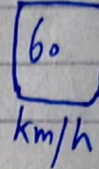
R2-1



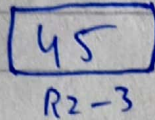
80
km/h



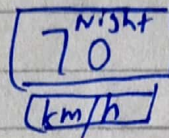
40
R2-2



60
km/h

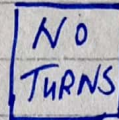
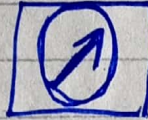


45
R2-3

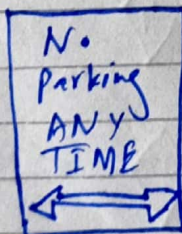


NIGHT
70
km/h

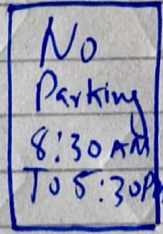
Regulatory Signs (Turn Prohibition Signs)



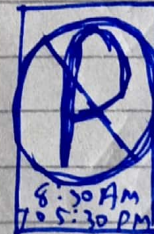
Regulatory Signs (Parking Control Signs)



R 7-1



R 7-2

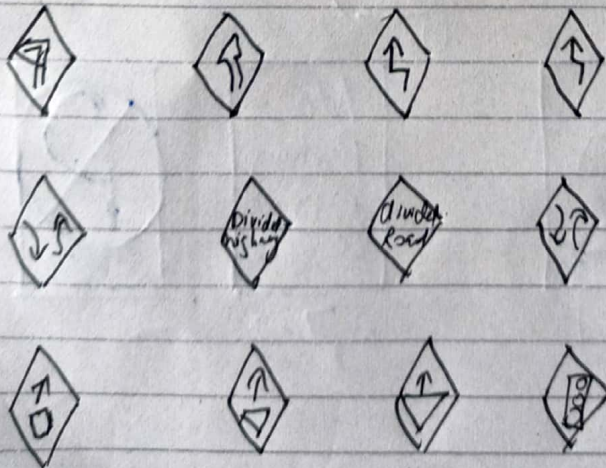


8:30 AM
TO 5:30 PM

Warning Signs:-

- * Changes in horizontal alignment
- * Intersections
- * Advance warning of control devices.
- * Converging traffic lanes.
- * Narrow roadways
- * Changes in highway design.
- * Grades.
- * Roadway Surface Conditions

Warning Signs:-



Question # 3

Discuss Road Margins?

Ans) Road Margins :-

The portion of the road beyond the carriageway and on the roadway can be generally called road margin. Various elements that form the road margins are given below.

- ① Shoulders
- ② Parking lanes
- ③ Bus bays
- ④ Service roads
- ⑤ Cycle track.
- ⑥ Footpath
- ⑦ Guard Rails.

Shoulders :-

Shoulders are provided along the road edge and is intended for accommodation of stopped vehicles, serve as an emergency lane for vehicles and provide lateral support for base

and surface courses. The shoulder should be strong enough to bear the weight of a fully loaded truck even in wet conditions.

* The shoulder width should be adequate for giving working space around a stopped vehicle. It is desirable to have a width of 4.6 m for the shoulders. A minimum width of 2.5 m is recommended for 2 lane rural highways.

② Parking lanes :-

* Parking lanes are provided in ~~urb~~ urban lanes for side parking. Parallel parking is preferred because it is safe for the vehicles moving on the road. The parking lane should have a minimum of 3.0 m width in the case of parallel parking.

③ Bus-bays :-

Bus-bays are provided by recessing the kerbs for the bus stops. They are provided so that they do not obstruct the movement of vehicles in the carriage way. They should be at least 75 m away from the intersection so that the traffic near the intersections is not affected by the bus-bay.

④ Service roads :-

Service roads for frontage roads give access to controlled highways like freeways and expressways. They run parallel to the highway and will be provided only at selected points.

* These roads are provided to avoid congestion in the expressways and also the speed of the traffic in those lanes is not reduced.

Cycle track :-

Cycle tracks are provided in urban areas when the volume of cycle traffic is high. Minimum width of 2 m is required which may be increased by 1 meter for every additional track.

6) Footpath :-

Footpaths are exclusive right of way to pedestrians, especially in urban areas. They are provided for the safety of the pedestrian traffic and vehicular traffic is high. Minimum width 1.5 meter and may be increased based on the traffic. The footpath should be either as smooth as the pavement or more smoother than that to induce the pedestrian to use the footpath.

Guard Rails :-

They are provided at the edge of the shoulder usually when the road is on an embankment.