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ID

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SECTION

"A"

SEMESTER

6<sup>th</sup> (completed)

SUBJECT

Transportation Engineering

SUBMITTED ~~BY~~ TO

Engr, Hamza

DATE

19/08/2020

Q No - 1

## GIVEN DATA:-

- ★ PHF = 0.92
- ★ Target  $V/c$  = 0.90
- ★ All lanes = 20 ft
- ★ Avg. speed = 35 mph
- ★ Crosswalk = 10 ft
- ★ Driver reaction time = 2.0 s
- ★ Deceleration rate =  $10 \text{ ft/s}^2$

## Required :-

Design the ~~of~~ signalized intersection having moderate pedestrian activity.

**Solution :-**

\* Calculate yellow interval for phase 1:

$$Y_1 = t + \frac{1.47 S_{85}}{2a + (64.4 \times 0.14)}$$

$$\Rightarrow S_{85} = 5 + 5 \Rightarrow 35 + 5$$

$$S_{85} = 40 \text{ mph}$$

$$Y_1 = 200 + \frac{1.47 \times 40}{2(10) + (64.4 \times 0.1 \times 20)}$$

$$Y_1 = 4.95$$

\* Calculate yellow interval for phase 2.

$$Y_2 = t + \frac{1.47 S_{85}}{2a + (64.4 \times 0.14)} \quad \begin{array}{l} S_{85} = 5 + 5 \\ = 45 + 5 \end{array}$$

$$Y_2 = 2 + \frac{1.47 (50)}{2(10) + (64.4 \times 0.1 \times 20)} \quad S_{85} = 50$$

$$J_0 = 5.67s$$

The yellow interval phase 1 and phase  
4.8s and 5.67s

⇒ Calculate the red interval phase 1

$$a_r = \frac{w+l}{1.47s_1}$$

$$S_{15} = 5 - 5$$

$$S_{15} = 35 - 5$$

$$S_{15} = 30 \text{ mph}$$

$$a_r = \frac{30 + 20}{1.47 \times 30}$$

$$a_r = 1.13 \text{ sec}$$

$$a_{r1} = \frac{P}{1.47 \times 815} = \frac{40}{1.47 \times 30} = 0.9$$

⇒ Calculate red interval for phase 2

$$S_{15} = 45 - 5 = 40 \text{ mph}$$

$$a_{r2} = \frac{12 + 20}{1.47 \times 40} = \boxed{0.54s}$$

The red interval for phase 1 & 2 are

1.13s and 0.54s

⇒ Calculate the total lost time per cycle.

$$L = y_1 + y_2 + a_{r1} + a_{r2}$$

$$L = 4.8 + 5.67 + 1.13 + 0.54$$

$$L = 12.24s$$

Calculate the cycle time using following formula

$$C_1 = \frac{L}{1 - \left[ \frac{V_c}{1615 \times PHF \times \frac{V}{C}} \right]}$$

$$C_1 = \frac{12.24}{1 - \left[ \frac{924}{1615 \times 0.92 \times 0.9} \right]}$$

$$C_1 = 39.6 \approx 40s$$

Calculate the maximum Green time for Phase 1 using formula

$$g_1 = (C - L) \times \left( \frac{V_1}{V_c} \right)$$

$$g_1 = (40 - 12.24) \left( \frac{470}{924} \right)$$

$$g_1 = 14.125$$

Calculate the maximum green time for phase 2 by formula.

$$g_2 = (C - L) \times \left( \frac{V_{cr}}{V_c} \right)$$

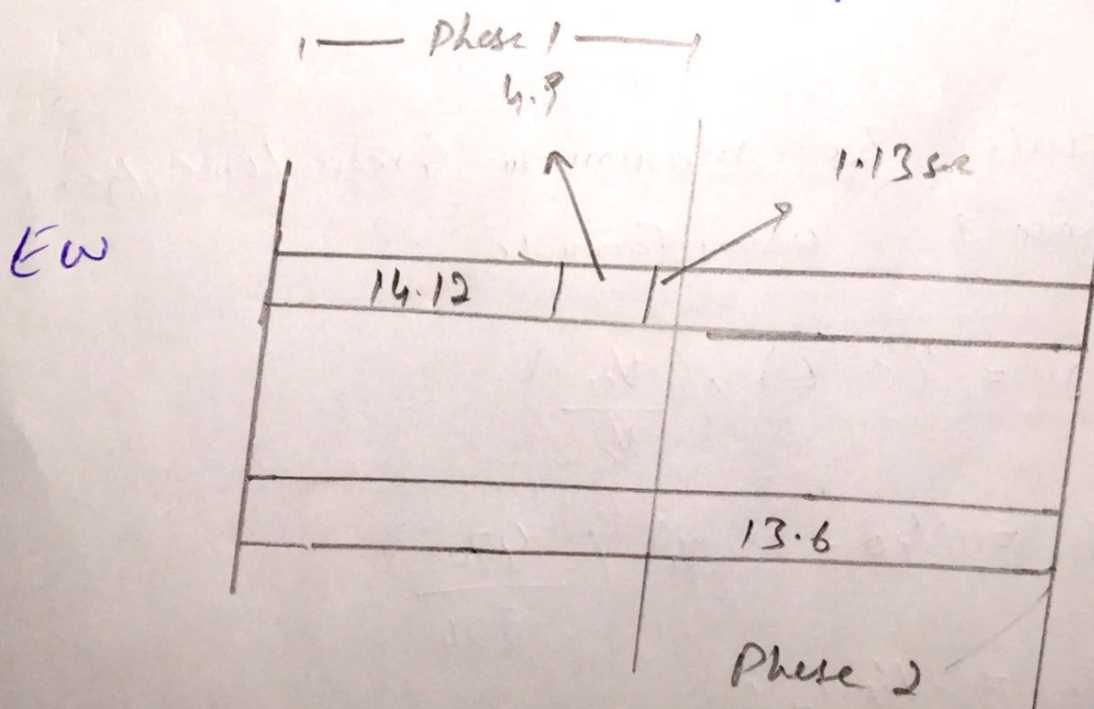
$$g_2 = (40 - 12.24) \left( \frac{454}{924} \right)$$

$$g_2 = 13.65$$

$$\text{Check} = g_1 + g_2 + L$$

$$= 14.12 + 13.6 + 12.24$$

$$= 39.96 \approx 40 \text{ Cycle length.}$$



QNo = 02 :- Discuss and Draw different types of Traffic signs marks.

## Traffic Signs Marks :-

Traffic signs are signs erected at the side of roads or above the roads to give instructions or provide information to road users.

The earliest signs were simple wooden or stone milestones. Later, signs with directional arrows were introduced.

For example, the fingerposts in the United Kingdom and their wooden counterparts in many

⇒ The MUTCD provides specification and guidelines for the use of literally hundreds of different signs for different purposes



# TYPES of Traffic Sign marks :-

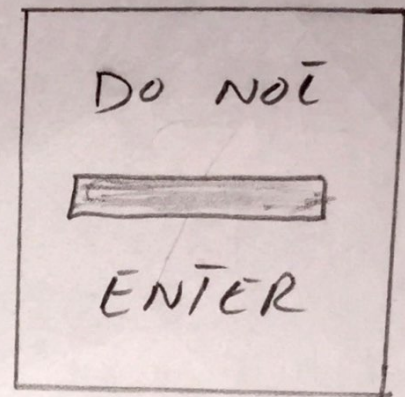
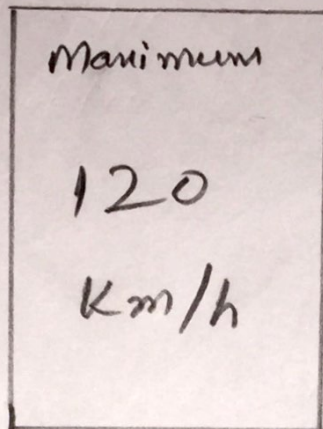
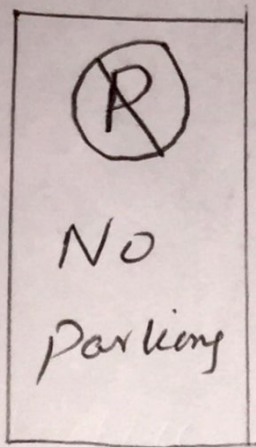
In general, Traffic sign types are given.

## 1) Regulatory signs :-

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

Regulatory sign usually black and white but some time in red and white, there are the Rules of road.

These are the stop and do not enter sign. The ones which communicate the message with little or no text. You know them, you obey them.



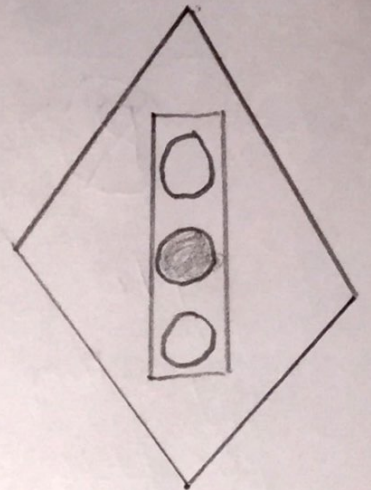
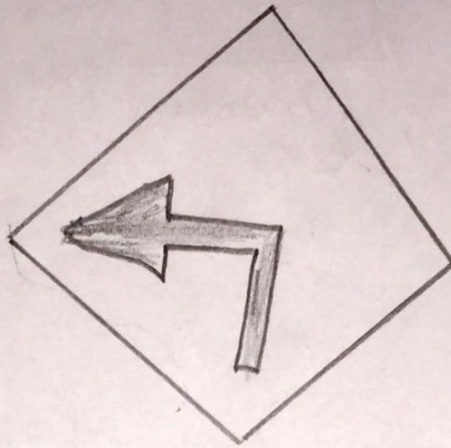
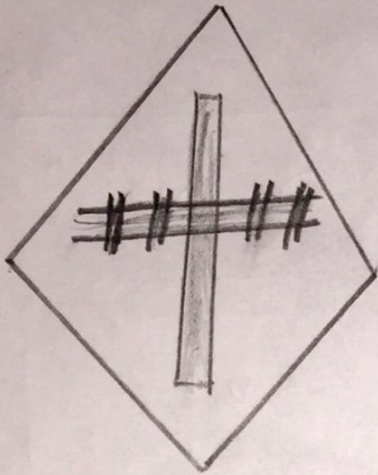
## 2) Warning Signs :-

These signs are designed to call attention to potentially hazardous or dangerous conditions adjacent to a roadway. They say

"Hey! Watch out for this" in not so many words.

Warning signs are yellow with black information

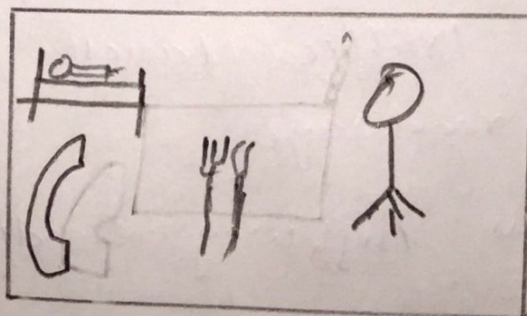
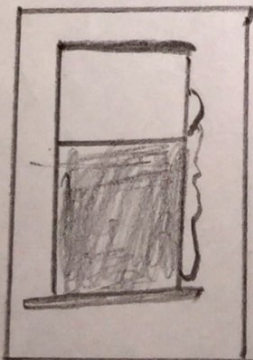
- changes in horizontal alignment
- intersection
- Advance warning of central devices
- converging traffic lanes
- narrow roadways
- changes in highway conditions.



### 3) Guide Signs:-

Guide sign show you

- ⇒ Route markers and mileposts
- ⇒ Destination sign
- ⇒ Recreational and cultural - interest Guide sign
- ⇒ Service Guide signs
- ⇒ Emergency services information display
- ⇒ Usually on a green background and white writing.



Q No - 3 Discuss Road Margins.

### Road Margins :-

⇒ Road margins are the various cross sectional elements of the road except the carriageway or pavement width.

OR.

⇒ 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 :-

Shoulder are provided along the road edge and is intended for accommodation of stopped vehicles, serve as an emergency lane for vehicles and provide lateral supports for base and surface courses. The shoulders should be strong enough to bear the weight of fully loaded truck.

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

### d) Parking Lanes :-

Parking lanes are provided in 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 minimum 3.0m width in the case of parallel parking.

### 3) Bus - bays :-

Bus bays are provided by recessing the kerbs for bus stops. They are provided so that they don't obstruct the movement of vehicles in the carriage way. They should be at least 75 meters away from the intersection so that the traffic near intersection

is not affected by the bus-bay.

#### 4) Service roads:-

Service road gives access to controlled highways like freeway and expressway. They run parallel to the highway and will be usually isolated by a separator and access to the highway 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 lanes is not reduced.

#### 5) Cycle Track :-

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

## 6) Footpath :-

Footpaths are the smoothly paved paths used by the pedestrians to walk parallel to the pavements. Footpaths are smoothly surface in order to attract the pedestrians to walk over them.

Footpaths are necessary where pedestrian traffic is considerable.

## 7) Guard rails :-

They are provided at the edge of the shoulder usually when the road is on an embankment. They serve to prevent the vehicles from running out of the embankment, especially when the height of the embankment exceed 3m. Various designs of guard rails are there.

Guard stones painted in alternate black and white are usually used. They also give better visibility of curves at night under headlights of vehicles.