

Traffic Engineering Vehicular characteristics: The design of geometric elements of a highway is affected by vehicular characteristics :-

- ☒ Width of vehicles affects on width of roadway (lanes), shoulder and parking.
- ☒ Length of vehicles affects on radius of horizontal curves, widening of curves, minimum turning, road capacity, sight distances, .. etc.
- ☒ Height of vehicles affects on the clearance providing under bridges and tunnels.
- ☒ Weight of vehicles affects on the thickness of layers of the road.

2 Vehicle dimension Particulars Maximum dimension Width maximum of truck or bus 2.44 m Height a)Single-deck vehicle 3.81 m b)Double-deck vehicle 4.72 m Length a)Single-deck vehicle 10.67 m b)single with more than two axles 12.19 m c)Tractor and trailer combination 15.24 m weight a)Unit of axels-maximum axle load 8.165 T b)Any vehicle or combination of vehicles of width less than 2.44 m 1.415 T c)If width greater than 2.44 m then  $W=1525(L + 7.3) - 14.7 L^2$  For each vehicle Vehicular characteristics: 4

EXAMPLE: Determine the weight of a single vehicle of width 2.44 m. Solution; From table  $L = 12.19$  m Therefore,  $W = 1525 ( 12.19 + 7.3 ) - 14.7 (12.19)^2 = 27538$  kg

Level of service ● To classify the different conditions of traffic flow on a highway, a term called (level of service) There are 6 level of service which are affecting by the following factors: a) Speed and travel time. b) Freedom to maneuver. c) Traffic restriction. d)Driving comfort and convenience. e)Safety and rate of accidents. f)User cost.

5 Cont. Level of service (It has nationally agreed that level of services can be classified as) I. Level ( A ) There are free flow, high speed, low density, little or no delays and driver are free to maneuvers. II. Level ( B ) Flow is stable, speed begin to be restricted but still high, and driver still have degree of freedom but less than in level (A). III.Level ( C ) Flow still in the stable zone, most of the drivers are restricted and satisfactory speed are possible to obtained. This level is reasonable for urban design

6 Cont. Level of service I. Level ( D ) Low speeds than in the above levels, flow approaches the unstable zone, little degree of freedom and little comfort and convenience. II. Level ( E ) Low speeds than in the above levels& flow approaches the unstable. III.Level ( F ) Forced flow , very low speeds and volume much than capacity. Flow in the form of queues.

7 Cont. Level of service level of service Type of flow Traffic volume/capacity for 3-lanes 2- way highway

|            |             |
|------------|-------------|
| A Free     | $\leq 0.40$ |
| B Stable   | $\leq 0.58$ |
| C Stable   | $\leq 0.80$ |
| D Unstable | $\leq 0.90$ |
| E Unstable | $\leq 0.95$ |
| F Forced   | $\leq 1.00$ |

8 Cont. Level of service 9 Factor Affecting Capacity and Volumes 1.

Gradient:The longitudinal slopes of a roadway are effecting on: a) Sight distance and hence efficiency. b) Safe headways which are greater than calculated on down hills while on up hills it while be less. c) Speeds of vehicles and trucks which will be slower than the design speed on up grades.

2. Traffic composition: To avoid any reduction in speeds or volumes, trucks and buses are converted into passenger car units as follow.

|                                 |                  |                                       |
|---------------------------------|------------------|---------------------------------------|
| Vehicle                         | Level of service | Equivalent Factor                     |
| Level I Rolling Mountain Trucks | A                | 3.4                                   |
|                                 | B-C              | 2.5                                   |
|                                 | 5                | 10                                    |
| Buses                           | D-F              | 2.5                                   |
|                                 | 12               | All Levels                            |
|                                 | 2                | 4                                     |
|                                 | 6                | Factor Affecting Capacity and Volumes |

3. Reduced lanes width: If the width of the lane is reduced than the standard width (3.65 m) .a reduction in capacity and service volume is anticipated.

4. Lateral clearance (width of shoulder): Any obstruction must be less than (1.83 m) at least apart from the edge of the roadway. If this distance is less, a reduction in volume and capacity is occurred.

Traffic control devices: which are usually employed for the control of traffic, consist of: 1) Pavement markings. 2) Traffic markers 3)Traffic signs 4) Traffic signals.

12 1) Pavement markings 13 2)Traffic markers a. hazard markers b. delineators 18 3) Traffic signs. a. Regulatory b. warning c. guide signs. 19 4)Traffic signals