

CHAPTER 3

VEHICULAR TRAFFIC

3-1. Effect on Pavement Design.

Pavement thickness is determined from anticipated traffic data which include types, distribution, and loadings of vehicles. Types include cars, light and heavy trucks, tanks, and forklifts. Distribution covers the average daily volume of each type of vehicle which, in turn, determines the total volume of traffic anticipated during the design life of the pavement. Vehicle loadings include maximum single- and tandem-axle pneumatic-tire loads and gross weight of the heaviest tracked vehicle. For most pavements, the magnitude of the axle load is of greater importance than the gross weight of pneumatic-tired vehicles. Thus, for the case of pneumatic-tired vehicles having equal axle loads, the increased severity of loading imposed by conventional four- or five-axle trucks as compared with that imposed by two- or three-axle trucks is largely a fatigue effect resulting from an increased number of load repetitions per vehicle operation. For forklift trucks where the loading is concentrated largely on a single axle, the severity of the loading is a function of the gross weight of the vehicle and the frequency of loading. For tracked vehicles where the loading is evenly divided between the two tracks and nearly evenly divided among the bogies, the severity of the track loading is a function of the gross weight of the vehicle, number of bogies, and the frequency of loading. In pavement design, one operation of a single axle is one stress application for both flexible and rigid pavements, but one

operation of a tandem axle is one stress repetition in a rigid pavement and is more than one stress repetition in a flexible pavement. For instance, for one operation of a tandem-axle dual-wheel load, it is one stress repetition in a rigid pavement and two stress repetitions in a flexible pavement. Relations between load repetition and required pavement thickness developed from accelerated traffic tests of full-scale pavements have shown that, for any given vehicle, increasing the gross weight by as little as 10 percent can be equivalent to increasing the volume of traffic by as much as ~00 to 400 percent. On this basis, the magnitude of the vehicle loading must be considered as a more significant factor in the design of pavements than the number of load repetitions.

3.2 Vehicle Representative Configurations.

For determining pavement design requirements, vehicles have been divided into three general groups. They are pneumatic-tired vehicles (cars, trucks, buses, etc.) tracked vehicles, and forklift trucks (including both solid and pneumatic tires). Each group has been divided into representative load configurations, and table 3-1 shows data for these representative configurations.

3-3. Traffic Evaluation.

Procedures for the evaluation of future traffic and determination of a design index are contained in TM 5-822-2-AFM 88-7, Chap. 5.

Table 3-1. Representative Configuration Data.*

<u>Configuration</u>	<u>Load Range kips</u>	<u>Tire or Grouser Contact Area sq in.</u>	<u>Average Tire Width** in.</u>	<u>Average Wheel Spacing† in.</u>
<u>Passenger Cars, Trucks, Buses, etc.</u>				
Pneumatic tires				
Single axle, single wheels	0-5	39	7.5	62.0
	5-10	42-46	9.5	72.0
Single axle, dual wheels	0-10	46-50	9.0	70.0†
	10-20	46-50	9.6	72.0
	20-30	46-50	10.5	72.0†
Tandem axle, single wheels††	0-10	50	7.5	72.0
	10-15	50	10.0	76.0
Tandem axle, dual wheels††	10-15	50	7.5	67.5
	15-20	50	11.0	72.0†
	20-50	50	12.0	72.0
<u>Forklift Truck</u>				
Pneumatic tires				
Single axle, dual wheels	10-35	--	7.5	72.0
Solid rubber tires				
Single axle, single wheels	0-5	19-42	5.0	28.0
	5-10	19-42	6.0	28.0
	10-20	19-42	7.0	28.0
<u>Tracked Vehicles</u>				
Solid rubber grousers (cleat)	0-20	28	15.0	64.0
	20-35	28	16.0	83.0
	35-50	--	16.0	99.0
	50-70	54	19.0	100.0
	70-120	54	23.0	110.0

*Based on characteristics of military vehicles.
 **Width of track for tracked vehicles.
 †Distance between center lines of single wheels or tracks; distance between center lines of dual wheels.
 ††Wheel spacings are 13-1/2 × 58-1/2 × 13-1/2. Tandem-axle spacing is 48 inches.