figures. The real question, however, is how hard is the average worker prepared to work in order that he may achieve the luxury of owning his own car. It is thought that the only real difference is that of time, and that as more young people grow up in association with cars, so more will strive to own them. The final factor to be taken into consideration is the potential national resources in relation to population. This factor has a good deal of speculation associated with it. Today's indications are that we lag behind America, but that position could be reversed.

After considering these factors, it has been assumed that when the population of Melbourne reaches 2,500,000 Victorian vehicle registrations (including all motor vehicles except motor cycles) will have reached 350 for each 1,000 persons which is slightly lower than the American figure today. After allowing for the greater proportional registrations in the country compared with the metropolitan area, and the normal proportion of commercial vehicles, this figure is equivalent to an average of 230 cars and utility trucks for each 1,000 persons in the metropolitan area, or just less than one for each family.

The effect of this assumption is that in the period for which we are planning, the total number of metropolitan vehicles will increase to 736,000 compared with the total of 211,000 in 1951. Thus the overall traffic will increase to about $3\frac{1}{2}$ times that of today. It will be spread over a large area, however, and the increase on routes approaching the city will be somewhat less than the increase in proportion to registrations.



61 ACTUAL TRAFFIC AND CALCULATED TRAFFIC

Table 88

ESTIMATED DISTRIBUTION OF POPULATION, RESIDENT WORKERS, EMPLOYMENT AND NUMBER OF CARS GARAGED FOR A POPULATION OF 2,500,000

Sub- division	Desident	Pasidant	Number	Cars and UtilityTrucks			
	Population (1,000)	Workers (1,000)	of Jobs (1,000)	Total Garaged (1,000)	Per 1,000 of Population		
1(a)	5	5	261.7	5	5		
1(b)	150	85.8	224.2	24.4	162.7		
2	100	53.4	57.7	16.2	162.0		
3	210	103.0	109.1	44.2	210.5		
4	315	150.0	69.1	72.7	230.8		
5	235	112.1	72.9	52.2	222.1		
6	317	145.1	48.5	73.3	231.2		
7	272	117.5	52.0	70.4	258.8		
8	134	73.1	37.5	29.8	222.4		
9	141	66.1	28.4	41.5	294.3		
0	230	102.1	82.5	56.4	245.2		
$\mathbf{X}_{\mathbf{c}}$	175	77.4	69.3	43.5	248.6		
Xs	110	46.8	24.1	23.1	210.0		
$\mathbf{X}_{\mathbf{n}}$	41	17.6	13.0	10.2	248.8		
Total	2,430	1,150	1,150	557.9	229.6		

Distribution of Future Traffic

To permit estimates being made of the principal movements of future traffic throughout the metropolitan area, the estimates of Table 88 were made for each of the subdivisions used in the statistical survey. The population figures were based on the areas zoned for residential purposes in the planning scheme and the planned population densities, and it has been assumed that the number of resident workers in each municipality will bear the same relation to the resident population as at present. In distributing employment, an analysis was made of the existing distribution of each of eight occupational groups. The effect of the proposed zoning on each of these groups has been taken into consideration. It has also been assumed in the distribution of employment that the number of central area workers, which in proportion to population would be about 300,000, will not exceed 262,000 as the result of decentralisation of some central area activities. The distribution of future "cars garaged" has been related to the existing distribution with a tendency for a levelling out over the whole area as car use increases.

Future Traffic to and from Central Area: The estimated total future traffic to and from the central area has been based on the assumption that the ratio of traffic generated by each central area job in the future will be in proportion to the over-all motor vehicle increase per head of population, and that the distribution of future central area traffic will follow the same laws as at present. For the basic figures



62 PRINCIPAL TRAFFIC MOVEMENTS 1951

of Table 88 traffic between the central area and any suburban area may be expressed by the formula:

$$T_c = 0.18 W + 0.28 J$$
 (4)

where the symbols have the same meaning as in formula (2).

Future Inter-suburban Traffic: The estimate of the total future inter-suburban traffic is based on the previous assumption that the total traffic (city and suburban) at any time will be in proportion to the total number of vehicles registered at that time. The distribution of inter-suburban traffic has been assumed to follow the laws established for present-day traffic. For the basic figures shown in Table 88 and using the same symbols as formula (3), the future traffic between two suburban areas A and B was taken as being expressed by the formula:

$$T_{s} = \frac{J_{a} J_{b}}{85,000 D^{1.5}} + \frac{J_{a} V_{b} + J_{b} V_{a}}{63,000 D^{1.5}}$$
(5)

Traffic computed from the above formula is shown in diagram 63 and Table 89.

The estimated total movements between subdivisions are 1,045,400 vehicles each day and within subdivisions 136,300 vehicles each day.



63 ESTIMATED FUTURE TRAFFIC MOVEMENTS

To obtain the total future traffic on the proposed road system, all these movements were distributed along the possible alternative routes in what appeared to be the most likely proportions.

ECONOMICS OF VEHICLE OPERATION

In the investigation of alternative new road routes three major factors require consideration, viz., the costs of acquisition, construction and vehicle operation. Current information was readily available for all but the cost of vehicle operation. Therefore, a study was made of this factor as it applied in particular to the metropolitan area of Melbourne. The study was based on three vehicle types:

- (a) Car, assumed to weigh 3,000 lb. and operating at an average speed of 30 m.p.h.
- (b) Light truck, assumed to weigh 8,000 lb. and operating at an average speed of 25 m.p.h.
- (c) *Heavy truck*, assumed to weigh 15,000 lb. and operating at an average speed of 20 m.p.h.

The components of cost are fuel,⁽¹⁾ oil, tyres, repairs, depreciation, registration, insurance and interest. Modifying factors were adopted to account for such facts that depreciation, for example, is dependent on obsolescence as well

⁽¹⁾ The cost of petrol was taken at 3/6 per imperial gallon.

Table 89ESTIMATED TRAFFIC BETWEEN SUBDIVISIONS FOR POPULATION OF2,500,000

Subdivision	16	2	3	4	5	6	7	8	9	0	X _c	X _s	X _n
1 (a)	77.7	25.3	53.8	48.9	40.3	27.1	38.4	22.2	20.2	44.8	37.5	15.2	6.6
1 (b)	51.4	49.3	45.3	26.7	26.6	17.6	13.2	32.1	13.1	15.5	7.7	1.7	1.1
2		14.0	6.8	9.9	11.2	9.6	6.2	10.8	5.0	5.2	2.7	0.6	0.5
3		· · · · ·	10.5	14.4	8.4	4.8	4.2	5.2	3.0	5.1	3.4	0.7	0.4
4	_			8.2	27.9	6.4	4.4	3.4	2.2	3.7	2.6	0.5	0.2
5				'	10.3	15.3	6.7	4.6	3.0	4.4	3.0	0.5	0.7
6						3.5	13.1	3.8	3.2	5.0	3.7	0.5	1.0
7							13.9	4.4	6.0	9.2	9.4	1.0	2.8
8					_		-	6.7	8.4	7.3	3.1	2.2	0.4
9				33 33			_		4.6	18.3	5.5	0.7	0.5
0	_	—			-		_			8.6	13.3	2.3	1.2
\mathbf{X}_{e}				· · · · · ·	_		-				4.1	2.2	1.3
X _s						·						0.5	0.1

(In thousands of vehicles per day)

as use. Samples from the 1951-52 costs of operating the Melbourne and Metropolitan Board of Works' vehicle fleet were used, modified to agree with overall motor transport costs supplied by the Federal Chamber of Automotive Industries.

The estimated costs (in pence) of various operations with each vehicle are given in Table 90.

With the zoning proposals of the planning scheme as a basis, reasonable assessments of car and truck traffic could be made for a specific road at some future date.

THE EXISTING ROAD SYSTEM

The pattern of the existing road system was determined in the early years of the State's history when Melbourne was little more than a village and the metropolitan area consisted of small isolated settlements separated by bushland. As the demand for land grew, the Government subdivided the bushland into pastoral allotments in accordance with a grid pattern with little respect for physical features. Stock routes of generous width - often three chains - to permit the grazing of animals passing along them, were provided radiating from the town area, and around the pastoral holdings one-chain roads were reserved. The former stock routes are today one of our major civic assets, but unfortunately they were not carried inwards as far as the original town area, neither were they always continued outwards at the same generous width with which they started. With the advent of the motor car and of fixed-rail street transport, the lost opportunity is very apparent.

With the passing of time, the pastoral allotments gave way to smaller farms and orchards, and finally to suburban development. Unfortunately there has never been any effective co-ordination of subdivisions with the result that many fine roads today are ineffective, whereas if they had been linked they would have catered for a great proportion of our future needs. In other places roads have been laid out on a lavish scale and many will never have more than local status, but will continue to impose an unnecessary burden on the community for their upkeep.

Many of the well-used traffic routes today pass through centres of relatively intense development. Shopping centres, which often originated at important intersections, have extended in ribbon-like fashion. The tramways authorities, seeking patrons, have chosen the main traffic routes for their tracks with the result that the demands of shopping, fixed rail transport and road vehicles are over-taxing existing facilities.

Map 64 shows the general pattern of roads radiating from the central area. The discontinuity in the width of road reservations is apparent. Of the ten main approach roads to the central city area, seven pass through large shopping centres and two through groups of smaller shopping centres. Three of the narrow routes and two of the wide routes pass through large industrial areas, and three routes skirt large industrial areas.

Table 90VEHICLE OPERATION COSTS

	Cost in pence for one vehicle						
Operation	Business Car ⁽¹⁾	Private Car	Light Truck(1)	Heavy Truck(1)			
One extra mile	8.5	6:1	14.1	17.1			
One stop and start	1.3	1.0	2.9	3.0			
One minute delay	1.2		1.2	1.2			
100 ft. rise and fall	0.4	0.4	2.2	4.2			

(1) Including the cost of drivers' wages at 6 - per hour.