and 90.47 per cent. of automobiles. The trams conveyed 63.5 per cent. of the passengers as against 36.5 per cent. by the automobiles. The 119 trams occupied 4,760 linear feet and the 1,139 motor vehicles—15,820 feet. This means 23 per cent. of the space was taken by 3,647 tram passengers and 77 per cent. of the space by 2,094 motorists. The motor car figures include a proportion of motorbuses.

At the bottom of this page some extracts from quotations by prominent American traffic authorities are given, to bear out the extreme importance of the question of the economic use of the road.

Melbourne Conditions.—A comparison of the road passenger carrying units which entered and left the business area of Melbourne over a period of thirteen hours on a normal day (29th April, 1924), shows:

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>Average No. of Passengers</th>
<th>Total Passengers</th>
<th>Percentage of Grand total.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Cars, Taxis, &amp;c.</td>
<td>30,897</td>
<td>61,794</td>
<td>18.5</td>
</tr>
<tr>
<td>Bicycles</td>
<td>11,118</td>
<td>11,118</td>
<td>3.3</td>
</tr>
<tr>
<td>Motor Cycles</td>
<td>5,331</td>
<td>5,331</td>
<td>1.6</td>
</tr>
<tr>
<td>Buses, &amp;c.</td>
<td>630</td>
<td>12,900</td>
<td>3.8</td>
</tr>
<tr>
<td>Tramcars</td>
<td>9,557</td>
<td>242,795</td>
<td>72.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>333,638</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Thus the tramcars in Melbourne constitute 16.6 per cent. of the passenger carrying street services and only 9.09 per cent. of the total traffic of the city, yet they transported 72.8 per cent. of the passengers. The similarity of Melbourne to Chicago in this respect is noteworthy.

The automobiles comprise 53.7 per cent. of the passenger carrying vehicles, yet they transport only 18.5 per cent. of the passengers.

Briefly stated, the comparison of street space, in solid line of contact, occupied by these two forms of transport is as follows:

9,557 tramcars transporting 242,795 people occupied 2,824,984 square feet.
30,887 automobiles transporting 61,794 people occupied 2,286,378 square feet.

STREET ACCIDENTS.

Notwithstanding additional regulation and supervision, the more rapid transport systems which have encouraged a greater degree of movement, are resulting in longer casualty lists year by year, and a consequent disorganization of traffic.

The record kept by the Police (Traffic Control) Department of reported accidents swells month by month but reported accidents are only a proportion of the total.

Britton I. Budd, the President of the American Electric Railway Association and the Chicago Rapid Transit Company—

"Increasing use of gasoline driven vehicles has brought to our large cities serious traffic problems which our industry must help to solve. The great mass of the people ride on the electric railway and will continue to do so. They will not tolerate much longer the endless delays caused by the small minority riding in automobiles. Neither can the automobilists themselves afford to put up with the numerous delays they daily encounter. A solution of the problem must satisfy the users of both kinds of transportation service. The answer in many places will doubtless be along the line of separation of grades, allowing the electric railways to give a rapid transit service."

NOTE.—Street railway means electric tram service.

George B. Anderson, Manager of Transportation of the Los Angeles Railway—

"In congestion by automobiles is found the most serious cause of delay to all forms of traffic. A check of the central business district, covering approximately 90 blocks, showing the movement therein of all classes of vehicles from 6 a.m. to 6 p.m. on 19th December, 1923, an average day, shows 263,110 automobiles, 48,556 trucks—a total of 311,666 automobiles of all classes—and 12,025 street cars; and from 5 p.m. to 6 p.m. a total of 34,449 automobiles and trucks and 1,436 street cars. The average street car load for this period was 77.7 passengers and the average automobile load 1.67 passengers including drivers. During the twelve-hour period each person travelling in an automobile occupied in linear feet 14.3 times as much as each passenger carried by street car. At 1.67 passengers per auto., to carry one average rush hour street car load of 77.7 passengers would require 47 automobiles which, in solid line of contact, would occupy 693 feet, or the longest city block from centre to centre of the intersecting street, while a street car occupies but 45 feet on the average. Two and one-half moving automobiles of average length occupy space of the same length as that of a street car, but in the same space the street car averages a passenger haul in the rush hour of 20 times that of 2½ automobiles."

* These figures are estimated. In no cities from which the figures are available is the average number of persons travelling in automobiles, including the driver, more than two. In regard to omnibuses the figure twenty is considered to be an outside average number of passengers, especially as the actual average per tramcar was only 35.
On the adjoining page is a sheet compiled from the police records of reported accidents in the Melbourne streets for the period from January to June, 1924. The chart clearly shows which are the most dangerous zones. The carrying out of the proposals recommended later, will considerably relieve these danger zones by a better distribution of the traffic.

**Remedies.**—Whilst many accidents and fatalities are due to traffic congestion, which will be relieved by the Commission's proposals, a large number are unquestionably due to carelessness on the part of both drivers and pedestrians.

Heavier penalties for recklessness, a vigorous "Safety First" campaign, additional and more stringent regulation by uniformed police, education of the child, rounding of street corners, enforced gyration of traffic at every suitable intersection, are remedies which should be adopted.

In congested areas pedestrians should be educated by police direction to cross streets at authorized places, and the habit of the general public of crowding on the roadways at controlled intersections whilst awaiting the directing policeman's clearance should be immediately stopped. The practice is not only dangerous to pedestrians, it is a menace to all vehicular and tramway traffic and blocks its forward flow at the time it is most necessary that a clear road should be available. In this connexion it is recommended that steps should be taken to inaugurate a system of thorough instruction to all the members of the police force engaged on traffic duty so as to ensure effective and uniform methods of regulating the traffic.

"*Keep to the Left*" on Footpaths.—By compelling pedestrians to "*Keep to the Left*" on footpaths instead of to the right, as at present, the risk of accident would be reduced. Such a regulation would ensure that pedestrians on the outside of the footpath would proceed in full view of the vehicular traffic coming in the opposite direction.

The report of the Traffic Congestion Board of 1919 includes this recommendation.

**SUBURBAN RAILWAY TRAFFIC AND CITY STATIONS.**

The electrification of the suburban railways has enormously increased the passenger traffic, and to an extent far greater than anticipated by the Railway Department.

**Flinders-street and Prince's-bridge Station.**—According to the report of the Traffic Congestion Board 1919, the Railway Commissioners then estimated, having regard to electrification and a 2 per cent. annual increase in population, that in 1923 the passenger traffic at Prince's-bridge and Flinders-street stations would be 209,000 per day. The actual traffic figures for 1922 were 241,139 per day, whilst in 1923 the daily total reached 265,000. In December, 1924, the average daily figures ascertained by the Railway Department were:

<table>
<thead>
<tr>
<th></th>
<th>Average Daily Figures</th>
<th>Highest Daily Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flinders-street</td>
<td>238,303</td>
<td>251,581 (Friday)</td>
</tr>
<tr>
<td>Prince's-bridge</td>
<td>44,548</td>
<td>47,438 (Saturday)</td>
</tr>
<tr>
<td>Combined</td>
<td>282,851</td>
<td></td>
</tr>
<tr>
<td>Spencer-street</td>
<td>42,564</td>
<td>43,572 (Friday)</td>
</tr>
</tbody>
</table>

The 1922 figures show that 19.5 per cent. of the total traffic was handled between 5 and 6 p.m., whilst the number dealt with between 7 and 9 a.m. and 5 and 7 p.m. represents 49.5 per cent. of the total. The figures do not include the large number of passengers who change from one line to another at Flinders-street without leaving the station.

In conference with railway representatives the Commission has been advised that the Department considers the traffic has by no means reached its "saturation point" even at the busiest hours.

Two statements supplied to the Commission by the Railway Commissioners which deal with Flinders-street station traffic are quoted below.

The following table shows the traffic on the suburban railways:

<table>
<thead>
<tr>
<th>Year (30th June)</th>
<th>Passengers</th>
<th>Journeys per head per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1903</td>
<td>50,064,567</td>
<td>99</td>
</tr>
<tr>
<td>1908</td>
<td>67,941,880</td>
<td>122</td>
</tr>
<tr>
<td>1913</td>
<td>109,033,647</td>
<td>156</td>
</tr>
<tr>
<td>1918</td>
<td>97,410,826</td>
<td>133</td>
</tr>
<tr>
<td>1923</td>
<td>145,910,182</td>
<td>171</td>
</tr>
<tr>
<td>1924</td>
<td>157,969,667</td>
<td>185</td>
</tr>
</tbody>
</table>
PLATE VIII.

1. Looking South.

2. Looking North.

VIEWS OF THE INTERSECTION OF SWANSTON AND FLINDERS STREETS

Showing the crowding of pedestrians in the streets in the vicinity of the Flinders-street Railway Station.

6044.
The following memorandum was addressed to this Commission on 23rd April, 1924:

"So far as Flinders-street station is concerned, with the introduction of longer trains, which will clear the platforms of waiting passengers every few minutes, it is not considered that the railways will need to make any considerable radical alterations for some time to come. Congestion occurs, but not as much within the station precincts as outside the station, in the vicinity of the entrances and exits...

So far as the Flinders-street station is concerned, its capacity to handle traffic has by no means been exhausted. Automatic signalling, electric traction, longer trains, the provision of two double tracks right through from Flinders-street to North Melbourne, all greatly add to the passenger capacity of the station."

In a further statement handed to the Commission on 27th June the Railway Commissioners say:

"The present Flinders-street station is capable of handling a very large increase in the present traffic. The heaviest period of the day is between 5 p.m. and 6 p.m. During that time, except on the Sandringham—Essendon and St. Kilda lines, only six-car trains are at present being run. The capacity of the station for handling traffic can be increased by approximately 35 per cent. by adding two additional carriages to the trains. Furthermore the train service is only run on three to four minute intervals on one or two lines during the hour of heaviest traffic. The provision of additional signalling equipment and the re-arrangement of train handling methods will enable the trains to be run at closer intervals during the absolute peak traffic. So long as platforms are kept clear, which could be done by the running of frequent and longer trains, no congestion would occur within the precincts of the station except when the schedule was disarranged through accident. No matter what facilities were available congestion will arise in such circumstances. Electric traction, owing to the flexibility and ease with which electric trains can be handled, compared with steam trains, has greatly increased the capacity of the Flinders-street station."

In their memorandum to the Traffic Congestion Board of 1919 the Railway Commissioners estimated that with a population of 833,354 in 1923, they would carry 108,336,020 passengers in that year. As shown above they actually carried 37,574,162 more than that estimate. The actual population was 852,850, which exceeded the estimate by 19,496 and at 171 journeys per head would only account for 3,333,816 of the above total. These figures show that there is an excess in passenger travelling to the extent of no less than 34,240,346 journeys or 31.6 per cent, above the Department's estimates of 1919 for the year 1923.

Relief of Congestion.—The Railway Commissioners expect, by enlarging the trains from six to ten cars, to provide "ample margin for further extension" of traffic. It must not be overlooked that whilst increased carrying capacity per train can be provided, the means of access to and from these trains is a problem remaining to be solved. The Railway Commissioners admit that congestion occurs in the approaches to the city stations. In the opinion of this Commission the removal of this congestion is a problem requiring immediate solution. The means of getting the public to the stations and the ability of the railway service to remove the constant flow of people are interwoven questions and must be solved together.

An analysis of the railway passenger figures gives the following:

| Population of Metropolis 31st December, 1923 | 852,850 |
| Estimated population in 1964 | 2,002,100 |
| Total passenger journeys on suburban lines for year ended 30th June, 1924 | 157,969,667 |
| Average number of journeys per head of population for year ended 30th June, 1924 | 340 |
| Average number of daily passengers | 431,611 |
| Average daily number using Flinders-street and Prince's-bridge stations | 282,851 |

The Future of Flinders-street Station.—Neglecting the established fact that the traffic increases at a much greater rate than the population, and assuming that the 2,002,100 people in 1964 make only 185 journeys each, the total in that year on the suburban lines would be 370,388,500, and the daily average number desiring to patronize Flinders-street station would be about 673,000. But if the number of journeys is 270 each, (which would correspond with the proportion of increase for the last twenty years) the daily traffic would be about 978,000.

By maintaining the ratio of journeys per head of population at the present day figures, the normal increase in population would increase the patronage of Flinders-street station by 100 per cent. in 29 years, should the station be then capable of handling them.

The question is, therefore, what extra facilities are practicable to enable 565,000 (double 1924 figures) people to use this station daily and be accommodated from the streets to the trains, and vice versa, with safety and comfort and without causing interference with the easy movement of all other traffic. Assuming, but not admitting, that these tremendous difficulties can be overcome, it is then necessary to calculate how many years it will be before the point of saturation is reached. Furthermore, it is of extreme importance to consider whether expenditure on extensive alterations at the central station will be imprudent.

It must be borne in mind constantly that nearly one half of the daily traffic of this great passenger station is dealt with in four hours only.
In view of the position disclosed by the above figures the Commission recommends that provision be made forthwith for spreading this tremendous volume of pedestrian and railway passenger traffic from the three city stations at Prince's-bridge, Flinders-street and Spencer-street by means of other city stations and improved tramway facilities.

Although the Railway Commissioners may consider that large increases in passenger traffic can be handled at Flinders-street, the Commission is convinced that this is extremely undesirable. Any policy that will result in concentrating more traffic at Flinders-street station should therefore be at once revised because it is obvious that some drastic means of relief must be provided within a decade or so.

**Alternatives.**—This Commission has considered the following alternative proposals:

(a) Straightening of the Yarra from near the boat sheds to Clarendon-street to afford room for expansion of the present station, and to provide access from the South.

(b) Removal, gradually, of the main station to the east of Prince's-bridge by simultaneous removal of the marshalling yards elsewhere.

(c) A double-decked station at Prince's-bridge.

(d) A system of subways under Flinders-street to Flinders-street station.

(e) A new loopline connecting the Richmond and North Melbourne stations by a route through the northern part of the city.

Although proposals (a), (b), and (c) would each reduce the congestion within the station itself, they are unacceptable to the Commission because they do not afford any relief from the congestion of street passengers converging on one central point.

**Subways to Flinders-street Station (d).**—Suggestions have been made for a number of years for subways or overhead bridges across Flinders-street to the central station. Generally speaking the advocates of these projects have studied the problem in relation to the existing streets.

The Commission has found that further streets and bridges are necessary for the present and future city traffic. The question of subways or overhead walks should therefore be considered with regard to the probable effect of these proposed new bridges and streets on the congested portion of Flinders-street opposite the station.

It will be seen from Plate No. XVI. that a wide street parallel to Flinders-street is proposed on the south side of the Yarra, connecting with Alexandra-avenue, and via a new bridge opposite Swan-street, with Swan-street, Richmond.

The principal reason for the recommendation which follows (page 35) for the provision of this main parallel road is to relieve Flinders-street of the greater part of its heavy traffic and a proportion of other vehicular traffic. Instead of using Flinders-street as at present, all traffic in the west of the city destined for the southern and certain eastern suburbs could then use the north-south city streets and continue over the proposed bridges across the river into the wide road parallel with Flinders-street, there to be distributed easterly or southerly as desired.

Traffic to and from the majority of the eastern suburbs has the choice of Flinders, Collins, Bourke, Lonsdale, and Latrobe-streets and would not be seriously inconvenienced if the traffic in Flinders-street opposite the central station was reduced, or prohibited, if found desirable during the hours of greatest railway travel.

Minimizing vehicular traffic in Flinders-street between Swanston and Elizabeth-streets, by such regulation would have the desirable effect of spreading, and providing safe and free movement for the huge number of railway passengers crossing Flinders-street.

Subways and overhead walks should be regarded as adjuncts to rather than substitutes for the street system. Subways can still be constructed if found necessary after the improved street system has been provided. The latter should be commenced at once and the necessary properties resumed before any further enhancement of value takes place.

A very large sum of money would be required for the construction of any scheme of subways or overhead walks, and the Commission considers this could be more wisely expended on the improvements recommended herein, which would afford greater relief.

It is appropriate to quote the finding of the Traffic Congestion Board of 1919, which specially reported on the provision of subways, as follows:

"The Board does not recommend the construction of subways under Flinders-street to the central station, on account of the expense of construction, the disadvantages connected with the substitution of underground artificially-lit subways, ramps, booking offices, &c., for the present booking offices, ticket gates, conveniences on street level, and the wide open-air concourse at Swanston-street entrance. In addition, there is the doubt as to whether they will assist materially in minimizing congestion in the streets in the vicinity of the station."
New Railway System in the North of the City (e).—The Commission recommends the development of a railway loopline connecting Richmond and North Melbourne stations through the north of the city approximately along Victoria-street, and having two or more intermediate stations. Such a line would effectively distribute the passenger traffic, and permit of considerable expansion of traffic without increasing the congestion in the centre of the city.

It is intended to deal with this proposal in the Commission's later Report. In the meantime it is considered that no railway development should take place which would conflict with the loopline through the north of the city.

Goods Traffic.—The Commission understands that the greatest proportional increase in railway goods traffic is being experienced on the Gippsland and other lines which pass through Flinders-street station and across the viaduct. It is recommended that as much goods traffic as possible should be kept off the Flinders-street to Spencer-street viaduct by diverting it around the north of the city. The outer circle and North Fitzroy lines might form the major portion of the necessary loop.

St. Kilda and Port Melbourne Lines.—In order to effect the better distribution of passenger traffic it is recommended that the St. Kilda and Port Melbourne railway lines should be diverted into Spencer-street station as stated on page 32. The passengers may then be transferred to a point within convenient distance of all parts of the city by trams along Flinders, Collins, and Bourke streets.

Railway Advisory Officer.—The Commission recommends that at least one experienced railway officer should be at once selected to study and advise upon railway development in relation to the general development of the metropolis. This officer should be freed from all administrative work, and should be required to confer with this Commission and other authorities before making recommendations. The Commission recognizes that it is impossible for the expert officers of the Railway Department to give the requisite time to the study of such important matters as instanced in the foregoing observations and to carry on the duties of their own offices at the same time.

METROPOLITAN TRAMWAYS.

The tramway statistics show an expansion more striking than those of the railways:

<table>
<thead>
<tr>
<th>Year (30th June)</th>
<th>Miles Open</th>
<th>Passengers</th>
<th>Passenger Journeys per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1903</td>
<td>48</td>
<td>46,832,910</td>
<td>92</td>
</tr>
<tr>
<td>1908</td>
<td>57</td>
<td>67,216,878</td>
<td>120</td>
</tr>
<tr>
<td>1913</td>
<td>76</td>
<td>101,554,112</td>
<td>153</td>
</tr>
<tr>
<td>1918</td>
<td>112</td>
<td>159,729,435</td>
<td>218</td>
</tr>
<tr>
<td>1922</td>
<td>121</td>
<td>226,999,954</td>
<td>266</td>
</tr>
<tr>
<td>1924</td>
<td>122</td>
<td>221,892,070</td>
<td>260</td>
</tr>
</tbody>
</table>

The Commission has been furnished with full particulars of the Melbourne and Metropolitan Tramways Board's General Scheme for the future development of the tramway services of the metropolis. This scheme provides for the electrification of the cable lines.

Conversion of Cable Tramways.—The conversion of the cable tramways is, in the opinion of the Commission, a work of great urgency. Every obstacle to the prompt completion of the work should be removed.

Tramways Board's General Scheme.—The General Tramway Scheme submitted to the Parliamentary Standing Committee on Railways in 1922 was approved in general principle by that body a few months later. The scheme was planned in accordance with the existing arrangement of streets and approaches to the city. Under prevailing conditions the Commission considers it is the best obtainable scheme.

The planning proposed by this Commission provides for new arteries and points of entry into the city proper which will materially affect portions of the tramway scheme.

The tramways proposed for the area included in this Report are shown on Map No. 4 and are described separately in the detailed recommendations regarding each proposal. The tramways to be recommended for other areas will be dealt with and included in a later Report, but they will conform with the proposals contained herein.

If due regard is consistently paid by all authorities to an adopted plan of future development, ultimate costs to the community must be materially reduced.
The Commission desires to make the following observations and recommendations at this stage, with regard to tramway matters:

**Trams in City Streets.**—It is not considered economically sound or practicable to remove all tramcars from the streets of the city proper.

**Segregation of Trams.**—It is considered that in streets of 120 feet and more in width, tramway traffic should be separated from all other traffic by placing tramways in reserves.

**Stopping Places.**—It is recommended that the number of stopping places for tramcars should be limited wherever practicable to not more than six stops per mile.

**RAILWAY AND TRAMWAY TIME ZONES.**

Plate IX. shows the quickest time required to reach the city from any part of the metropolis using either railway or tram for the whole journey by whichever is the quicker service. The time as shown on the Plate may be considerably lessened if tramways are used in conjunction with the railways.

The Plate shows the absence of rapid transport facilities in areas which are comparatively close to the city, and that parts of the metropolis within five miles of the business centre are as far distant in transport time as other parts thirteen miles from the centre.

The unequal distribution of rapid transport facilities, as at present, has caused a concentration of population adjacent to the lines of quickest transit, leaving areas between such lines of communication comparatively sparsely occupied.

**COMPARISON OF INCREASED TRAFFIC ON RAILWAYS AND TRAMWAYS.**

The foregoing statistics show an increase in twenty years of 191 per cent. in railway traffic on the suburban lines, and of 50 per cent. during the last five years. For the same periods the increases in tramway traffic have been 384 and 42 per cent. respectively. The number of passenger journeys per head of population has increased in the last decade in much greater ratio on the tramways than on the railways.

It is therefore evident that whilst the tramways have carried a greater and increasing number of people during the last twenty years, the percentage increase in the last five years has been greater on the railways. The saving of time rendered possible by electrification is undoubtedly the principal contributory cause of the greater patronage of the railway services. More especially this saving is most valuable in the distant suburbs rapidly increasing in population. These suburbs must always largely depend upon railway facilities rather than tramways. The railways have gained some of the increase which would have gone to the tramways if the latter had been electrified.

These railway and tramway figures illustrate the well known fact that every increase in population results in a greater proportionate increase in traffic. A graph illustrating this is published (Plate X.).

**MOTOR OMNIBUSES.**

Notwithstanding the additional tramcars and trains which have been provided, the popularity of the motorbus suggests a consideration of the question of whether further facilities are necessary.

The seating accommodation of the largest buses now running in Melbourne is 33, whereas the average seating of the various kinds of trams is 42. The comfortable standing room in the buses in use does not exceed 24, making a total capacity per bus of 57. Electric trams provide comfortable standing accommodation at least equal to the seating, which means that the average tram now in use is capable of transporting 84 people in comfort and safety. Trams having a capacity of 104 passengers (standing and seated) such as will be used when all lines are electrified, would each carry 47 people more than the largest bus now operating.

As the schedule speeds of buses and trams are practically the same when performing the same service, it is apparent that more than twice as many buses as trams would be required, and under peak loading conditions the disparity in carrying capacity per unit becomes even greater. Most of the main routes are congested during the busy hours, and the complete replacement of trams by buses would therefore result in greater street congestion.

It may be noted that an overwhelming preponderance of expert opinion in other countries supports the Tramways Board's contention that for mass transportation the electric tramway is the most effective and economical means of transport. Nevertheless, as local conditions and costs may occasionally invalidate conclusions derived from experience in other countries, the Commission has considered it wise to go into the matter in some detail. The question is of importance in view of the statement so frequently made that the cost of laying electric tramway tracks in place of the cable tramway tracks is not justified.

* Recent legislation has reduced the capacity of buses by limiting the number of standing passengers.
PLATE X.

_ Metropolitan Town Planning Commission Melbourne _

**Railway & Tramway Passengers**
1903 to 1923

**Population**
1903 to 1923

**Relative Increase Total Passengers and Population**
1903 to 1923
On main routes the portion of the roadway suitably constructed for buses would be no more available for ordinary traffic than is the tram track, which costs no more. The time interval between trams on St. Kilda-road during peak hours is approximately 30 seconds. At least twice as many buses will be required to give a similar service, so that there would be a bus every 15 seconds in both directions and the special roadway which would have to be provided for them would not be available for other traffic at such time, when other traffic is also at its maximum.

Estimates based upon the figures published in the Tramways Board's Annual Report show that the cost per seat mile with electric trams is about 4d. This includes operating charges and all capital charges, including contributions to bridges, upkeep of roads, abolition of level crossings, and many other charges which the Tramways Board pays out of its revenue. The cost of providing a seat mile with large buses is estimated at about 7d., excluding tax. Smaller buses with pneumatic tyres will cost more to operate per seat mile.

The cost of providing a seat mile in buses making no contribution to the roads, bridges, &c., is therefore 40 per cent. greater than in trams, which form and maintain large sections of the road surface and contribute large amounts to Government revenue and to the rates. An increase of 40 per cent. in the average fare paid by each of the 220,000,000 tram passengers would represent £750,000 per annum to be paid by the travelling public if the existing tramways were replaced by buses. In addition, the municipal rates would have to be increased to pay the amount now paid by tramway passengers for maintaining nineteen feet of roadway, and also the increased amount to make good the damage caused by the buses.

Manchester.—It is appropriate to point out that according to the 1923 Report of the Manchester Corporation Tramways (England) the number of buses required as an equivalent to their bogie trams would be more than three buses per tramcar.

London.—London is quoted by motorbus advocates as a model of modern transport, but it cannot be fairly compared with Melbourne. Notwithstanding the very complete facilities for local passenger transit afforded by the underground railway system, motorbuses and other vehicles are so numerous in the London streets at the present time that the rate of movement has been reduced to under five miles per hour. The fact that London has such a complete underground railway system which so greatly relieves the street traffic, is frequently overlooked when comparing the traffic of the two cities.

The most important statement on this subject which has come under the notice of this Commission is the evidence given by Lord Ashfield before the Court of Inquiry into London Tramway Wages. Lord Ashfield is not only one of the most prominent tramway authorities, but he is also in control of the largest motorbus system in the world. An extract from his evidence is appended.

Other Authorities.—Several extracts from the opinions of eminent authorities on this subject follow.

Conclusion.—There is ample field for each of the systems of transport now operating in the metropolis, but unnecessary duplication of services is unwarranted and prejudicial to the public interest.

TRAMS AND MOTOR BUSES.

EXTRACTS FROM RECENT STATEMENTS BY PROMINENT AUTHORITIES.

Britton I. Budd, President of the American Electric Railway Association and President of the Chicago Rapid Transit Company:

"Experience has demonstrated that for mass transportation the gasoline driven vehicle cannot supplant the electric car."

F. S. Welty, Assistant General Manager, Omaha and Council Bluffs-street Railway (U.S.A.):

"It is now the generally accepted opinion that the bus is a valuable agency of transportation if used in the proper field; that of auxiliary or feed service to existing transportation systems and service to territory not already provided with adequate rail transportation."

W. H. Sawyer, President of the East St. Louis and Suburban Railway (U.S.A.):

"I am perfectly willing to have it written on record definitely that competitive, unco-ordinated systems of transportation serving the same streets in the same district, in the same community, are fundamentally unsound."

A. Baker, General Manager of the Birmingham Corporation Tramways (England):

"On routes in suburban districts where some sort of transport is necessary and where there was no likelihood of trams being required, I would certainly use the petrol omnibus. I would use the petrol omnibus in running cross-country routes and in connecting up the outer termini of tramways. I desire to repeat and emphasize that, for the transport of large masses of people expeditiously and cheaply, the humble tramcar has no competitor, and still holds the field."
"Buses never can handle the volume of traffic which the electric railways are moving daily. In those cities where the public has tried both systems it has decided in favour of the electric. Has there any reason to suppose the experience of the citizens of Des Moines, Toledo, Saginaw, Bridgeport, and other cities, is not representative of the public feeling elsewhere? Akron has more recently tried and reached the same answer. We all know that the motor bus supplies a very definite need. Be that as it may, it cannot supplant the service rendered by the electric railways. Experience has demonstrated that the bus is of more value to the public in supplementing electric railway service than in superseding it. The public is principally interested in cheap, dependable transportation, and it is realizing more and more that this can be furnished best by the electric railways. It is also realizing more and more that the unregulated operation of buses has an unfavorable effect upon local transportation service."

NOTE.—The term "railway" used by the above authorities should read as "tramway" in Australia.

EXTRACT FROM LORD ASHFIELD'S EVIDENCE BEFORE THE COURT OF INQUIRY INTO LONDON TRAMWAY WAGES.

(From "Electric Railway and Tramway Journal, London," 11th April, 1924.)

LORD ASHFIELD
Examined by Mr. Bevin.

Mr. Bevin: I wanted to ask you whether, up to a certain period, you held the view that buses would ultimately supersede trams?

Lord Ashfield:—No.

You never held that view?—No.

Could it be said to have been the outlook, shall I say, of your companies?—It was never my outlook, and it was never the view taken by any of my colleagues; it was quite the contrary. We have a very large investment in tramways of this kind, representing some millions of money. We certainly do not hold the view that tramways have become obsolete, and that buses will completely supersede them. From the public point of view, we should disagree with that policy. We think that tramways will continue to play an important part in dealing with the transport of the London public.

It is your opinion that these services are to be complementary?—I agree.

Then do you think they should be so regulated that, instead of being used in exterminating competition, the public supply should be regulated as between the three?—Yes, I am bound to accept what Mr. Pick has said this morning on that question. Clearly, the present methods for dealing with passenger traffic in London cannot possibly secure a satisfactory position to the public, or to the employees, or to those who have invested their money in these undertakings. Clearly, the situation as it now is must inevitably end in disaster. I use that rather exaggerated expression after very careful consideration, because it is not only a question of tramways. It is true that is the matter before you now, because you have an industrial dispute in front of you. That industrial dispute arises out of the financial situation. It is quite impossible for my companies to meet any further expenditure. I go much further than that, and say that as things are now we cannot meet the present expenditure. The tramway companies cannot continue to go on under the present circumstances. So far as the omnibuses are concerned they, too, are now faced with an equally difficult problem, because there again, resulting from the chaotic conditions in London, they too are showing a very unsatisfactory financial result, and if that state of affairs goes on it will be impossible for the omnibuses to continue to meet their present expenses. And now you come to the underground railways; it is equally true of them; they cannot go on under the present circumstances. So you are dealing, not with the situation affecting tramways alone, but you will ultimately find that you will have to deal with the omnibuses and the underground railways.

Then it would be your opinion that the companies would be, even on the bus side, terminating their agreements?—I have no hesitation in saying to you—I will be quite frank about it—that if the present state of things goes on the company is bound to strain itself to the very utmost, because in the past years the buses have been profitable, and one would not quickly take advantage of a situation where the buses were not doing well; but ultimately that will be the result unless their financial position improves.

Are you in favour of a general pooling of all resources—fares, &c.?—I do not think there is any other way to deal with the London traffic problem other than by complete co-ordination of all the traffic facilities—railways, omnibuses, tramways, and all of them being worked under a directing authority, public in character, which would see that the fares charged are only sufficient to provide the three things mentioned by Mr. Pugh, and that the public receive what is necessary in the way of services, and no more. Only in that way is it possible for the London traffic situation to be properly worked; and that I am not suggesting to you as a theory; I am not putting it to you as my own personal view upon the matter; all I have said to you is supported by the experience which every other large city in the world has gained, and which every other city in the world, so far as I know, is doing to-day; certainly every capital city in the world has a system of public control. I will now give you an instance, if it would be of interest to the Court. It is rather similar to what we are going through in London now. It is an instance in America, where a demand was made for increased wages by the tramway employees. It was a large system of tramways, one of the largest in the United States. They were unable to meet this demand for further wages; they could not say, in answer to the application, "fares shall be increased." There is an economic limit to fares; they are fixed by long experience, and I agree with Mr. Pick that if we had all the power in the world to deal with this question of fares in London it would not add to our income to-day. On the contrary, my view is that if you ventured to add to the fares in London now, your income would diminish rather than increase. But going back to this American situation, they could not meet this demand, and wages had reached a very high level and yet the tramways could not pay the wages demanded. Omnibus competition was very severe and the result was that the tramways—I hope it is not a portent of what will happen in London—did not operate for thirteen weeks, the whole system was shut up for thirteen weeks because the Government would not move to deal with this question of control.
That seems to be a disease of Government?—Yes. Ultimately they were bound to deal with it, and the result is that you cannot get an omnibus licence in that area unless there is a public necessity for the vehicle. If there be a necessity for it, then you can have the licence. That has straightened out the situation. It took a very long time, and it cost a great deal of money to bring it about. That is the experience wherever you go; that if you leave this question of competition open to free play in the end it brings about disaster, and the reason for it is this, that whereas you could have competition in almost every other form of industry, you cannot have competition in transport in its widest sense, because every form of transport must operate. You cannot shut down your doors if you are not earning sufficient money to keep it going; the public demands the service, and it must be kept going. That being so, some form of protection is vitally necessary to a business of this kind.

You know that the tramways pay a good deal for road upkeep under their statutory obligations?—Yes, they do.

Is it your view that passenger-carrying vehicles running in the public service should be assessed in such a manner as to make an equal contribution to road upkeep?—So far as I know that is practically the case to-day. Certainly the omnibuses pay a very large tax.

What would the tax of £75 a year on a London general omnibus represent per bus mile run?

Mr. Frank Pick.—I think it is £84.

Mr. Btin.—What would that represent per bus mile run?—It is a matter of arithmetic.

Mr. Frank Pick.—It is about ½d. to 1½d.; it varies.

THE ROADS PROBLEM.

It is quite evident that the standard type of construction of the main roads of the metropolis is not sufficiently strong to serve the present needs of the traffic they have to bear. The maintenance of these roads to an efficient standard has become almost prohibitive owing to the continuous repairs necessary. The reconstruction of such roads in any of the various ways now regarded as adequate for a first class road would require the expenditure of an enormous capital sum. So large is this sum that it is essential that heavy traffic should be limited to particular routes.

Modern heavy transport requires a special and expensive road. This was not formerly the case, and a street system was not designed to carry the traffic along co-ordinated routes, and for the most part all streets were of a fairly uniform type of construction and strength suitable for light or, at the most, intermittently heavy traffic. As it is now necessary to provide a road of special construction for heavy traffic the first step should be to decide upon a system of routing, and only the roads selected for through traffic should be specially constructed. The type of construction should have regard to the nature and extent of the traffic.

The Commission is preparing a scheme of main routes for the metropolis on the basis that first class roads capable of withstanding all classes of modern vehicular traffic should be constructed at convenient distances apart according to circumstances. The community would thus be sufficiently well served, and expenditure reduced.

The main radial roads forming the direct routes between the city and outlying towns should be constructed to bear heavy traffic, and these will also serve the local district on either side.

The Commission believes that the making of the main routes which it is defining, and the restriction of the heavy traffic to those thoroughfares will reduce construction and maintenance on other routes, and leave much more money available for the expensive construction necessary on the defined routes.

Whilst residential streets are frequently constructed to a greater width than is required by the volume of traffic using them, a great many of the main streets of the metropolis are 66 feet wide, and on some of them is laid a double line of tramway. During "peak" hours the space occupied by the trams will only permit of intermittent use of the tracks by the rest of the traffic. Such a width is too narrow for streets containing a double tram track and bearing much traffic. In such streets resumptions for widening are very costly and to save expense it is often practicable and desirable to secure a parallel road for use by much of the through traffic. The use of residential streets by through traffic should be discouraged by all possible means and heavy traffic compelled to follow prescribed routes. If this were the case the cost of the construction and maintenance of residential streets would be considerably reduced.

Restrictions on Vehicles.—In addition to the question of limitation of heavy traffic to specified routes the question of the right types of road and what limitations should be placed upon their use is of equal importance. The various types of road suitable for modern traffic are now so well known that it is unnecessary to refer to them in detail in this Report.

The universal provision of the highest type of road is so expensive as to be impracticable. Heavy independent self-propelled vehicles must be catered for by the road maker as far as is reasonably possible. In regulating such use regard must be paid to four principal factors viz., speed, weight, tires, and axle load, all of which are interdependent.
Speed.—For heavy traffic a limit of speed is essential to preserve the road. If a vehicle with a certain maximum load and suitable tires exceeds the speed suitable to the road, damage rapidly occurs, especially if the appointed speed is much exceeded. Not only is the surface, when slightly out of repair, subject to serious damage by excessive speed of a heavy load, but much more are the foundations seriously damaged, entailing greater expense for repair than the earning power of the vehicle causing the damage.

Weight.—To be reasonably possible and within the limit of sound financial administration there must be some restriction upon the weight of the vehicle and its load.

Assuming that some form of concrete road with or without a carpet is desirable to meet modern conditions,—and the Commission considers that it is,—there must be a limitation of the load carried per axle, otherwise even such a road will be expensive to maintain.

Axle Load.—The distribution or spread of the total load over the road surface as much as is possible is essential, and in this respect there must be a maximum allowable which shall not be exceeded.

In some cases, to distribute the load properly, more wheels than four should be provided. If the load borne by any one axle is greater than that which the road is designed to carry, damage will inevitably occur. Vehicles economical to users may now be constructed of such a weight and size that it is obvious that their use must be prohibited. There is a limitation upon the practicability of raising the standard type of road construction to meet the wants of classes of vehicles continually increasing in weight.

Tires.—For anything but the lighter traffic a prescribed width of tire is essential. This has been recognized in the “Width of Tires Act,” which, however, admits of varying standards in adjoining municipalities, causing confusion and uncertainty. Any legal provision therefore on this subject should be uniform for the whole State.

The use of projections on the surface of tires which come into contact with the road should be prohibited. The materials of which the tires are made may vary according to the other conditions of the load. Hard rubber tires, for instance, may be used with less damage to the road than hard metal tires, though having an equal load. Metal tires with rounded edges are not objectionable if the other conditions of the use of the road are complied with.

It is well recognized that vehicles with hard metal tires without limitation of load and rounded edges are very destructive to all types of road.

The diameter of the wheel should also influence the width of tire.

Legislation.—The Commission having laid down the essentials of regulation is, however, not prepared without further investigation to suggest the exact details of the standards requisite for reasonable restriction. These are matters which should be decided by, say, three competent engineers, and their decision made the subject of an amendment of the law.

The Apportionment of Road Space.—A study of the streets of the metropolis shows that in many cases their widths are not selected with due regard to their use. Streets which are purely residential in character, and carrying only light traffic are to be found of the excessive width of 99 feet, while conversely main traffic routes which carry a double line of tramway are often of the inadequate width of 66 feet.

In cases where the vehicular and tramway traffic is confined to one street of that inadequate width it should be widened, if practicable, or a parallel street provided.

With the object of minimizing the cost of construction, and apportioning the road space in the various streets in the metropolis to meet the conditions for which they are being used, the Commission recommends that when streets are being reconstructed, or new streets opened, they should conform with the cross sections shown on Plate XI.

Residential streets should be tree planted and the traffic portion should only be sufficiently wide to meet the needs of the traffic in that street, as shown by recommended cross sections for residential streets 50, 66, and 99 feet wide.

The recommended treatment for main traffic routes is shown for widths of 66, 84, 99, 100, 132, and 198 feet for general cases. All streets of 84 feet width and over are planned to carry tramway and vehicular traffic, and the space as shown on the cross sections would be available for each class. Roads of 132 feet width and over should be treated as parkways. Alternative methods of treating 198 feet roads are shown, and it will be seen how a centre parkway could be used until the volume of traffic required the use of another roadway, which would provide for the separation of light and heavy vehicles.
Plate XII.

Metropolitan Town Planning Commission Melborne

Graphs of Southerly Traffic - City of Melbourne

Traffic Census - 29.4.1924 - 7 AM to 8 PM

Legend

- Inward Traffic
- Outward
- Total