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REPORT ON PASSENGER TRANSPORT SERVICES OF THE CITY OF GEELONG.

APRIL, 1949.

AUSTRALIAN ELECTRIC TRACTION ASSOCIATION

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INTRODUCTION.

After the publication of the report by Mr. Hector H. Bell, Junior, on Geelong's passenger transport services, a committee was appointed by the Council of the Australian Electric Traction Association to examine the situation. The committee's findings are set out hereunder.

The passenger transport problem of any city is not only complex and difficult in itself, but must be considered in relation to the changing industrial and residential conditions of the area. Above all, no city authority should adopt an expedient which, while cheaper in the immediate future, will bring heavy and increasing costs as long as it lasts; for such expenses must ultimately be paid in some way by the citizens.

After considering the report on Geelong passenger transport services by Mr. H.H.Bell, Junior, in which he recommends, among other things, that the existing tramway system should be replaced by diesel omnibuses, this committee is convinced that better results would be obtained by retaining it. As the possibilities of a suburban railway service in Geelong are very limited (see Proposed Suburban Rail Service), most of the traffic would have to be handled by buses, which are an expensive and unsatisfactory substitute for trams where loading is heavy.

As we accept without question the facts set out in Mr. Bell's history of Geelong's transport services, we shall not deal with this subject further. This also applies to most of the notes and data describing the present arrangements.

However, after carefully considering Mr. Bell's recommendations, we feel that he has not given full consideration to the possibilities of improving and developing the tramway system. We do not question his statement that the Geelong tramway system is not now a paying proposition, but we maintain that it can be made so, and that only in this way can the city obtain a safe, reliable, comfortable and economical mass transportation service.

THE PROPOSED SUBURBAN RAIL SERVICE

An important feature of the Bell report is the suggestion that the 51 motor omnibus routes which served the North Shore industries should be replaced by a local suburban railway service, to be established, using the existing line to South Geelong.

In many larger cities there is a trend towards this mode of transport, but it is not so well suited to Geelong. Suburban railways are advantageous where groups of suburbs extend for greater distances from the city, and where passenger traffic is heavy and continuous. The advantage of rapid transport, over long distances with infrequent stops, offsets the disadvantages of infrequent service and comparative inconvenience. The large numbers carried throughout the day pay the high operating expenses.

SPECIALS ONLY.

If the suburban service is to be provided at peak periods only by running carefully timed special trains, some of the above objections may not apply. However, inconvenience and grime would still be present, and the following most serious disadvantage would apply.

(e) The principal object of the rail service is to relieve the proposed bus fleet of most of the heavy industrial peak traffic. It should be remembered, however, that as the railway could not reach most of the suburbs, most passengers would require transport to and from the stations. This would call for special bus services to many districts, all connecting with the infrequent and crowded trains (as shown later it is not possible to provide better than an 18 minute service).

Because of the concentrated loading which the trains would create, the standby bus fleet would be unduly large, a feature which the rail service was intended to eliminate.

It should further be pointed out that most of the employees would have to make a change of vehicles, not required were a through service in operation. Such changes are always disliked, and would be a source of lasting dissatisfaction among the employees, whose objection to the earlier transport arrangements is one of the factors in the city's transport problem.

These conditions would not arise with trams, destined for various suburban termini, collecting the employees as they leave the works (see Transport to North Shore Industries).

Also, much of the changing would occur at Geelong Station, where buses, requiring extensive turning space, would add to the present congestion at the station entrance.

Finally, it must be emphasised that it would be a retrograde step for any electric transport undertaking to be superseded in part by a steam service, characterized wherever used, by infrequent running, low efficiency over short distances and general grimyness.

SERVICE DETAILS: Suburban trains would consist of 5 to 7 cars, with seating capacity of between 450 and 650, and a much higher crush load.

Operating times would be roughly as follows (under the most favourable conditions):

North Shore.	3½ minutes to
North Geelong.	4 minutes to
Geelong.	1 minute stand.
	4 minutes to
South Geelong.	5 minutes to shunt loco. around train.

Thus, with two trains operating, an eighteen minute service is the best obtainable, making no allowance for delays caused by movements of mainline trains.

COMPARATIVE COSTS.

At present the State Electricity Commission operates 27 trams in Geelong. Of these, six are double truck (bogie) cars with a peak load capacity of more than 130, 13 are single truck cars of three different types, with peak load capacities of more than 90, and the remaining eight are larger single truck cars of two different types, with peak load capacities of more than 100. (The M. & M.T.B. lists the capacities of the first two groups as 140 and 100 respectively, and these have been greatly exceeded under special conditions.)

To equal this capacity, at least fifty 31 passenger buses would be required, such vehicles having a safe crush capacity of about 55. However, with buses a greater number of spare or "stand by" vehicles is needed than with trams, because maintenance work is more elaborate, frequently involving the replacement of vital parts, and is required more often, and because mechanical defects per mile are several times greater. Different authorities give this reserve as between 10% and 15%.

Thus at least 56 buses would be needed to replace the existing trams alone, and experience may show even these to be inadequate. To put 56 diesel buses on the road would cost at least £285,600.

As the maximum useful economic life of a bus, under the heavy loading and frequent stopping of city working, is ten years, at the end of a thirty year period, buses to replace the present trams alone, would have cost £856,800 on present costs. (As prices have always gradually risen despite fluctuations, two thirds of these will be purchased at prices which are a matter for conjecture, while trams built now can run for up to 35 years).

To these capital expenses, must be added those of new depot installations (see Depot Facilities), and the final cost will be greatly swelled by the far higher operating costs, with large quantities of fuel, tyres, spare parts and maintenance, and additional crews for the more numerous vehicles. (These points are dealt with in later sections).

The above figures do not provide for additional services, to areas which should have been reached by the tramway system as the suburbs developed, and which are now served by private bus operators. Nor do they provide for the handling of the heavy North Shore industrial traffic, which also should be within the functions of the city's transport system. Also the fleet will need to be expanded considerably as traffic develops and the suburbs spread.

It will be seen also that the above cost is £406,800 more than the £450,000 given by Mr. Bell as the estimated cost of rehabilitating the tramway system, with replacement of the rolling stock, and major reconstruction of the tracks.

A recent examination of the Geelong permanent way by members of this committee has shown that it is generally in good order. Replacement of rotted sleepers is already in progress, and the rails are not badly worn (see Trackwork).

Certain single track sections should be duplicated and this would be the most expensive work.

Modern, high capacity, 1-2 man, four motor, bogie cars, designed for the Geelong system, could be built for about £7300 each. (The M. & M.T.B. builds its latest sliding door "luxury car", type S.W.6 for about £6700. The new Brisbane City Council quiet running, streamliners cost £6600). A fleet of 50 such cars, which

would be sufficient for all Geelong's requirements, including extensions and industrial traffic for many years to come, would cost £365,000 (compare with £856,800 for buses). These would have a useful economic life of at least 30 years (see General Characteristics of Trams and Buses, point 3).

As there is at present no need for such an ambitious building programme, it will be seen that the tram fleet can be developed as required, at a long term cost so far below that of the proposed diesel buses, that no operating authority should regard them as anything but a short term expedient.

TRANSPORT TO NORTH SHORE INDUSTRIES

The greatest single problem of Geelong's suburban transport is the heavy peak loading to and from the industrial area at North Shore. At present, numerous privately owned buses of mixed types and ages are used to handle this traffic, and these are out of service most of the day. The service is unsatisfactory in many ways, and has been the subject of much worry and negotiation, and a number of make-shift arrangements.

This traffic like that from Geelong to suburbs, can be satisfactorily handled by an improved tramway service, at a much lower cost. Later, as the staffs of these industries expand, the superiority of the trams in this, the class of mass crowd-movement work to which they are best suited, will become even more evident.

This Committee proposes that the existing North route should be extended into Bent Street, crossing the wheat sidings on the existing bridge, then turning off on to open ballast track at the left of the road, and following the existing cycle path to a point near the North Shore Station. This extension could be single track, with a passing loop provided if necessary. Including the latter, little more than a mile of open ballast track would be needed, with no main line railway crossing, but having a crossing with three V.R. sidings leading to the freezing works. A low embankment would be necessary to cross the area at the mouth of Cowies Creek, which is subject to flooding at high tide.

For this extension, secondhand railway rails could be used, and the track ballasted with ash or cinders as used in railway yards. (The Transcontinental Railway was ballasted with similar materials, bearing axle loads higher than those of any tram).

An estimate of the cost of the whole scheme is appended. It may appear high, but the solution of the transport problem would amply justify it, and the route could later be extended to serve (and develop) the North Shore housing area, north of the factories, where extensive residential development would provide employees with homes nearby. The advantages of this, to the firms and their employees, are obvious.

To enable peak traffic from the works to avoid the city streets, a connection should be laid from Drumcondra corner over Church Street Bridge, to connect with the West terminus, and a stretch of Pakington Street single track should be duplicated, to eliminate the series of passing loops, which would hinder the operation of express cars serving the industries. At the Aberdeen Street intersection, the West - Chilwell link should be restored. The completion of these connections would increase remarkably the capacity

and efficiency of the tramway system, by the provision of alternative routes between most of its termini. It would enable trams from the industries to reach most parts of the system without passing through the main streets of the city. Direct services to West, Chilwell and East (and to Newtown and Eastern Park if desired) could use these connections. The present layout does not permit direct running from North to East and Eastern Park without shunting in Ryrie Street.

A few of the present special industrial bus services would continue to serve areas not reached by the trams.

The remaining industrial load of approximately 2300 persons could be handled as one batch by 18 bogie trams (or, for example, 9 bogie and 12 single truck of present types), and this number should be reduced if agreement can be reached for suitable staggering of starting times.

PROVISION OF TRAMWAY ROLLING STOCK

It should be remembered that there are ample tram building facilities in Australia, with tramway workshops in Brisbane, Melbourne, Adelaide and Hobart engaged in this work. When present orders are completed and these 'shops revert to maintenance work, building equipment and staff will become available for outside orders. Also, a firm is building 250 new trams for Sydney, and at least one other firm tendered for the work.

In the meantime, to cater for the industrial traffic, another 11 bogie cars can still be obtained cheaply from the M. & M.T.B., and repainted and fitted in the satisfactory manner in which the present 6 have been. The Board also has another 7 four wheel cars not in use, some of which might be made available to help at Geelong until new cars can be built.

A few years ago the S.E.C. purchased land at the rear of the power house, and the present tram depot could be greatly extended by housing the paint 'shop and repair 'shops in the ground floor of the proposed new building. If this proves to be impractical, another site will have to be found for a second, smaller car shed. The cost of this would be only a fraction of that of the depot or depots which would be needed for a bus fleet (see Depot Facilities).

The cost of procuring and renovating an ex-Melbourne bogie car is less than one sixth that of a new diesel bus, and, if the tracks are maintained, it will still be running smoothly, with its far greater loads, when the bus is replaced.

GENERAL CHARACTERISTICS OF TRAMS AND BUSES.

This is a subject which has caused much controversy for many years, but many participants are ill-informed and much of what is written never reaches the general public. The following advantages of modern trams over motor buses are relevant to Geelong conditions. Many of them also apply to the older trams now in service.

1. Lower running costs per passenger mile.

2. Lower maintenance costs. For months on end, most trams require only an occasional adjusting of brake rods, replacement of brake blocks and trolley wheels and cleaning of controller contacts.

3. Longer vehicle life, due to stronger construction and lack of road bumping and vibration. The 410 W2 class cars,

which constitute about five eighths of the M. & M.T.B. day service trams, are up to 27 years old. They are still mixed with later types on most routes, all being listed together as "W" on the Board's car location sheets. They show no sign of deterioration. The oldest trams in use in Australia are the famous "matchbox" combination cars gradually being withdrawn from service in Brisbane. Still carrying heavy peak loads, these were built 50 years ago, with the cruder materials and limited technical facilities of those days. Another example is the standard V.R. bogie tram. For 33 years, these cars have carried very heavy loads to and from St. Kilda Station.

4. Faster acceleration, even with full loads.

5. Less obstructive to traffic. Fewer vehicles for given number of passengers, no pulling out from kerb, no unpredictable swerving (see Traffic).

6. Higher schedule speeds (with equal number of stops).

7. Ease and simplicity of control. Where one man operation is necessary this makes it safer.

8. Unrestricted kerbside parking for private vehicles (and bicycles in Geelong's parking racks).

9. Greater safety for pedestrians, passengers and other road users (see Safety).

10. Greater reliability. Mechanical and electrical faults a fraction of those of buses.

11. Greater overload capacity. The value of this was shown during recent Melbourne suburban train stoppages, when trams two feet longer than present Geelong bogie cars carried more than 220 passengers.

12. Ability to operate coupled together. Many so run in four Australian cities, including Adelaide's latest type. Gives economy in peak hour crews and increases passenger hour capacity of routes.

13. Greater permissible vehicle length.

14. Easy reversing without loops or turning circles. Buses obliged to turn back at unusual points cause even more obstruction and danger than at normal termini.

15. Greater comfort. Obsolete single truck trams are too often compared with modern buses. A bogie tram gives a smoother, steadier ride than any bus. (Padded seats were long considered unnecessary in trams, but buses without them would be intolerable). Smooth running and good lighting enable tram passengers to read comfortably.

16. Benefit to local rates. A tramway operating authority maintains part of the road surface without using it; heavy buses destroy roads (see Road Damage).

17. Use of home produced materials and equipment, including steel instead of rubber tyres.

18. Vehicles electrically "earthed" at all times. The first person to board a bus is frequently shocked by accumulated frictional electricity, generated as it approaches (several examples were recently mentioned in the Melbourne press).

19. No poisonous fumes, greasy smoke and unpleasant odours. A bus emits thousands of cubic feet of exhaust fumes in a day's running; much of it is carbon monoxide.

20. Less noise and engine vibration. The modern tram, with its smooth, even movement and rotary motors is adequately quiet without being dangerously silent. Motor buses, with their reciprocating engines, diesel knock and necessary gear boxes, emit considerable noise, particularly when starting or climbing hills (see P.C.C. Development).

21. Simpler operation of power driven auxiliaries (doors, brakes, brilliant and reliable lighting, including fluorescent).

22. Use of home produced electricity instead of imported fuels.

23. Rapid loading and unloading.

More information on these points is given in "Towards Ideal Transport" by C.R. Bizeray (The Light Railway Transport League, 245 Cricklewood Broadway, N.W.2. England), from which they were adapted. Readers are reminded that the book deals with English conditions and that consequently some of the author's statements and figures are not applicable here.

DISADVANTAGES:

Only two of the alleged disadvantages of trams will stand close examination.

1. The possibility of a power failure. These occur so rarely that they are not a serious factor, and they are usually of very short duration.

2. The fact that an accident to one may delay others. This is a nuisance, but the frequency of accidents does not justify considering it a serious one. As the tram can usually be driven away under its own power (often from the damaged end), most such delays last only as long as needed to take note of names and details.

FURTHER REASONS FOR RECOMMENDING TRAMS FOR GEELONG

FLEXIBILITY:

"Flexibility" of transport services finds many advocates who fail to appreciate the difference between the various senses in which the term is applicable. It may be interpreted as follows:

1. In the sense of being steerable in traffic, it is explained later (under Traffic) this is no unmixed blessing, and in the case of large public transport vehicles, is better replaced by mechanically compelled segregation.

2. In the sense of being able to vary the intensity of service over any given route or portion thereof. This is a truer definition of flexibility, and is evident less with rubber tyred vehicles than with trams, since the former require turning circles, loops or triangles, whereas the latter can reverse at any convenient cross-over without hindering other traffic, and possess a useful margin of elasticity in their overload capacity. Some systems also use portable crossovers, which are assembled and spiked down where needed.

3. In the sense of being able to transfer some or all of the vehicles to a temporary route or unusual area for special workings. This is better described as mobility, and while the motor bus is mobile, this attribute is only necessary for a minor proportion of the passenger vehicles operated by any large system. For its main services, regularity, comfort and low fares are more important, and these are best provided by modern tramways.

THE VALUE OF EXISTING ASSETS:

In spite of the fact that the capital value of the undertaking will be written off by June, 1950, most of it's equipment and facilities are in good order, and some items would be of great value for future operations.

As mentioned elsewhere, the track is far from the end of its useful life and can remain as the nucleus of the future, larger system. The recently acquired bogie cars, though old, are the most useful trams that have ever been operated in Geelong. The eight Pengelley (large single truck) cars, built for the system in 1925, are still well within the recognised amortization period of 30 years, and are, in fact, almost as good as when new, though of a type now regarded as obsolete. The value of the overhead wiring, including span poles, feeders, etc. must not be overlooked, and there is also the power plant which supplies 550V. D.C. to the trams. The depot has in no way deteriorated and its offices, workshops and other equipment remain serviceable.

The real, practical value of all these specialised assets can be destroyed only by an ill-considered decision to abandon them.

Finally there is the staff, an efficient organization of trained and experienced specialists, whose futures should also be considered.

It is for these reasons, that American transit experts state that "Where an electric street railway system already exists, any part of which is serviceable or repairable, ...the economic advantage of .....the new installation (over buses) would be accordingly increased." (From an American Transit Economics Study in the possession of the A.E.T.A.).

DEPOT FACILITIES:

The present tram depot would be quite useless as a bus depot because of it's peculiar design and the fact that a far larger area would be needed.

A complete new depot sufficient for a fleet of at least 96 buses (56 to serve present tram routes, as shown under Comparative Costs, 20 for extensions and branches, and at least 20 more to permit the system to handle the North Shore traffic) would have to be built. Apart from storage space and a reasonably large movement area, the nature of the vehicles would necessitate workshops with machine tools and spare parts on a larger scale than for trams, with a correspondingly larger maintenance staff. Fuel storage facilities would be needed, and a tyre department.

Administrative, revenue and traffic offices would be larger and staff facilities more extensive because of more numerous crew and depot personnel.

As it is unlikely that a suitable site would be available near the city centre, considerable "dead mileage" may add to operating costs.

HIGH ROUTE CAPACITY:

This is a great advantage where heavy crowds must be cleared in a short time, as at sporting fixtures, or where industrial establishments provide intensive peak loads of short duration. A single lane of trams will carry as many passengers as two lanes of buses or nine lanes of private automobiles. This means that peak crowds carried in trams occupy a smaller road area, an important factor in city streets where many routes converge and larger numbers of vehicles would increase congestion.

The American Transit Research Corporation states that "No one form of street transport will adequately serve the needs of a large city, but the electric car will move more passengers per hour, past a given point, than any other mode of street transport."

P.C.C. DEVELOPMENT:

The famous American standard tram, known as the P.C.C. car, is still developing in technical perfection and in popularity, and similar cars are now operated in other countries, including Canada, Spain, Italy, and Belgium. Many P.C.C. features, including the revolutionary resilient wheels, and magnetic track brakes, are also being adopted where the body design would not suit local conditions. (e.g. Blackpool,England).

The M. & M.T.B. has obtained the Australian rights for manufacture of P.C.C. trucks and other equipment, and an imported sample set is soon to be tested. The progressive Brisbane City Council tramway system has already conducted experiments with a new design of noiseless wheel, developed in conjunction with the University of Queensland.

These developments indicate that most future Australian trams will have many P.C.C. features.

ROAD DAMAGE:

A frequent service of heavy buses will ruin a road faster than any other type of traffic, and the cost of repairing and maintaining it usually falls upon the local council.

Cr. L.E.H. Hales, who was Mayor of the City of Northcote during the recent Bourke Street tram-bus controversy, informed a member of this committee that the rebuilding of High Street, when the present buses cease running, is expected to cost between £100,000 and £110,000.

In Launceston, bus operation on certain routes has caused movement of the road surface at stops, pushing the kerb out of place and displacing indicator posts. The council now plans to lay deep concrete platforms at these points and to connect them with a concrete strip along the road. The cost of this work should be charged against the buses, and its effect upon tyre life will add further to the operating costs.

The Newcastle City Council has recently pointed out that road maintenance costs have trebled where (double deck) buses have replaced trams, and detailed figures have been published and can be made available.

Uneven roads react upon the buses, giving rough riding for the passengers and loosening the bodywork, necessitating increased maintenance. This is one of the reasons why operating costs of heavy city bus services usually show a steep rise after a few years.

SAFETY:

In considering the merits of different forms of street transport, the subject of safety is an important one often neglected, and in this field the tram stands supreme.

As a rail vehicle can be much heavier than a pneumatic tyred one of the same size, its construction can be far stronger, giving increased protection to passengers, and increasing stability.

As all trams are fitted with lifeguards, consisting of a release gate under the bumper, and a drop tray suspended behind it a few inches above street level, no person falling in front of it can be run over by the wheels.

With its leading wheels unprotected and its unpredictable course, the bus is a danger to pedestrian and vehicular traffic, but other vehicles can confidently run close beside a tram.

It is sometimes pointed out that tram passengers are endangered by having to cross to the footpath, but it should be remembered that half of all bus passengers cross the whole street after alighting.

The tram's most striking safety feature is its exceptionally efficient braking. Air brakes safely reduce a tram's speed at a rate which would cause any road vehicle to swerve out of control. However, the tram cannot swerve, and if it slides towards the obstruction with locked wheels, adhesion is increased by sanding the rails.

If air, sand and reverse power are applied in full together, there is no other vehicle of any kind that can make a more violent stop.

When sand is used, emergency braking is affected very little by wet or greasy rails, while the danger of violently braking large road vehicles on wet streets is well known.

Hand brakes are also provided, mainly to hold unattended cars, but they are effective if air brakes are out of order.

POPULATION:

As the population of Geelong and district is 50,000 and is still increasing, it seems likely that it will soon reach the figure of 60,000, reported to have been given by Mr. Bell as necessary to support a tramway. Extension of the tramway system towards new housing areas would accelerate the increase.

Also, there are many tramway systems operating successfully in cities of under 50,000 inhabitants. An example is Fort Collins, Colorado, U.S.A., which has an efficient little system serving only 5,600 and many others could be quoted.

TRAFFIC:

In the use of available street space, public transport, which must always carry a majority of the travelling public, is entitled to priority over the private vehicle. However, trams, having twice the carrying capacity of buses in relation to total road space used, are less obstructive to other traffic.

In spite of kerbside loading, the use of buses aggravates the traffic problem in several ways.

At many stops the "No Parking" area is too short for buses to conveniently draw near the kerb, so they obstruct one traffic lane while loading. If sufficient space is provided (about 90 feet), following buses still "queue up", waiting to enter. This means that at city bus stops parking must be prohibited for a far greater length if the traffic is to flow unhindered. Where several bus routes use one city street, separate loading points must be provided or a bottleneck in the service will develop at peak periods. With heavy bus traffic, much of the parking space in Geelong's central streets would be lost, and with it would go some of the very useful bicycle racks.

A bus pulling out from a stop forces overtaking traffic to swing out towards the centre of the road, a dangerous feature where there are two lanes of moving vehicles.

Tramway safety zones are sometimes described as obstructive, but they never oblige motorists to stop, a point often overlooked because they are so often found where traffic lights are used. They narrow the street on one side, but loading buses use almost as much space, and the crowds waiting obstruct the footpaths, a factor of real importance because severe congestion can occur there at peak periods. Reduction of road width at zones must be balanced against overwhelming advantages of trams in quickly removing heavy crowds using a minimum of road space per passenger.

The deep sloping gutters in Geelong city streets make them unsuitable for heavy bus operation, and reconstruction for a considerable length at stopping places would be necessary.

TRACKWORK:

The tracks generally are in a better condition than those of many Australian systems. Many of the existing sleepers are rotting and the work of replacing them is now in progress. Apart from the curves, which wear quickly, the rails are not badly worn, and the S.E.C. Tramway Superintendent estimates that they are good for more than 20 years of the present traffic. Some rail joints and special work require the attention of the welding wagon, and other normal maintenance work.

For future requirements, the Broken Hill Proprietary Company has now in service mill equipment designed for rolling the new Australian Standard Tramway grooved rail, and this is being done for several authorities. The steel shortage is limiting production, but while the shortage lasts, two proved alternatives may be used: the Melbourne system of bolting a tongue strip to the web of an ordinary rail; or the Brisbane method of using such rail with a concrete groove in the road.

WARTIME TRANSPORT:

It is sometimes claimed that buses can be used in time of war for defence work, such as troop movements, while trams would be useless. In fact, experience has shown that full functioning of city transport is most vital for war industries, and passenger traffic becomes heavier.

As buses are dependent upon imported fuel and tyres, they are a liability in wartime, and the failure of supplies of oil, rubber, or the numerous spare parts needed, would cause a breakdown of the system.