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The Proposed Light Rail Transit Way From Tea Tree Plaza To Victoria Square

By George Clarke and Peter Casey

**A Report on the Department of Transport's proposal
as advocated by the September, 1978 Draft Environmental
Impact Statement, NEAPTR Working Papers and
other official documents.**

**Prepared for The Corporation of the City of Adelaide
October, 1978**

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FROM TEA TREE PLAZA TO VICTORIA SQUARE

A REPORT ON THE DEPARTMENT OF TRANSPORT'S
PROPOSAL AS ADVOCATED BY THE SEPTEMBER,
1978, DRAFT ENVIRONMENTAL IMPACT STATEMENT,
NEAPTR WORKING PAPERS AND OTHER OFFICIAL
DOCUMENTS.

PREPARED FOR
THE CORPORATION OF THE CITY OF ADELAIDE

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INTRODUCTION

In May this year, the Adelaide City Council considered a publication by the Government's North East Adelaide Transportation Review (NEAPTR) project on several alternative routes of a Light Rail Transitway (LRT) through the City of Adelaide.

On 29th May, 1978, the City Council submitted a statement and a report on the LRT project to the Minister of Transport. The report examined the compatibility of the LRT project with the economic, social, environmental and transport objectives and policies of the City of Adelaide Plan and the Council reiterated:-

"The Adelaide City Council supports the Government's policy of developing and improving public transport facilities. The Council will welcome and encourage any proposal to improve access between the City and the North East, provided that it is environmentally acceptable, as well as being co-ordinated and compatible with other transport systems within the City".

On the LRT routes then proposed within the City, the Council concluded:-

"The Council believes, however, that none of the four limited options within the City published in the NEAPTR report, can be accepted as adequately complying with the Objectives and Policies of the City of Adelaide Plan.

The Council believes that any surface rail system penetrating the Park Lands would entail extremely adverse environmental effects to Park Lands and residential areas which must be in direct conflict with relevant Objectives and Policies of the City of Adelaide Plan."

The Council questioned assumptions and recommendations made by Government transport planners favouring the LRT project over other alternative systems:-

"The Council is concerned that the potential of the existing Northfield line should be further investigated, since it appears to be one proposal that is acceptable environmentally, as well as being well integrated with an existing established metropolitan rail system."

"The Council considers that the under-used existing passenger rail terminal should be upgraded and strengthened."

"The Council is unable to comment on the need for a system of the capacity envisaged, since up to date forecasts of future population, residential densities, city retail and office space and employment, are not quoted and relevant information concerning land use (with which transportation planning should be integrated) contained in the 1962 Metropolitan Plan is out of date."

"The Council questions the following assumptions on which NEAPTR recommendations are based:-

- . It has been assumed that small differences in travelling times are a major factor in influencing commuters to use public transport, in preference to private vehicles.
- . It has been assumed that the Adelaide Railway Station is too far from the Central Business District to be an effective public transport terminal.
- . It has been assumed that L.R.T. which has proved to be effective in densely populated cities elsewhere, can successfully provide public transport to sprawled, low density communities such as exist in the Adelaide suburbs."

No response has been made by the Minister or Department of Transport to the City Council's May, 1978, submission.

On June 19, 1978, it was announced that State Cabinet had decided to build a "high speed tram" (or light rail transit) system linking Tea Tree Plaza with Victoria Square and running down the Modbury Corridor (along the Torrens River Valley) through the inner suburbs, along Mackinnon Parade (through the City's northern Park Lands) and King William Street through the City.

The Minister said: "an environmental impact statement will now be prepared on the route chosen by Cabinet and there will be a further short period for public comment before the final decision is taken in September" (1978).

In view of controversy over the LRT proposal, the Council decided to obtain independent advice. On July 14th, 1978, the Council appointed Mr. George Clarke and Mr. Peter Casey, the principal authors of the 1973-74 City of Adelaide Planning Study, to study the NEAPTR LRT proposal, its environmental impact on the City and its relationship to the City of Adelaide Plan.

City Council staff drew-up the City routes at a scale of 1:500 (about 40' to 1"). Messrs. Clarke and Casey documented and assessed the environmental and traffic impacts the proposed LRT would have on the City. These impacts are summarised in Section 1 of this report.

The proposed LRT project was examined in the light of the 1973-74 City of Adelaide Planning Study and the subsequent 1976 City of Adelaide Plan. It was found that the LRT project, as currently proposed, would seriously breach the comprehensive and integrated environmental and transportation principles of the City Plan.

These conflicts are described in Section 2 of this report, together with indications of how the LRT project could be broadened and improved to bring it into harmony with the City Plan's balanced provisions for vehicular traffic, pedestrians and environmental protection.

Section 3 of this report summarises the consultants' conclusions and recommendations. These were written following discussions between Council's consultants and the Director General of Transport of the consultants' preliminary review of NEAPTR's Working Papers on Government policy and the cost and benefits of the project as a whole.

The conclusions and recommendations of Section 3 of this report indicate a number of issues which the consultants believe should be resolved before the currently proposed LRT project is committed to construction.

The Appendices to this report are summaries of some of the work covered by the Council's consultants in reviewing NEAPTR publications.

At an early stage of the study, the consultants felt that the LRT project's environmental and traffic impacts on the City might have to be accepted in return for overwhelmingly greater social and economic benefits that the proposed LRT line might bring in the future to the residents of the North East suburbs. It was therefore necessary to review the 69 Reports and Working Papers produced by NEAPTR over the last three years. These amount to more than 5,000 pages of detailed technical work, computer assisted mathematical projections, expert opinion and simplified interpretations and summaries for public relations and participation purposes.

The key Working Papers compare how a variety of possible different public transport systems for the North East suburbs would operate on a typical weekday in the year 1996.

Projections are made of the costs and benefits of a number of different systems, how many people would use them, the effect each would have on vehicular traffic, pollution and other matters.

In a few weeks and with limited resources, Council's consultants could do no more than to check the apparent reasonableness of the conclusions drawn from the published data by the advocates of the LRT project.

A series of statistical tables comparing NEAPTR's published data on the 1996 performance of seven different transportation systems for North East Adelaide and a preliminary series of technical analyses and critical comments on the comparisons, were prepared.

The consultants concluded that the case for the LRT was "not proven". A preliminary analysis of NEAPTR's own Working Papers indicated that even assuming high population and City workforce growth rates, which are now unlikely to be achieved, the proposed LRT line to Tea Tree Plaza:

- * would not attract a significant number of people to switch to public transport;
- * would not significantly reduce vehicle traffic, energy consumption or air pollution; and
- * would not, on NEAPTR's own economic analysis, have future socio-economic benefits equal to costs at a 10% discount rate.

It was concluded that the environmental impacts the LRT would have on the City if it were built in its currently proposed form would outweigh the projected 1996 benefit of bringing 825 more people a day to the City than radial buses would.

The Director General of Transport disputed these interpretations of the NEAPTR technical data and therefore new comparisons were prepared, using figures stated to be relevant by the Director-General. The results do not appear to be significantly different (see Appendix 12). The Director-General has indicated that it is the intention of his Department to undertake further economic analyses of the LRT project using new data not previously available. This further economic analysis would be for the purpose of a submission to the Commonwealth Government for approval for support from federal urban transport funds.

It is beyond the limits of the consultants' brief and budget from the City Council to pursue highly complex technical details of computer modelling in any attempt to match the resources of the Department of Transport in this regard. The Appendices to this report are therefore only to be read as a preliminary draft series of technical analyses of, and comments on, NEAPTR publications to date, raising questions which appear to merit further consideration.

SECTION 1

ENVIRONMENTAL AND TRAFFIC IMPACTS ON THE CITY

THE OFFICIALLY PROPOSED ROUTE

The North East Light Rail Transitway (LRT) route through the City of Adelaide which is currently officially proposed in the September, 1978, Draft Environmental Impact Statement, is straight and direct. It favours fast running of the proposed 50 to 55 metre long coupled Light Rail Vehicles proposed and saves precious minutes in travel time over alternative routes.

It enters the City by a cut-and-cover tunnel under Park Terrace into Park 9 near the University Sports Oval south of Mann Terrace.

It runs in an open cut between Mann Terrace and Bundeys Road. It crosses Bundeys Road at grade into Park 11, cutting across the northern side of the College of Advanced Education Sports Oval.

It then runs along Mackinnon Parade West, necessitating the narrowing of the road, its conversion to one-way traffic and permanent elimination of all parking.

It crosses through landscaped parts of Parks 11 and 12, and crosses Frome Road, a major traffic artery, at grade, to an LRT station in Park 12 just east of Sir Edwin Smith Avenue.

It then crosses the City-bound traffic lanes of Sir Edwin Smith Avenue to run down the centre of that Avenue to cross the City-bound traffic lanes of King William Road to run along the landscaped median and turning lanes in King William Road to an LRT station in the centre of the road opposite the Festival Theatre.

The LRT then crosses North Terrace at grade and runs down the centre of King William Street to the major City LRT station between North Terrace and Grenfell-Currie Streets. It then continues down King William Street and through Victoria Square to join the Glenelg tram line which is intended to be converted for LRT operation.

THE PROPOSED LRT STATIONS

The official September, 1978, plans show three different types of stations as follows:-

- * Twin left side boarding platforms at the Park Lands station near Sir Edwin Smith Avenue;
- * Right side boarding from a single centre-of-the-road platform in King William Road opposite the Festival Theatre; and

- * Split single right side boarding platforms on either side of the fountain at the north end of Victoria Square.

The latest official plans do not show a station design for what would be the busiest and most congested station of all, the station in King William Street opposite Rundle and Hindley Streets.

This is a difficult design problem. Of all alternatives roughly sketched in earlier official documents, only two seem to have practical possibilities.

The first seems better for L.R.T. operations but takes at least 3 lanes out of use for a long stretch of King William Street. This comprises centre street passenger waiting and boarding platforms as wide as a normal traffic lane, one between Rundle/Hindley and Grenfell/ Currie Streets for north-bound passengers, another between North Terrace and Rundle/Hindley Streets for south-bound passengers. This arrangement would occupy the best part of four traffic lanes in King William Street if the platforms were absolutely central. It would thus seem desirable to offset the arrangement to take two lanes on the one side and one lane on the other side of the centre line of King William Street. People would then walk to the ends of the central street station platforms from existing pedestrian crossings at each cross street intersection. Safety railing would be necessary along the non-boarding sides of platforms continuously between cross street intersections. (See relevant plan and photomontage in this report).

A possible alternative would be to have no boarding platforms at all and to run the LRT tracks in existing traffic lanes on either side of the existing median (which would then only carry the staunchions supporting the overhead wires). Passengers would then wait along the length of existing footpaths and cross to the centre of the road to mount the LRT carriages from street level when traffic lights stopped other vehicles from moving and signalled passengers to "walk". The major drawback to this is that passengers would walk through stationary or possibly moving motor vehicles over 50 to 100 metres lengths on both sides of the street.

These are simplified descriptions of possible approaches to the problem, which is yet to be seriously studied by the advocates of the project, but which is further analysed on page 17 of this report.

The route and the stations have been drawn and studied by City Council staff and consultants at a scale of 1:500. These plans, and photo montages of the project, are presented with this report.

SOCIAL AND ENVIRONMENTAL IMPACTS ON THE PARK LANDS, NEARBY AREAS AND THE PEOPLE WHO USE THEM

The LRT route currently officially proposed is the straightest and fastest variant of several running east-west across the Northern Park Lands. It runs parallel to Mackinnon Parade East but on-street along Mackinnon Parade West and in the centre of Sir Edwin Smith Avenue. This has more social, but less environmental impact than the "all Park Lands" variant, which runs through Park Lands near Mackinnon Parade West and Sir Edwin Smith Avenue, instead of on-street in those sections.

This part of this report is based on surveys carried out by the City Council's Parks, Gardens and Recreation Department.

The route across the Northern Park Lands would inconvenience a total of 335,000 users of the affected Park Lands each year, estimated by experienced Council Officers as follows:-

Sports players: 250,000 per year (Park No. 9: 40,000; Park 11: 210,000).

Other Park users: 85,000 per annum.

In the Park Lands a total of approximately 70 to 90 trees (depending on detailed design) would be lost and others would be lopped. In King William Street, 24 trees and 48 shrubs in the median would not survive.

The costs of removing these and of replacing an equivalent number in new buffer planting strips where this is desirable and possible, is estimated at about \$100,000. Extra costs of about \$12,500 would be involved in altering sports facilities. These costs should be borne by the LRT project if it is ever built. A net area of more than 1 hectare of Park Land would be alienated, as measured by Council's Parks, Gardens and Recreation Department.

Some details of the adverse social and environmental impacts of this LRT route are:-

From Park Terrace to near Mann Terrace:

- * Cut and cover tunnel with mounded roof and possible above-ground ventilators.
- * Loss of four or more trees (River Red Gums) depending on detail design.
- * Pedestrian access to Park Lands over tunnel-roof.

From near Mann Terrace to near Bundeys Road:

- * Sunken open cut completely fenced both sides along tops of concrete retaining walls.
- * Track must be completely lined with safety fences where not in cutting.
- * People not able to walk across track except at special safety crossings.
- * One pedestrian safety crossing possible at or near Bundeys Road.
- * Loss of 32 trees (2 Aleppo pines, 8 River Red Gums, 22 Elms).
- * Loss of two tennis courts (1 lawn, 1 hard).

- * University Sports Oval and floodlit lacrosse area reduced in area and altered. Loss of two discus/shot putt circles.
- * New buffer planting mounds necessary to hide the open cut from Mackinnon Parade.
- * New buffer planting necessary between sports areas and LRT track to stop balls going onto track.
- * Views over Park Lands from Mackinnon Parade cut by buffer planting.
- * Mackinnon Parade East divorced from Park Lands visually and physically.

From Bundeys Road To Mackinnon Parade West across the College of Advanced Education Sports Oval:

- * Loss of one senior football oval and one senior turf cricket pitch by cut in area of College of Advanced Education Sports Oval, resulting in restricted use.
- * Loss of one concrete discus/shot putt circle.
- * Loss of six trees (4 Sugar Gums, 1 Kurrajong, 1 Elm).
- * Essential safety fences on both sides of track would stop people walking to Park Lands except at infrequent safety crossings, possibly at or near Bundys Road or Jerningham Street.

Along Mackinnon Parade West between Jerningham Street and Frome Road:

- * Elimination of 220 parking spaces along the entire length of Mackinnon Parade West; narrowing and conversion of this Street to one-way traffic east-bound.
- * Social dislocation by elimination of parking and creation of traffic congestion for residents and visitors to University Gym and Fitness Centre, Kathleen Lumley College, Park Lands and Sports Ovals, thus creating traffic and parking problems in Finnis Street, Jerningham and other North Adelaide Streets.
- * Noise impact on houses and buildings fronting Mackinnon Parade West, against which no mitigating measures are physically possible.
- * Safety fencing on Park Lands side of LRT track will stop people walking to and from Park Lands except at one safety crossing in front of the University Gym and another at the Frome Road level crossing.
- * Loss of five trees between Frome Road and Mackinnon Parade.

If the LRT track was to run in the Park Lands alongside the road, so as to avoid narrowing and congesting Mackinnon Parade West, then at least 25 River Red Gums would be lost and about 50 others would be lopped to allow the LRT track to pass near them.

From Frome Road to Sir Edwin Smith Avenue across Park No. 12:

- * Loss of ten trees for LRT track and station in Park Lands near Sir Edwin Smith Avenue.
- * Safety fences along track would stop access to Park Lands except at Frome Road and Sir Edwin Smith Avenue, cutting Park 12 into two parts.

At Sir Edwin Smith Avenue this LRT route enters the middle of the road for the rest of the way to Victoria Square. Sir Edwin Smith Avenue would have to be widened continuously by 3 metres (5m in part), eliminating kerbside parking. This would cause:-

- * Loss of an additional 10 to 20 trees, depending on how the widening was arranged.

ENVIRONMENTAL IMPACT ON THE CHARACTER OF KING WILLIAM STREET

One of the most pleasant features of the City is the vista along King William Street and Road, from Victoria Square to the Festival Theatre and the Torrens River.

This is the central axis of the City and of the metropolitan area as a whole. It is pleasant, uncluttered and dignified with its tree planted median strip, and gay with closely spaced flags on tall flag poles.

The whole happy character of this axis would change. Up to twenty-four trees and forty-eight shrubs would be removed and if not removed, would be unlikely to survive the cluttered, congested situation created by the volumes of 50 metre long coupled LRT cars, buses and motor vehicles competing for road space with heavy volumes of metropolitan north-south through traffic, while pedestrians try to cross these traffic streams to reach the LRT stops in the centre of the road.

Stanchions and overhead wires would become the axial feature of the street. An LRT station, lined with safety fences and with a roof shelter, would presumably replace the median strip for most of the two blocks between North Terrace and Grenfell-Currie Streets.

IMPACTS ON TRAFFIC CONGESTION IN KING WILLIAM STREET AND ROAD, KINTORE AVENUE, FROME ROAD, MORPHETT STREET AND MONTIFILORE ROAD.

These four roads together carry north-south traffic through the City. They make up what transportation engineers call a "corridor".

Because there is no effective bypass road close to and west of the City, to carry the heavy volumes of metropolitan through traffic wanting to travel directly between the northern and southern parts of the metropolitan area, without stopping in the City, much of this traffic is forced onto King William Street and Road or one of the other parallel roads through the centre of the City.

Thus heavy commercial and other through traffic, which has no business in the City, congests these City streets and damages the amenity, environment and efficiency of the City for pedestrians, public transport, delivery, service and other local traffic which serves the City.

This unnecessary through traffic was 36,000 vehicles a day in 1972 and grew to more than 40,000 vehicles a day in 1977, or 38 per cent of total traffic on the four roads.

This is the biggest single environmental and traffic problem in the City. Until this unnecessary congestion is removed by the provision of bypass roads, no significant progress can be made in implementing improvements in public transport, pedestrian facilities and the overall environment of King William Street.

Research in 1973 (based on 1972 traffic data) as part of the City of Adelaide Planning Study, established that the provision of bypass roads outside the City to the west, was an essential prerequisite to any longer term attempts to give greater priority to public transport, pedestrians or landscaping in King William Street.

The total practical capacity of the four City streets is 120,000 vehicles a day, having regard to the hourly distribution of traffic.

In 1973, it was projected that this capacity would be reached by 1980, and that action was needed by then to provide bypass road capacity outside the City boundaries.

Traffic counts by the Adelaide City Council indicate that traffic in King William Road increased by about five percent between 1972 and 1977 to about 36,000 vehicles per day. During the same time, traffic on Montefiore Road increased by 18 percent to about 37,000 vehicles per day, on Frome Road by 14 percent to 26,000 vehicles per day and on Kintore Avenue to 9,000 vehicles a day. Traffic in the corridor has increased from 95,000 in 1972 to 108,000 in 1977.

Research in 1973 for the City of Adelaide Plan estimated that the corridor would carry 136,000 vehicles per day by 1985, without any major change to the metropolitan road or rail network. This would be 16,000 greater than the total capacity of the roads. This trend line projection for 1977 was about 110,000 vehicles per day.

The estimate of 136,000 vehicles per day in 1985 was prepared on the basis of a metropolitan population of about 1,175,000 being attained by 1985, and hence a trend line projected population of about 960,000 in 1976. The 1976 population is measured at the 1976 Census was about 5 percent below this. This is consistent with the general decline in the rate of population growth.

It is now estimated that the traffic in the corridor will be no more than 125,000 vehicles per day in 1985, compared with 95,000 in 1972 and 108,000 in 1977.

This aggregate volume by 1985 would exceed the capacity of the four approach roads by about 5,000 vehicles per day. In other words, the capacity of the northern approach road systems would be reached, by 1982/3 and not 1980 as previously estimated, unless measures are taken to provide bypass roads to divert through traffic from the City.

Table 1

DAILY TRAFFIC ON NORTHERN APPROACHES TO THE CITY CENTRE

<u>Year</u>	<u>Daily Corridor Traffic (vehicles Per Day)</u>	<u>Assumed Metropolitan Population</u>
1972 - traffic counts	95,000	850,000
1977 - traffic counts	108,000	920,000
1985 - estimated in 1973 for City of Adelaide Plan.	136,000*	1,175,000
1985 - current estimate	125,000*	1,000,000
1996 - current estimate	136,000*	1,100,000

* Effective capacity is 120,000 vehicles per day without LRT tracks.

Analysis of the distribution of traffic increase over the last five years indicates that the greatest absolute increase has been on Montefiore Road and that relatively little increase has occurred in King William Road. This seems to indicate that Montefiore Road has been under-utilised compared with King William Road and hence was better able to absorb the increase within the corridor. The situation now is that Montefiore Road, King William Road and Frome Road are all congested at peak hours and none of these three major arteries has the capacity to absorb more than a limited share of future growth that might take place over the next seven to ten years. The capacity of Frome Road is restricted by the historic narrow bridge over the Torrens River. Allowing for some traffic growth in Kintore Avenue, it would appear that King William Street could absorb a further 10 percent increase in peak hour traffic provided that the capacity of King William Street is not reduced by the introduction of LRT operations.

Complete denial of the two central or median lanes in King William Road and King William Street to motor cars would reduce the capacity of these streets by about 15 percent at North Terrace and 20 percent at Grenfell Street. This implies an approximate 6 percent reduction of the capacity of the corridor as a whole. Shared use of the median lanes by LRT and motor cars would lead to a lesser reduction in the road capacity of King William Street (about 10 percent) and the corridor (about 3 percent).

This reduction in street capacity is calculated from data on modern LRT vehicles and data published in the Australian Road Research Board's Signalised Intersections Capacity Guide. On this basis, the type of 50 to 55 metre long double coupled LRT vehicle proposed for use in King William Street, would displace the equivalent of six ordinary motor cars.

Table 2

IMPACT OF LRT ON CAPACITY OF NORTHERN APPROACHES TO CITY CENTRE

<u>King William Street Alternative</u>	<u>Effective Corridor Capacity (Vehicles per day)</u>	<u>Estimated year of reaching capacity based on present growth</u>
No change	120,000	1982-83
Shared operation of tracks by LRT and motor vehicles	116,000*	1980-81
Exclusive tracks for LRT	112,000*	1978-79

Table 2 indicates that bypass road capacity will be needed by 1982-83 under normal conditions, without any attempt being made to build LRT tracks, stations and new signal systems which would favour LRT movement over vehicular traffic in King William Street.

The impact of any start of construction on LRT tracks, stations and signal systems would immediately be to block two or three lanes for up to a year and bring forward the need for bypass road capacity by four years.

If and when the LRT tracks are made available for shared use by motor vehicles, the need for bypass road capacity would still grow two years earlier than under normal circumstances.

It seems that the Government has not yet committed itself to build new bypass road capacity, despite the fact that this was one of the major recommendations of the City Council's 1973-74 City of Adelaide Planning Study and is a key element in the City of Adelaide Plan. The subject is barely touched on in NEAPTR publications. It is not mentioned in the official Environmental Impact Statement published as late as September, 1978.

The 1973-74 City of Adelaide Planning Study estimated that in 1972, 36,000 vehicles per day on King William Street and parallel streets (38 percent of the corridor traffic) was through traffic, and that this would increase to 49,000 vehicles per day (36 percent of the corridor traffic) by 1985.

Notwithstanding that population and traffic growth have slowed down, the fact remains that by 1977, over 40,000 vehicles per day using the corridor were through traffic and that up to 80 percent of this could be diverted. The amount of traffic diverted would depend on the quality and extent of the bypass facilities provided.

Three such bypass traffic projects recommended in City of Adelaide Plan publications, are:-

- (a) Widen Fullarton Road, between Glen Osmond Road and Kensington Road, and upgrade the section Park Terrace, Robe Terrace, Fitzroy Terrace between Hackney Bridge and Torrens Road:- estimated diversion 6 percent of corridor traffic or 7,500 vehicles per day in 1985.
- (b) Complete the Hindmarsh Boulevard deviation between Fitzroy Terrace and South Road, and widen South Road and Marion Road to 24 metres within the existing road widening scheme:- estimated diversion 12 percent of corridor traffic or 15,000 vehicles per day in 1985.
- (c) Complete the section of the North-South Freeway between South Road and Grand Junction Road or thereabouts:- estimated diversion 15 percent of corridor traffic or 19,000 vehicles per day in 1985.

Completion of all three projects would divert about 35,000 vehicles per day by 1985, after allowing for vehicles which would divert onto either (b) or (c).

The need for bypass road capacity will grow in line with population growth and with the degree of use made of any LRT in King William Street.

If, by 1996, as NEAPTR projects, LRT vehicles run through the City at two minute headways, then estimates made for the City Council indicate that north-south motor traffic through the City centre will be 20,000 vehicles per day more than City streets crossing North Terrace can handle without unreasonable congestion.

Since all official projections of the possible benefits of the LRT are in terms of what might be achieved by 1996, it is surprising that no government commitment has been made to build any need for any major bypass around the City, apart from local road widening. No specific plans have been published and the costs of essential bypasses have been omitted from LRT economic evaluations. This is all the more surprising, in view of officially published projections showing that the LRT would make no significant difference to the total usage of motor vehicles - even in 1996.

The 1973-74 City of Adelaide Planning Study recommended that a detailed investigation into the need for and the environmental impact of a major bypass road to the west of the City be carried out as a matter of urgency, and that the City Council should be a party to such an investigation. The 1978 LRT proposal now makes such an investigation even more urgent. It also indicates that the construction of a bypass should be programmed so that at least the first stage of the recommended bypass project can be completed before the start of construction of any LRT in King William Road and King William Street reduces their capacity to carry vehicular traffic.

NEED TO AMEND THE ROAD TRAFFIC ACT

The official LRT proposal is for motor vehicles to be allowed to drive along the LRT tracks where these run on-street.

This would require amendment to Section 73 of the Road Traffic Act, which states that:-

"A driver about to make or making a right turn shall not permit his vehicle to obstruct the progress of a tramcar or to stand in a place where it is likely to do so".

It would need to be amended to allow private motor vehicles in King William Street to make right turns during business hours. It is anticipated that the existing ban on right turning vehicles during peak hours would remain in force.

THE IDEA OF CONVERTING KING WILLIAM STREET TO A FULL OR PARTIAL MALL FOR PUBLIC TRANSPORT AND PEDESTRIANS

This long term objective was discussed by the City Council's consultants and the Director General of Transport in 1974.

It was then and is still, obvious that this could never be seriously considered unless and until the Government committed itself to:-

- (a) the construction of major new north-south bypass roads west of the City, such as the Hindmarsh Boulevard and the central North-South Freeway; and/or
- (b) the construction of the central city underground railway tunnel to take rail or LRT lines from the North East (and possibly elsewhere) under the City.

In the City of Adelaide Plan, both these pre-requisites (the bypass and the tunnel) are specified on Diagram 4 "The Desired Future Overall City Movement System". They are referred to in Policy 114: "when through traffic in the City has been substantially eliminated and public transport usage has been significantly increased, consideration should be given to the planning of Victoria Square and King William Street (north of Victoria Square) as pedestrian dominant areas".

IMPACTS ON BUS OPERATIONS IN KING WILLIAM STREET AND KING WILLIAM ROAD

Surveys of peak hour bus traffic on King William Street were conducted by the Adelaide City Council during July 1978. For the peak hour between 8.00 a.m. and 9.00 a.m., south-bound bus volumes were about 150 over the section of King William Street between North Terrace and Victoria Square (Flinders Street), while the corresponding north-bound volumes were about 100.

Analysis of these and other data, and of Adelaide Public Transport Maps showing bus, train and tram services, allows estimates to be made of the origins of these buses, and hence of the likely residual south-bound peak hour bus traffic in King William Street if an LRT were to be built.

The proposed LRT would not divert any buses from the four approaches from the north and east. These would total between 65 and 70 buses per hour. It would allow diversion of only a small proportion (possibly 25 percent) of the 28 local buses through Lower North Adelaide and of the 16 buses operating along Lefevre Terrace. However, it would allow for high diversion (possibly 75 percent) of the 19 or more limited-stop buses now travelling via Lower North Adelaide.

Thus about 30 of the 150 suburban buses now using King William Street could be replaced by an LRT. It is possible that the Beeline bus service could also be reduced in frequency but this would have little effect on the total volume of buses in King William Street. The residual volume of buses in King William Street is therefore likely to be about 120 per hour south-bound during the morning peak, an overall reduction of the order of only 20 percent. It should be noted that all or almost all of the buses now using Frome Road would be replaced by the LRT.

Bus volumes in King William Road south of Sir Edwin Smith Avenue are basically similar to those in King William Street, with some inbound buses from the north terminating at Kintore Avenue, offsetting other buses from the east travelling along North Terrace to King William Street. Consequently about 100 buses per hour would travel south along King William Road during the morning peak following the opening of an LRT from the North East.

Any attempt to re-route Kintore Avenue buses to King William Street would further reduce the capacity of King William Street below that estimated earlier in this report and accelerate the need for bypass roads around the City.

EFFECT ON VEHICULAR TRAFFIC AND BUS OPERATIONS IN FROME ROAD.

The road pavement of Frome Road would need to be widened from its present width of 11.5 metres to 14 metres for a distance of 200 metres on either side of the LRT Park Lands level crossing, in order to allow movement of two lanes of traffic in each direction through the level crossing.

A level crossing will greatly increase the stresses in the existing pavement due to braking of vehicles, possibly including buses, and accelerate the need for replacement of the pavement. Because of this, an entirely new strengthened pavement on this road appears necessary for up to 100 metres on either side of the crossing to cater for the stopping and starting of the 26,000 or more vehicles per day that will continue to use this road. The costs of these measures should be borne by any LRT project.

Signal control on the crossing should be such that the proportion of green time excluding amber time available to road traffic does not fall below 50 percent over any three minute period during the day. Subject to this condition being met, the concept of signal timing programs giving pre-emption to LRT vehicles only in the peak direction should be satisfactory. In addition, minimum green phase times for road traffic should be 25 seconds.

Figures produced by the Director General of Transport indicate that about 24 buses per hour travelled towards the City on Frome Road during the morning peak hour in 1974. These buses were basically limited stop services catering for the Tea Tree Gully area. It is understood that the frequency of buses serving these areas has increased since 1974 and will continue to increase in the future. It is these buses which would be replaced by the LRT if it were built. The outcome is that no existing bus services would continue to use Frome Road. However, the opportunity would exist to divert other buses from King William Street to Frome Road. This would be a useful way to help control the congestion in King William Street caused by introduction of an LRT.

IMPACTS ON VEHICULAR TRAFFIC AND BUS OPERATIONS IN LOWER NORTH ADELAIDE.

All limited stop bus services now using Mackinnon Parade and Finnis Street could be replaced by the LRT. Most limited stop and some local services now using Melbourne Street could be replaced. However, about 30 buses per hour would still continue to use Melbourne Street. This volume would not justify retention (after the opening of any LRT) of the bus priority lanes now being planned for Melbourne Street. Introduction of a bus priority lane for inbound traffic would have little or no adverse effect on local business in Melbourne Street; but the introduction of same in the afternoon for outbound traffic would have some adverse effect. The necessity for bus priority lanes prior to the opening of an LRT can only be determined after further studies of travel speed of buses along Melbourne Street. Studies so far suggest that existing traffic volumes in Melbourne Street are not reducing the overall operating speeds of buses along that street.

The loss of 220 parking spaces in Mackinnon Parade West, caused by the on-street LRT route, would have considerable local impact.

IMPACT ON VEHICULAR TRAFFIC AND BUS OPERATIONS IN SIR EDWIN SMITH AVENUE.

Sir Edwin Smith Avenue between Pennington Street and King William Road has a width of between 17 and 19 metres kerb to kerb. Kerbside usage in areas not required for bus zones varies from 1 hour to all day.

This street carries an estimated 20,000 vehicles per day. Peak hour counts indicate a morning peak hour flow of 1,006 vehicles per hour inbound and 477 outbound; and an afternoon peak hour flow of 1,020 vehicles per hour outbound and 671 inbound.

Sir Edwin Smith Avenue carried an inbound peak hour volume of 63 buses per hour in 1974 and probably about 70 per hour now. With an LRT in operation, Sir Edwin Smith Avenue would continue to carry about 40 buses per hour in the peak direction. Provision of two moving traffic lanes in each direction outside of the LRT tracks would be necessary. Widening of Sir Edwin Smith Avenue to 22 metres kerb to kerb, over the section from King William Road to just north of Pennington Terrace, would be required.

Traffic signals providing pre-emption for LRT vehicles would be required at the intersection of Sir Edwin Smith Avenue and Pennington Terrace. It would probably be necessary to completely prohibit right-turns from Pennington Terrace into Sir Edwin Smith Avenue.

Traffic signals pre-emption for LRT vehicles should be subject to this being restricted to the peak direction only and to a maintenance of the proportion of green time, excluding amber time, not dropping below 50 per cent when measured over any three minute period during the day. In addition, introduction of signals providing pre-emption for LRT vehicles is likely to lead to accelerated wear and tear on the pavement of Sir Edwin Smith Avenue through the braking of vehicles including buses. Pavement strengthening on the approach lanes of Sir Edwin Smith Avenue would be necessary for a distance of 100 metres north of Pennington Terrace. The costs of this should be borne by the LRT project.

IMPACTS OF LRT STATIONS ON TRAFFIC AND PEDESTRIANS

The officially proposed line would have four stations in the City of Adelaide, north of Victoria Square. These would be:-

- * In the Park Lands immediately east of Sir Edwin Smith Avenue;
- * In the middle of King William Road at the Festival Theatre;
- * In the middle of King William Street between North Terrace and Grenfell-Currie Streets; and
- * In the northern islands of Victoria Square.

The station at Sir Edwin Smith Avenue would not have any major impact on traffic as the stop for pick up and set down would be made in the Park Lands away from the roadway, but a pedestrian crossing of the Avenue would be needed to get to it.

The station near the Festival Theatre would presumably use central island platforms. Adequate space is available at Victoria Square for any conceivable loading and unloading patterns without any need for special intrusion of the platform into the road carriageway.

The greatest impacts would be at the busiest station in King William Street a block on each side of Rundle Mall. It is assumed that northbound coupled LRT vehicles would load and unload between Rundle-Hindley and Grenfell-Currie Streets. Southbound LRT combinations would load and unload between North Terrace and Rundle-Hindley Streets. Central island platforms are assumed.

Northbound loading would require the greatest platform capacity. The following analysis attempts to quantify this. From examination of workforce distribution within the City, it is estimated that about two thirds of total City patronage would load and unload at the Rundle-Hindley LRT station. Consequently, a design loading of 4,000 persons per hour on the northbound platform would need to be assumed. On average, platform capacity for 150 persons would be required. However, even small deviations from the scheduled two minute frequency would lead to platform overloading. A platform capacity of 300 persons should be provided.

Platform loadings on the top deck of Sydney's Wynyard Platform in the early 1970's were about 22,000 persons per hour on a platform with an effective area of about 1,200 square metres, yielding a throughput of about 18 persons per hour per square metre of platform. This level of crowding was clearly unsatisfactory and a space standard of 10 persons per hour per square metre is suggested here. This requires a total area of 400 square metres for the north-bound platform. Given the constraints that no more than two 50 metre LRT combinations should be loading simultaneously, a platform length of no more than 100 metres should be envisaged. This requires a platform width of 4 metres. As the existing median is only 1.8 metres wide, further widening by 2.2 metres plus an extra 0.5 metres for safety railing would be required. This will lead to the reduction of one extra traffic lane in width at that station, in addition to the two lanes used by the tracks.

A platform of 400 square metres would allow about 1.3 square metres per waiting passenger. This space standard is necessary to allow for the jostling of passengers (in many cases carrying parcels) and also the interaction between boarding and alighting passengers moving along the platform to the signalised pedestrian crossings at Rundle-Hindley Streets and at Grenfell-Currie Streets at the extreme ends of the platform. Continuous safety railing would be necessary to prevent any midblock pedestrian crossing to protect pedestrians and prevent traffic chaos.

For southbound loading and unloading, the platform would be located between Rundle-Hindley and North Terrace. This platform could possibly be a little narrower, but in practical terms, the net effect of the Rundle-Hindley station will be that three traffic lanes and the median strip will be taken up for most of the two blocks between North Terrace and Grenfell-Currie Streets.

Because the station and tracks would occupy three lanes, it would be necessary to remove all loading zones, bus stops and taxi stands at least during the morning and evening peak hours between Fowlers Lane and Clarence Place on the eastern side of King William Street and between Gilbert Place and Hindley Street on the western side. Peak hour standing restrictions would be necessary on all cross streets within 50 metres of King William Street on both the approach and departure sides of the road. All taxi stands from King William Street would have to be removed to the cross streets, reducing other kerbside uses in those streets.

In addition, closure of all existing mid block median gaps between North Terrace and Grenfell Street would be necessary, together with the probable need to close mid block median gaps between Grenfell Street and Victoria Square.

Rain protection covering over the station platforms would be needed in each direction up and down King William Street from the Hindley-Rundle intersection north to North Terrace and south to Grenfell-Currie Streets.

RELATIVE IMPACTS OF BUSES AND LRT VEHICLES ON TRAFFIC

One of the advantages claimed for LRT vehicles is that they need operate at only two minute headways, compared with standard buses needing to operate at 20 second headways to carry the same number of people. This infers that LRT vehicles or combinations have six times the carrying capacity of individual standard buses in moving the estimated peak load of 6,800 persons per hour. Individual 44 seat buses operating at 20 second headways could carry this load completely seated, with some 15 percent spare seating capacity as well. Whether LRT vehicles operating at two minute frequencies can provide the same standard of seating without the need for unduly long LRT vehicles or combinations is highly questionable. Evidence so far available suggest that combinations of 60 to 80 metres in length would be required to maintain equivalent standards of seating. The effect of such long combinations on traffic and pedestrian flow during boarding and alighting, and therefore on station design, would require further detailed investigation. However, it is likely to be quite adverse, as postulated in NEAPTR Working Paper 18 which noted that the operation of triple units (approx. 80 metres long) at two minute headways could create road congestion and pedestrian hazard to a degree that would be unacceptable. It may require lengthening of signal cycle time within the City of Adelaide. This is now kept down to 70 seconds in order to maintain the good pedestrian discipline which currently exists at street crossings.

The actual design and length of LRT combinations that will be used to carry the projected load at two minute headways has yet to be worked out. The seated passenger carrying capacity for any given length will be governed by whether the LRT vehicles are to be capable of single or double ended operation and whether they need double-sided loading. It appears that double-ended and double-sided vehicles will have to be used.

If the combinations are to be restricted to 50 metres in length, which is probably the maximum acceptable for City operation, they are likely to have seating capacities of no more than 180 and possibly as low as 150 seats. This implies between 25 and 35 per cent standing passengers. Alternatively, frequencies would have to be reduced from two minutes to one and a half minutes or less to provide the same level of seating capacity as by standard buses at 20 second headways. Increases of this magnitude would reduce the capacity of King William Street by an additional three or four per cent to effect a total reduction in capacity of about 13 or 14 per cent for shared operation of the LRT tracks.

Articulated buses have a seating capacity of 70 to 75 seats. These would have little or no greater effect on vehicular traffic than ordinary buses and could operate at lower frequencies to provide the same passenger carrying capacity. It is quite likely that articulated buses could operate at a little over double the frequency of 50 metre LRT combinations and provide equivalent seating capacity. They could also be deployed to streets other than King William Street to provide a more flexible service, linking to a "pull-on" busway in the North East Corridor from Park Terrace to Tea Tree Plaza.

A NOTE ON COSTS

The LRT would generate certain direct and indirect costs within the City which would be borne by the City Council and/or by City people, unless care was taken to ensure that all such direct costs were borne by, or compensated from, the budget for the LRT project. These indirect and direct costs should also be included in socio-economic assessments of benefit/cost ratios for the project as a whole.

These costs include:-

- * removal and replacement of trees and landscaping and alterations to sports facilities;
- * the alienation of about 1 hectare of the Park Lands;
- * safety fences and pedestrian crossings in the Park Lands;
- * new signal systems at all affected points;
- * widening of Frome Road over 400M length, pavement strengthening 200M length;
- * widening of Sir Edwin Smith Avenue by 3M, pavement strengthening 100M length;
- * costs of reallocating kerbspace in King William Street and cross streets;
- * a proportion of the costs of building bypass roads; and
- * injurious affects on properties along Mackinnon Parade.

SECTION 2

CHANGES NECESSARY TO PROTECT THE
ENVIRONMENT OF THE CITY IN ACCORD
WITH THE CITY OF ADELAIDE PLAN

Since 1971, one of the major policies of the State Government has been to improve existing and develop new and innovative public transport facilities. The Adelaide City Council has co-operated with and assisted the Government to plan for the implementation of public transport policies and projects. Council's consultants worked closely with Government transport planners during 1973 and 1974 on the City of Adelaide Planning Study which led to the adoption by the Council of the Council's 1976 City of Adelaide Plan. The City Plan is the result of years of intensive work and consultations in which all government and community interest groups participated extensively.

The City of Adelaide Plan demonstrates Council's commitment on the same social and environmental "quality of life" issues which inspire the Government's transport policies. The City Plan now being implemented, integrates and balances ten major social, environmental and transport objectives, through 127 detailed policies on landscape, streetscape, conservation, environmental protection, walkways, public transport, vehicular traffic and parking, as well as employment, education and residential development.

The current officially proposed LRT project breaches understandings and principles concerning the balanced introduction of traffic, transport, pedestrian and environmental improvements which were embodied in the City of Adelaide Plan after years of joint Council-Government studies and consultations.

These understandings and principles are embodied in the Plan's Diagram 4, entitled "Desired Future Overall City Movement System" and in Policies 39, 41, 69, 70, 71, 76, 94, 95, 100, 101 and 114 of the Plan as formally adopted by the Council in October, 1976. The understandings and principles relevant to the current LRT proposal may be summarised as follows:-

1. The Government should build the planned major bypass roads to stop the environmental damage and economic waste caused by unnecessary north south through traffic of 40,000 to 50,000 vehicles a day using King William and parallel City streets, while the City Council would simultaneously assist the Government to improve existing and develop new and innovative public transport facilities.
2. The Park Lands, which make Adelaide unique among Cities the world over, would be protected, improved and expanded instead of continuing to be eroded as they have been over the past century.

3. Any future public rail transport line from the North East or elsewhere would run underground within the City boundaries, as specified in Parliamentary Paper 109 of 1974 and on Diagram 4 of the City of Adelaide Plan, so as to prevent environmental damage to City streets and Park Lands.
4. If the Government's planned full Central City Underground Link ultimately proved uneconomic, the Government would build major new bypass roads and improve others outside the City so as to completely eliminate vehicular through traffic from the City, before any attempt was made to degrade the environment of King William Street by further congesting it with an LRT line; so that King William Street North could become a spacious and dignified mall served by public transport and essential local vehicles, uncongested by through traffic.

However, the LRT project now proposed does not include any such measures to avoid the harmful effects it would have on vehicular traffic congestion, the safety and comfort of pedestrians and the environment of City streets and the Park Lands within the City.

The current proposal is conceived purely and simply as a public transport project. All other considerations have been sacrificed to provide the shortest, fastest and cheapest route through the City from one sector of the Metropolitan area.

The motivation is narrowly focussed. It is to make the LRT line as fast and attractive as possible to future City commuters and shoppers from North East suburbs, in an attempt to attract people to use public transport.

However, if the net overall result is to reduce the attractiveness of the City as a place to work, move about in, visit and live in, the exercise becomes self-defeating.

There is thus an essential need for the kind of careful balance and integration of objectives, policies, programs and projects of all types. This balance and integration was sought by the 1973-74 City of Adelaide Planning Study and is now incorporated in the City of Adelaide Plan.

The Plan states that:-

"The City movement system should be developed as part of the overall Metropolitan movement system in accordance with the transportation principles that through-City traffic be reduced and public transport usage to and within the City be increased as agreed by the South Australian Government and Adelaide City Council."

"Movement around, through and within the City should be managed in accordance with the principles of the Desired Future Overall City Movement System illustrated on Diagram 4 and shall be guided by the relevant Objectives, Policies and statements of desired Future Character of Precincts, contained in this Plan. Diagram 4 illustrates the principles which should guide action over future years to integrate the public transport, vehicular, parking and pedestrian

systems and is not a detailed plan. The achievement of the principles of the Desired Future Overall City Movement System depends on the co-operation of and action by, both the South Australian and Commonwealth Governments. These principles will need to be periodically reviewed and in the light of evolving technologies and changing community needs and demands and should be subject to carefully staged and monitored implementation."

The Planning Study and the Plan stressed that:-

"Through-traffic should be diverted as far as practicable to existing and proposed Metropolitan Arterial Roads around the City."

The Study recommended that:-

"Joint Australian, State and Local Government sponsorship should be sought for a social and environmental impact assessment of the Central North-South Freeway on the Metropolitan Area to the northwest, west and southwest of the City, together with the determination of the detailed design of the Freeway and other measures necessary to minimise such impact. The construction of this bypass should be expedited as a matter of urgency."

The Study and the Plan proposed that:-

"Heavy commercial and truck traffic within the City should be confined to the use of those roads described as "Arterial Roads" (Metropolitan, intra-City and major City distributor) on Diagram 4 of this Plan, always provided that such heavy commercial and truck traffic with a trip origin or destination within the City may use other City streets absolutely necessary for that trip. The necessary regulations and enforcement under this policy should be devised and implemented as a joint and co-operative endeavour by the Adelaide City Council and South Australian Government authorities."

The Study accepted and endorsed the Government's proposed City underground rail link and other public transport proposals:-

"The South Australian Government's policies of extension and electrification of the existing railway system and provision of an underground railway through the City, should be supported. Concept Diagrams 12 and 14 show schematically the current proposals being studied for extending the rail system and locating railway stations to collect and distribute passengers throughout the City. The proposed electricification programme should provide faster rail services than those existing and increase the scope for providing park-and-ride facilities at and feeder bus services to, suburban rail stations, particularly in the outer areas. Inner-suburban areas should continue to be best served by direct bus services to the City."

So did the Plan:-

"The South Australian Government's policies of extension and electrification of the existing railway system and provision of a rapid transit (i.e. underground rail) system through the City, should be encouraged."

"If the South Australian Government determines upon the provision of a light railway or tramway system the practicability of connecting such a system to the existing Glenelg Tramway and its extension northwards towards the Victor Richardson Drive should be investigated."

The Study recommended that:-

"King William Street and Victoria Square should be planned as pedestrian-dominant areas for full implementation following completion of the underground railway and of adequate bypass roads to the west of the City."

This is embodied in the Plan as:-

"When through traffic in the City has been substantially eliminated and public transport usage has been significantly increased, consideration should be given to the planning of Victoria Square and King William Street (north of Victoria Square) as pedestrian dominant areas."

For Victoria Square, the Study recommended that:-

"Following construction of the Central North-South Freeway, or the City underground railway, or both ..."

"The diagonal roads through Victoria Square should be closed, dug up and their area landscaped. The east-west road through Victoria Square should be lowered to pass under the Square and covered by a landscaped and paved deck. Only the four roads around the edge of the Square should remain open to traffic at grade. Future major development fronting the Square could provide elegantly designed pedestrian over-bridges across these roads from the first floor of the building to the pedestrian area of the Square".

The Study envisaged:-

"Closure of Victoria Square to the north-south through-traffic, with the diagonal roads being returned to landscaped open space. The roads around the periphery of Victoria Square should remain open to form a one-way access loop."

"Grade-separation of Grote-Wakefield Street under Victoria Square. This should be integrated with the design of the Victoria Square Station on the underground railway and any proposal to extend the Glenelg tramway northwards. It may be necessary to restrict the headroom clearance for use by cars only."

"Severance of Currie-Grenfell Street, Waymouth-Pirie Street and Franklin-Flinders Street at or near King William Street to eliminate all traffic movement across King William Street except buses. Widened footpaths at these intersections should be used for tree planting."

"Closure of King William Street north of Victoria Square to all vehicular traffic except public transport vehicles and emergency vehicles and at specified hours of the day, service and delivery vehicles."

With respect to the Park Lands, the Study unequivocally concluded that:-

"No further alienation of any area of the Park Lands should be permitted under any circumstances."

The Plan contemplates increases in the area of the Park Lands following the closures of roads and the removal of some existing buildings, but did not contemplate further alienation.

To bring the current LRT proposal into conformity with the Objectives and Policies of the City of Adelaide Plan, it would be essential to alter and/or expand the project so as to reduce and preferably to eliminate the environmental impacts, detailed in Section 1 of this report, on:-

1. King William Street; and
2. The Park Lands.

It would also be desirable to integrate the design and construction of any future LRT through Victoria Square with the City Council's long standing aims to reshape the Square as a truly fine and beautiful landscaped centrepiece for the City and the State.

CHANGES TO THE OFFICIAL LRT PROPOSAL NECESSARY TO PROTECT AND ENHANCE THE ENVIRONMENT OF KING WILLIAM STREET IN ACCORD WITH THE CITY OF ADELAIDE PLAN.

When Government and City Council representatives worked closely together on the City of Adelaide Planning Study, the spirit that inspired their endeavours was that "if the job's worth doing at all it's worth doing properly." This is an Adelaide tradition in environmental planning initiated by Colonel William Light.

A similar zeal is demonstrated by the Transport Department planners in their desire to do something which has never been done in Australia before - build a Light Rail Transitway - and to give it the best possible chance of attracting riders by making it as high speed, non-stop, up-to-date and comfortable as possible, in an effort to make up the time spent by 75% of its riders who would have to catch feeder buses to a suburban LRT station and wait for an LRT vehicle.

The summary public relations documents which advocate the LRT project, such as the 1978 publication on the proposed City of Adelaide Routes and

the recent official Draft Environmental Impact Statement, contain references to and sketches of King William Street as a "Transit Mall" with widened footpaths and reduced traffic lanes used by LRT vehicles, buses and essential vehicles only, as well as photographs of a beautiful such Transit Mall in Zurich, Switzerland.

If the Government now does not wish to proceed with its 1973 plan for putting the Tea Tree Plaza rail transit line in an underground tunnel through the City, then the satisfactory and practicable way both to avoid severely disruptive impacts on pedestrians, drivers and the environment in King William Street and to really improve the City as well as public transport, is to transform King William Street into a proper Mall for use by LRT's, buses, pedestrians and essential vehicles only.

In other words, a clumsy, partial expedient should not be accepted. If the LRT is worth building at all, it's worth doing properly.

The idea of "certain designated LRT only streets" in the City was first raised by the Director General of Transport in his 1973 report "Public Transport in Metropolitan Adelaide" which was adopted as Government policy and ordered by the House of Assembly to be printed on 1st November, 1973. It has always been agreed by State and Council planners and is indeed obvious to any citizen, that an essential prerequisite to such a Transit Mall would be the provision of alternative bypass roads for traffic now using any proposed Transit Mall.

Such a stipulation was incorporated into the City of Adelaide Plan. The proposal was defined as one "which cannot take place unless and until through traffic is substantially eliminated" by the building of essential bypass roads.

In Section 1 of this report, updated projections are made which indicate that bypasses for north-south through traffic now using King William Street are likely to be needed in any case, even if the LRT is not built, by 1982-83.

If an LRT was built and the tracks were shared with motor vehicles, new bypass capacity would be needed by 1980-81. Indeed, if and when King William Street is dug up to lay LRT tracks and build LRT stations, new bypass road capacity would appear to be needed immediately.

The three bypass proposals listed in Section 1 of this report - a widened Fullarton Road, the planned Hindmarsh Boulevard and a section of the central North South freeway - could together by 1985 divert about 35,000 of the 125,000 vehicles a day then trying to use King William Street, Morphett/Montefiore, Frome Road and Kintore Avenue. A definite program to build these three bypasses would enable a start to be made on the development of King William Street as a transit/bus/service vehicle and pedestrian mall. This requires detailed investigation, planning, costing and decision making as an integral part of any fully considered official LRT proposal.

Another measure to mitigate the impacts of the current official LRT proposal on King William Street would be to put it in a tunnel under

King William Street from outside the Festival Theatre to Victoria Square. If this were a cut-and-cover tunnel and not a deeper one as the Government originally proposed under the City, building it would disrupt traffic for several years and necessitate the relocation of some underground services. It would defer but not eliminate the need for new bypass roads. For these reasons, it seems unlikely that the Government would favour it.

CHANGES TO THE OFFICIAL LRT PROPOSAL NECESSARY TO PROTECT AND ENHANCE THE ENVIRONMENT OF THE PARK LANDS IN ACCORD WITH THE CITY OF ADELAIDE PLAN

It is difficult to suggest measures to mitigate the impacts of the official LRT route through the Park Lands, or to suggest with confidence any practical alternative route that would have lesser impacts than the currently proposed route and yet still be as direct, straight and fast as the transport planners want it to be.

Other surface routes through the Park Lands, such as from Hackney Road along Botanic and Victoria Drives, or across Rymill Park to Grenfell Street, have already been strongly rejected by the LRT advocates and are hardly likely to be less publicly controversial than the current official route.

One possible alternative which would have minimal impact on Park Lands yet would be comparatively direct, straight and fast for LRT operations, appears to be a line along Stanley Street, North Adelaide. The Government's original proposal for a City underground rail link was for a tunnel under Stanley Street, as shown on Diagram 4 of the City of Adelaide Plan.

Stanley Street has adequate width for both the LRT and local traffic. It would be necessary for the line to follow a similar gradient to that proposed over the section east of Jerningham Street in order to pass in a tunnel under Mann Terrace and Park Terrace. In addition, it would need to be in another tunnel under the length of Stanley Street between Jerningham Street and Brougham Place. This would allow the LRT to follow the old route of Bagots Road, where it would emerge in open cut so that it would intersect at grade with King William Road at Brougham Place.

This alternative would involve relocation of a sewer and other miscellaneous utilities in Stanley Street. It would also require an adjustment to the route outside the City boundary to bring the LRT to the new entry point to the City.

It is put forward for consideration by the City Council and the Department of Transport, without specific recommendation in this report.

Another alternative which would reduce LRT impacts on the Park Lands to acceptable levels, would be to extend the already proposed LRT tunnel under Park Terrace continuously under open grassed areas in the Park Lands all the way to emerge on the east side of Sir Edwin Smith Avenue. A cut and cover tunnel predominantly under grassed areas would not damage a significant number of existing trees. Impacts on access to the Park Lands, and on Mackinnon Parade east and west would be substantially eliminated by this alternative.

The two alternatives suggested above - a Stanley Street route or a tunnel under grassed areas of the Park Lands - are the only options which might prove to mitigate significant impacts on the Park Lands and to be widely acceptable.

CHANGES TO THE OFFICIAL LRT PROPOSAL NECESSARY TO PROTECT AND ENHANCE THE ENVIRONMENT OF VICTORIA SQUARE IN ACCORD WITH THE CITY OF ADELAIDE PLAN.

The location and design of any future LRT route through Victoria Square should only be determined as one element in a comprehensive plan for the reshaping of the entire Square in accord with Policies 49 and 114 of the 1976 City of Adelaide Plan. Such comprehensive design should be a joint exercise between representatives of the City Council and Department of Transport.

Any such design cannot be finalised until firm plans are made and commitments entered into on the construction of bypass roads around the City and whether and if so, how, King William Street is to be transformed into a Transit Mall.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

The Department of Transport has been charged by the State Government with responsibility for achieving the Government's public transport objectives, policies, programs and projects as laid down in 1973 by Parliamentary Paper 109 "Public Transport in Metropolitan Adelaide", which states that:-

"The projects put forward for the development of public transport in South Australia have the overall objective of reducing the amount of private automobile travel and should be accompanied, if necessary, by limitations on automobile travel to minimise the impact of transport on the physical environment."

"The South Australian Government has acknowledged that the pattern of public transport usage will not change markedly in the foreseeable future unless policies and programs are implemented which will consciously deter the use of the private automobile in peak periods and encourage the use of public transport".

The NEAPTR publications and the current LRT proposal are the result of the Department's dedicated pursuit of those objectives, policies and programs over the years since 1973.

The Adelaide City Council has the responsibility for upholding the City of Adelaide Plan, prepared in close consultation with the State Government over the four years 1973-76 and which comprises 10 Objectives and 127 Policies (including specific programs and projects) to which the efforts of authorities in South Australia should be directed inasmuch as they affect the City and which include Objectives to:-

"Minimise through-traffic crossing the City and non-essential vehicular movement within the City and establish an appropriate hierarchy of roads to distribute intra-city traffic, reducing where and when practicable the area and number of carriageways;"

"Create an integrated city-wide, traffic-separated walkway network focusing on a City core in which emphasis is given to the ease and comfort of movement on foot;" and

"Create a City characterised and integrated throughout by large trees in the streets, squares and park lands, by usable landscaped space within individual development sites; and by carefully designed street furniture, signs, lighting and paving in public places;

as well as to:-

"Maximise the accessibility of the City by public transport and improve and promote the use of public transport to and within the City".

There is a conflict, an unnecessary one, between the responsibilities of the two authorities.

An assessment of the current LRT proposal's impacts on the City (as set out in Sections 1 and 2 of this report) indicates that the LRT project, as currently proposed, conflicts with the Landscape and Streetscape, Pedestrian and Vehicular Traffic Objectives and Policies of the City of Adelaide Plan.

It is therefore recommended that the Adelaide City Council request the Government to authorise the Department of Transport, the Highways Department and the Adelaide City Council to carry out a joint investigation and prepare a joint report to the Government with agreed recommendations on the following Terms of Reference:-

1. LRT Route Location, Design and Operation Through the City

A mutually acceptable detailed design for an LRT route and stations within the City, involving consideration of and recommendations concerning:-

- (a) an LRT route in a tunnel under grassed areas of the Park Lands south of Mackinnon Parade;
- (b) an LRT route along Stanley Street, partly in tunnel;
- (c) the detailed design of stations, with particular emphasis on the King William Street and Road stations;
- (d) the specific arrangements for traffic management and control, including signal systems and effects on pedestrians and the movement, turning, stopping and parking of motor vehicles, taxis, buses and delivery and service vehicles when sharing streetspace with LRT units; and
- (e) the integration of the LRT route design with future plans for the remodelling of Victoria Square and the extension of the LRT line down King William Street South and through the Southern Park Lands to Glenelg.

2. Transformation of King William Street North to a Full or Partial Mall for Public Transport, Pedestrians and Local Vehicular Traffic

- (a) the relative degrees and stages of such a transformation of King William Street to a partial or full Transit Mall; and
- (b) the feasibility and implications of different degrees or stages of transformation.

3. Amount of Through-Traffic Needing Diversion from the City Centre to Protect and/or Enhance the City's Environmental Standards and Economic Efficiency

- (a) agreed definition of the volumes of through traffic which will need to be diverted by particular dates if:-

- (i) no LRT is built;
- (ii) an LRT is built and shares King William Street with other traffic as defined by arrangements pursuant to Terms of Reference 1 above; and
- (iii) King William Street is transformed into a partial or full Transit Mall as defined pursuant to Terms of Reference 2 above.

4. The Routes and Construction Program for Bypass Roads Around The City

- (a) the routes along which bypass road capacity should be provided;
- (b) staging programs to provide bypass roads to handle the volumes of traffic defined pursuant to Terms of Reference 3 above; and

5. The Relative Costs and Benefits of the Proposals

- (a) a breakdown of costs attributable to:-
 - (i) the LRT project;
 - (ii) the State Highways budget;
 - (iii) the Adelaide City Council;
- (b) costs and benefits of the proposals to the community.

These Terms of Reference are not as formidable as they may appear, because each of the three authorities - the Department of Transport, the Highways Department and the Adelaide City Council - have been studying these matters for some years and well understand the problems involved.

It is essential that the experience and expertise of the three authorities be brought together and co-ordinated so as to produce a balanced and integrated plan which could give practical effect to the Government's strongly determined overall policy.

It would probably be desirable that a 3 man task force (one from each authority) be appointed to carry out the study and they be given a deadline by which to report to the Government.

It appears that any decision to build the project, before these Terms of Reference can be answered and considered by the Government, would be premature.

Weight is given to this view by the fact that the Department of Transport has stated that because of the sketch nature of NEAPTR's computer model used to project how many people would use the LRT in 1996 and because the data fed into the model was MATS data from the nineteen sixties updated by 1976 population and road survey data, the Department intends to prepare a new set of future traffic assignments and economic analyses of the costs and benefits of the LRT project.

This new set of analyses will use data which has only recently become available from a new Metropolitan Adelaide Data Base Study.

It is the Department's intention to undertake this new economic analysis using the most recent data available before the LRT project is submitted to the Commonwealth Government for approval for support from federal urban public transport funds. This additional work is necessary as the submission to the Commonwealth ought to be based on recent data. If it is not, the Commonwealth Department of Transport (or the Bureau of Transport Economics) is liable to request a re-analysis.

It therefore again appears that an early State Government announcement of a decision to build the LRT project would be premature, pending the results of such a new economic analysis based on recent data.

A decision to build the LRT line as the key element in the future public transport system for the North-East suburbs, involves capital expenditure of a very high order. It is reassuring to believe that a new economic analysis based on up-to-date facts, is to be made before such a major commitment of public funds.

The currently proposed overall public transport system for the North East area, based on the LRT, would tie up total capital funds of \$112.6 million (estimated in 1977 dollars with no allowance for inflation) calculated from NEAPTR's 1977 Working Papers as follows:-

339 buses (including buses to feed people to LRT stations):	\$33.9 million
66 LRT cars:	\$19.8 million
Land used for LRT tracks and stations:	\$ 7.3 million
LRT construction costs	\$48.4 million
2 rail power units and 6 rail cars for existing Northfield line:	\$ 3.2 million
<hr/>	
TOTAL	\$112.6 million *

The annual cost of having this capital tied up, at 10 per cent, would be \$11.3 million per year.

The annual costs of operating and maintaining the system (with one man LRT operation) was estimated in 1977 at \$13.6 million.

*An "all-bus" system would have capital costs of about \$45 million, or about 40 percent of the costs of the L.R.T. based system.

See Tables 1 to 4 of Appendix 12 to this report.

If two man operation was necessary, annual operating costs would probably be \$16.2 million.

Total annual costs would therefore be between \$24.9 million and \$27.5 million in 1977 dollars.

The 1977 NEAPTR Working Papers estimated that up to 141,195 separate trips would be made on an average weekday on the total system (buses, trains and LRT) by 1996 when the system should be well established and patronised. This is the highest of a number of alternative estimates made.

A rough estimate of total revenue may be made by assuming an average trip fare of 25 cents (1977 value). This would produce total revenue, over 310 days a year, of over \$10.9 million a year.

On the face of it, this appears to indicate that the system would increase the S.T.A. operating losses by between \$2.7 and \$5.3 million a year and still leave the annual cost of capital of \$11.3 million a year to be written off in Government accounts.

A decision to base the transport system for North East suburbs on an LRT line and feeder buses is therefore a serious one, necessitating the most careful analyses and consideration of alternatives.

When the new projections of patronage and economic analyses are done, it is to be hoped that they will take into account the questions that have been raised in recent months by people who have had the time to peruse the 1976-77 NEAPTR Working Papers. Many of these questions are indicated in the Appendices to this report.

One of the most important of these is a problem which has only arisen recently since the NEAPTR calculations were made.

NEAPTR began in 1976 and adopted then reasonable projections that Metropolitan Adelaide's population would grow by 1996 to 1,100,000, an increase of about 200,000 (or 22 per cent) over 20 years.

The North-East study area was defined by NEAPTR as a pie-wedge shaped area covering the Local Government Areas of City of Adelaide, Campbelltown, Enfield (part), Kensington, Norwood, Payneham, Prospect, St. Peters, Salisbury (part), Tea Tree Gully and Walkerville.

In 1976, 273,000 people lived in this North-East area. NEAPTR projected that by 1996 it would house 339,000 people, an increase of 66,000 (or 24 per cent) over 20 years.

NEAPTR assumed that 33 to 35 per cent of the total Metropolitan population growth to 1996 would live in the North-East study area.

But in early 1978, Professor Borrie, in the Supplementary Report of the National Population Enquiry, postulated that even with Australian national net immigration of 50,000 people each year, the population of Metropolitan Adelaide might only reach 983,000 by the year 2001.

Borrie cannot be disregarded. If his postulation is accepted, then the whole population of Metropolitan Adelaide would only grow by 70 to 80 thousand between 1976 and 2001. It is not reasonable to expect that the North-East would attract 66 thousand of those extra people.

All NEAPTR's computer simulations of how many people would use public transport systems are based on a North-East population increase of 66,000 to a total of 339,000 to 1996. This may now be regarded as a potentially serious over-estimate.

This could mean that NEAPTR's predictions to date on the future need for, and future use of, high cost, high capacity radial public transport systems may not be achieved by 1996 or for many years later.

For example, on what may prove to be optimistic population projections, NEAPTR has predicted that an LRT plus feeder bus system would, on an average weekday in 1996, benefit the City of Adelaide by bringing to it by public transport, about 825 (or 3.8 percent) more shoppers, visitors and workers from the North East suburbs, than the "base case" radial bus system would bring. About 200 of these could be expected to travel in the peak hour.

These 1996 numbers appear small in relation to the 1972 City workforce of 83,500. Thus the benefits to the City of Adelaide seem small.

The benefits of any North East LRT system to the community as a whole, were calculated by NEAPTR to be less than costs to the community, when assessed at a discount rate of 10 percent, which would not be an unreasonable rate to be applied when public funds are being rationed out among a host of claims on the ordinary taxpayer.

It is not yet known how these figures may be affected by possible lower than expected future population growth in Adelaide.

It would seem prudent for the Department of Transport to re-run its computer programs using the metropolitan population estimate by the National Population Enquiry, as well as more optimistic ones, and for the Government to delay a decision to build an LRT line until the results of such comparative studies can be evaluated.

It would also seem prudent for the Department's updated sets of future traffic assignments and economic analyses to use as a "base case", for comparison with the LRT, one possible future public transport system for the North East which has not yet been tested and evaluated in such comparison.

Such a system would use improved buses (including modern articulated buses) on improved roads (with improved intersections and signals, minor road widenings and realignments). It would feature both bus priority arrangements to speed people on radial routes to the City and extra cross-suburban bus services, combining these in one system instead of treating them as mutually exclusive options. A rail extension to Ingle Farm served by feeder buses might also prove to be a valuable part of this relatively low cost system.

Within the limits of their present brief, Council's consultants cannot venture any conclusion on the merits of such a system, but do conclude that it would be prudent to test it and to demonstrate its social and economic costs and benefits before the Government reaches a final decision to commit the State to construct the currently proposed LRT.

GEORGE CLARKE

PETER CASEY

1st November, 1978.

A P P E N D I C E S

APPENDIX NO. 1

IMPLICATIONS OF POPULATION CHANGES IN METROPOLITAN ADELAIDE AND STUDY AREA.

The population of Metropolitan Adelaide at the 1976 Census was 912,100. NEAPTR began in 1976 before the Census and adopted then reasonable projections that Metropolitan Adelaide's population would grow to 1,100,000 by 1996, an increase of about 200,000 (or 22 percent) over 20 years.

The North-East study area was defined by NEAPTR as a pie-wedge shaped area covering the Local Government Areas of City of Adelaide, Campbelltown, Enfield (part), Kensington, Norwood, Payneham, Prospect, St. Peters, Salisbury (part), Tea Tree Gully and Walkerville.

In 1976, 273,000 people lived in this North-East area. NEAPTR projected that by 1996 it would house 339,000 people, an increase of 66,000 (or 24 percent) over 20 years, and that 33 to 35 percent of the total Metropolitan population growth to 1996 would live in the North-East study area.

But in early 1978, Professor Borrie, in the Supplementary Report of the National Population Enquiry, postulated that even with Australian national net immigration of 50,000 people each year, the population of Metropolitan Adelaide might only reach 983,000 by the year 2001. This report indicated that the Australian population would be about 15.6 million in 1996 with no immigration and 16.9 million with 50,000 per annum net overseas immigration; and that the South Australian proportion of the national population is steadily decreasing.

The most recent statistics for new housing tend to support this view. The reduction in completion of new dwellings in South Australia is almost three times as bad as the national slump. The national downturn from 1976-77 to 1977-78 was 12 percent. The South Australian downturn was 33.7 percent.

Borrie cannot be disregarded. The difference of over 100,000 between his latest estimates and earlier NEAPTR estimates is too great to be ignored. If his postulation is accepted, then the whole population of Metropolitan Adelaide would grow only by 70 to 80 thousand between 1976 and 2001. It is not reasonable to expect that the North-East would attract 66 thousand of those extra people.

All NEAPTR's computer simulations of how many people would use public transport systems are based on a North-East population increase of 66,000 to a total of 339,000 to 1996. This must now be regarded as a potentially serious over-estimate. Projections of how many people would use the proposed LRT by 1996, must therefore also be regarded as potentially serious over-estimates.

Table No. 1 shows estimated population increases prepared for NEAPTR for the period 1976-1996, together with the ABS Population Census results for 1976.

These show that NEAPTR overestimated the 1976 population in Tea Tree Gully, underestimated it in Salisbury and also in other growth areas of Meadows, Noarlunga and Stirling, and were on target in the balance. Such variations are quite common when inter-censal estimates have to be determined by extrapolation. However, the general trend of these figures does indicate that outer area population growth is by no means restricted to the north-eastern corridor and that considerable growth is occurring in the southern sections of the metropolitan area.

Table No. 1

POPULATION IN GROWTH AREAS OF ADELAIDE

LGA	Sector	NEAPTR Population Estimate 1976*	ABS Population Census 1976#	NEAPTR Population Estimate 1996
Campbelltown	North-East	41,147	41,500	49,500
Tea Tree Gully	North-East	58,460	55,700	100,000
Salisbury (Part)	North-East	42,142	45,000	61,200
Salisbury (Part)	North	28,900	33,100	46,300
Munno Para	North	22,200	22,700	34,000
Meadows	South	9,000	12,400	18,700
Noarlunga	South	42,900	47,900	76,000
Stirling	South-East	9,500	11,100	19,000
Marion	South-East	67,700	68,700	82,000
Woodville	West	75,600	76,200	90,000

* Estimated September 1976

As subsequently adjusted by ABS, following first release in October, 1976.

The Australian Bureau of Statistics estimate for 1977 population of Adelaide (Catalogue 3201.4) shows some interesting short term trends which support this. The estimated 12 months increase in population for Adelaide has been 10,700 (1.2% of the 1976 population). The main growth areas have been the Para sub-division with a 4.3% growth (4,700 persons) with almost all of this occurring in Salisbury; and the Southern sub-division with a 3.5% growth (8,200 persons), mostly in the Noarlunga-Willunga area (11.2% - 6,300 persons), now served by the new Christie Downs railway extension with feeder buses from Morphett Vale.

Within the North-Eastern sub-division the high growth rate in Tea Tree Gully (7.1% - 4,100 persons) has been offset by declines in Enfield and, to a lesser extent, East Salisbury to yield an overall increase of only 1.4% (2,100 persons).

The NEAPTR population projections show a continued population decline in most of the inner to intermediate suburbs in the North-East corridor. If transport services to the outer suburbs were not improved to any

great extent, then the prospects of infilling or repopulating these inner to intermediate suburbs could improve. If oil were to become extremely scarce in the future, this would be a desirable growth pattern. The possibility of this extreme scarcity is discounted to a large extent on the basis that petroleum products developed from alternative sources are likely to be available in adequate quantities but at a higher price than the current petrol price. Notwithstanding this, any planning policies that might lead to infilling of the inner suburbs in lieu of outer suburban sprawl should be encouraged. Ideally, it is only when the infilling has taken place that the outer suburban spread should be allowed to continue.

The consequences of deferment of the LRT project or of not proceeding, could have been more fully understood had the NEAPTR study considered the requirements for an intermediate year such as 1986.

The NEAPTR study suffered from one of the major weaknesses that has afflicted most traditional transportation studies over the years. These have been based on the requirements of a future target year about 20 to 25 years subsequent to the date of the study and have paid insufficient attention to the intermediate requirements and subsequent staging between current conditions and target conditions.

More detailed consideration of intermediate stage requirements allows greater flexibility in staging the ultimate plan. It allows for changes in staging and programming to accommodate changes of population, land use and workforce not foreseen in the base year, usually the year of the study.

Greater than anticipated increases in population and workforce can justify an accelerated staging programme, while less than anticipated increases can justify a deferral of a major works programme or a reduction in the size of relevant planned projects. In the case of the NEAPTR project, it is highly likely that, if the latest Borrie estimates referred to earlier prove to be substantially correct, the NEAPTR estimates for 1986 population will be close to the actual population achieved ten years later in 1996. Availability of similar traffic and public transport patronage estimates for 1986 as an intermediate year would be most useful in determining more effectively the types of transport facilities that would best serve the North-East Area if the future growth and development of Adelaide, forecast at the data collection stage of the study, does not materialise.

If it does not, as now seems likely, the gradual staged development and improvement of bus systems and services on improved roads could give more flexibility at lower cost than an LRT, to cope with changes in growth rates and patterns, changes in lifestyle, work habits and work places, in shopping habits and recreation patterns, in age distributions and in levels of poverty and affluence.

APPENDIX NO. 2

FUTURE PATTERNS OF JOURNEYS TO WORK.

Workforce and workplace patterns are likely to change radically as computers replace clerical workers in central city offices and more people work part-time, flexitime and in the suburbs. Commuter corridor peaks will be considerably lower and work trips spread throughout the day and across the metropolis in ways that inflexible, concentrated capacity, radial public transport lines (such as the proposed LRT) cannot handle well.

The North-East is as low in overall density as any average outer suburban area in the world. Travel needs are not highly concentrated on a single non-stop radial corridor to the city centre because many work in the western, northern and eastern suburbs. Cross suburban travel needs are high and rising (See NEAPTR Working Papers Group 9 and City of Tea Tree Gully Community Needs Survey 1977).

The NEAPTR project was originally prompted by the emptiness of the single radial corridor of land originally reserved (along the Torrens Valley to Modbury) for a freeway project which was cancelled on social and environmental grounds. It was later given impetus because the Government's Land Commission and Housing Trust acquired and want to develop 1,580 hectares (3,790 acres) of land on the outskirts of Salisbury, Ingle Farm and Tea Tree Gully.

The NEAPTR project is primarily designed to serve the needs of people in the North-East for radial travel to and from the city centre, particularly in peak hours.

NEAPTR predicted future journeys to work in the City of Adelaide, using City employment projections made in 1973 for the City of Adelaide Planning Study.

The central area of the City where workers tend to use public transport, is the Y shaped area centred on King William Street, between the Torrens River (the top of the Y) and Victoria Square (the bottom of the Y) and between Hindmarsh and Light Squares. These are the areas marked A, B and C on the map on Page 24 of the 1974 draft City of Adelaide Plan (the red book).

It was projected that the 53,500 jobs in this central area in 1972 would grow at between 1.69 per cent and 2.84 per cent per annum, which would have produced 58 to 62,000 jobs by 1977. In 1977, the City Council resurveyed jobs and land use in the City. Preliminary results (not previously available to NEAPTR) show that in 1977, total jobs in this area were only 55,390. This is 3,000 less than the "low" projection, because of heavy falls in job numbers immediately outside the edge of the Core District.

For the smaller City Core District (Area A) between North Terrace and Victoria Square, on both sides of King William Street, it was projected that jobs would increase at between 2.1 and 3.3 per cent compound per annum from 31,000 in 1972 to between 40 and 48,000 in 1985. For the first five years to 1977, Core District jobs grew at 2.56% per annum to 35,190, right in the middle of the projected range. However, it now seems that this rate of increase will not continue to 1985 or 1996.

The 1972-75 period was a boom period for employment in the City of Adelaide. Commonwealth and State authorities expected public service employment to rise by 4 to 6% per annum. The same authorities now have firm "no growth" or staff-reduction policies.

In view of the current recession, recent drastic cuts in Metropolitan population projections and recently accelerating trends for computerisation to replace clerical workers, long term City Core job projections should now be revised downwards for the 1980s and 1990s.

The trend for people to work part-time, flexitime, or in the suburbs is now accelerating. In future, work trips can be expected to spread out during the day and across the suburbs.

Computers of varying sophistication have been in existence for nearly 30 years and have been effectively present in Australia for the past 20 years. Up to the mid-1970s, the effect of the computer has generally been to generate or create work particularly for white collar workers. The computer took the repetition out of many inventory, accounting and scientific tasks, and opened up the way for far greater volumes of work to be handled in far greater detail than could have ever been achieved manually. More people were required to prepare data for, and assimilate data from, computers. These people were doing work that would not have been possible without computers (many of the NEAPTR Working Papers are examples of this).

However, as computers have become both more numerous and more sophisticated, the period of full employment provided by computers has just about drawn to an end. The situation has now been reached where the computer, instead of generating work for the work-force, will start to replace workforce with increasing momentum.

It has been recently predicted that up to 31 per cent of the workforce in Australia could be unemployed by 1984 if the computer takes over in offices and factories at the rate postulated by expert observers in the industry. The people likely to be most affected are the clerical and lower-grade administrative staff in the tertiary industries (particularly in the city centre), and unskilled and semi-skilled people in manufacturing industry. These are the groups from which the captive public transport market is drawn, and from which the marginal users of private cars are generally drawn.

How this potential unemployment problem will be handled is not known. However, consideration of the available options indicates that the peak hour demand for transport vehicles over the next decade is more likely to fall rather than rise.

One option is a program to shorten the work week for the workforce in general, or to expand the part-time workforce considerably. This would result in either people commuting to work only two to four days per week during the regular peak hours, or commuting one way during the morning or evening peak and the other way during the off-peak hours in the middle of the day, or both. This would certainly reduce peak hour demand.

Indicative of this trend towards part-time work is a recent commencement of permanent part-time employment in the South Australian State Public Service. Although introduced only at the beginning of 1978, it is reported that the concept is popular and likely to continue and spread, notwithstanding that some senior departmental officers are apprehensive about its viability.

Another factor that should not be overlooked is the effect of flexitime on peak hour travel demand. Flexitime has been progressively introduced into the various levels of Government over the past few years and is likely to spread to private enterprise within the next few years. In spite of this, there are some indications that a significant proportion of the workforce now on flexitime are not yet using it to its full potential. It is anticipated that as this potential is more fully realised, the trend towards the flattening and spreading of the peak period will continue.

Irrespective of the options and practices that might evolve, a reduction of 20 per cent or even 30 per cent in the peak hour commuter demand is not unlikely over the next decade.

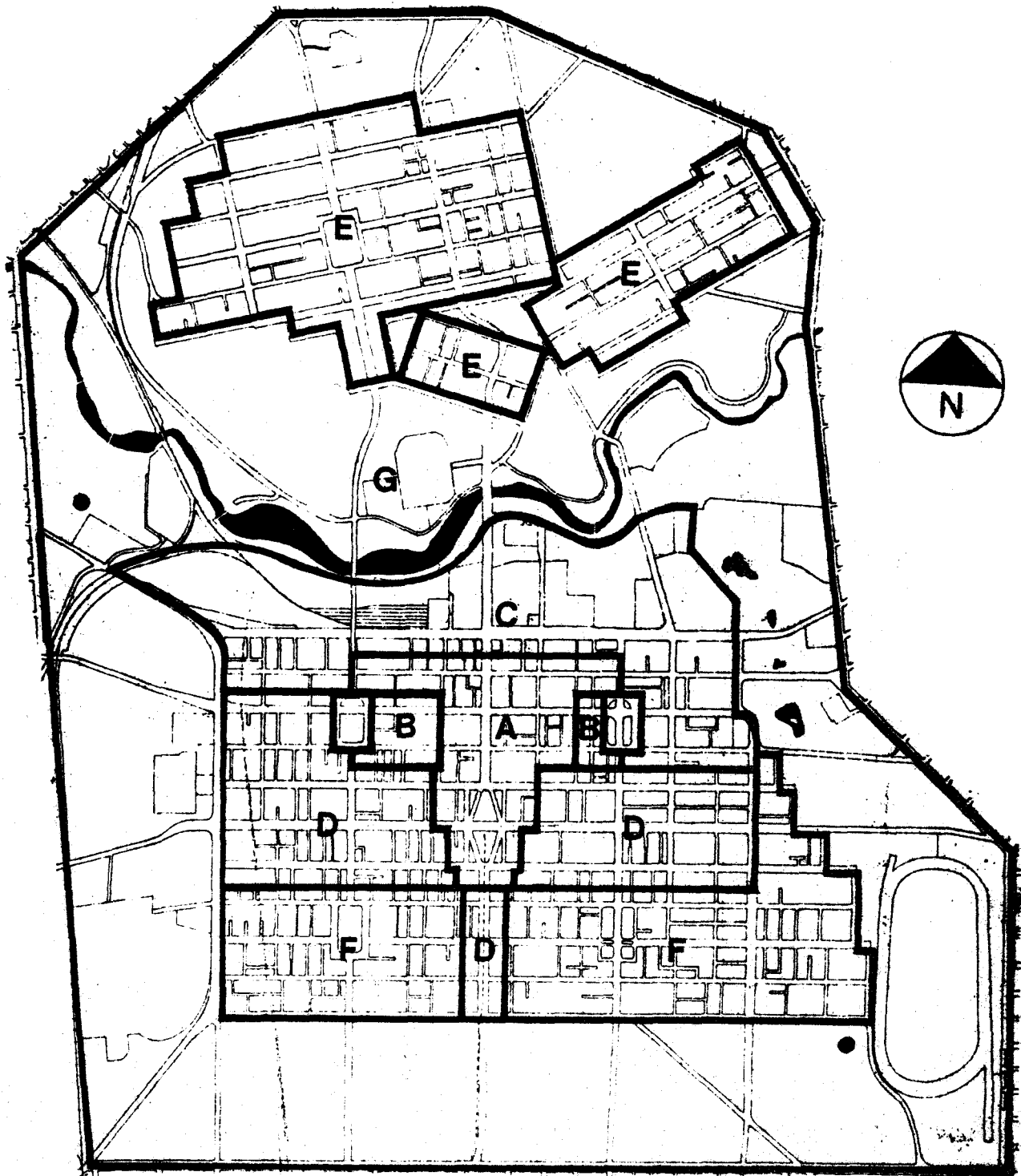
On this basis, any decision to initiate any major capital works designed to alleviate peak hour congestion without contributing significantly to user benefits during off-peak periods could well be deferred for, say, five years. This particularly so if the likely excess of benefits conferred over costs incurred is likely to be only marginal at best, as has been demonstrated to date for the proposed LRT project.

TABLE 1. CITY OF ADELAIDE EMPLOYMENT CHANGES 1972-77

	ACTUAL JOB NUMBERS	COMPOUND GROWTH RATES PER ANNUM PROJECTED IN 1973 FOR PERIOD TO 1985		ACTUAL JOB NUMBERS	ACTUAL COMPOUND RATE
		Low	High		
* CORE DISTRICT, (Area "A")	31,000	+ 2.1%	+ 3.3%	35,190	+ 2.56%
* INNER FRAME DISTRICT, (Area "B")	3,900	+ 2.34%	+ 3.52%	4,100	+ 1.0%
* OUTER FRAME - West End Precinct, North Terrace Precinct, East End Precinct, (Area "C")	18,600	+ 0.79%	+ 1.78%	16,100	- 2.84%
TOTAL	53,500	+ 1.69%	+ 2.84%	55,390	+ 0.7%

Source: Adelaide City Council 1972 Land Use Survey, and preliminary counts from the Council's 1977 Survey.

* See attached map.



WORKFORCE FORECAST AREAS

Source: USC City of Adelaide
Plan, page 24.

APPENDIX NO. 3

SUMMARY OF ECONOMIC ANALYSIS

NEAPTR Working Paper No. 25, Economic Assessment, considered eight basic types of improvement options covering the range from moderate changes in public transport services to heavy rail improvement. However, the moderate change option was not analysed and assessed. The remaining seven basic options were combined with several route options to yield a total of 12 options to be analysed.

No economic assessment has yet been made of an improved "all bus on roads" system for the North East. Neither the LRT nor any other project (with the sole exception of a Freeway), had a Benefit/Cost ratio exceeding 1.0 (i.e. benefits are less than costs) for a discount rate of ten per cent per annum. The range was 0.16 to 0.95. For a discount rate of seven percent, the range was 0.25 to 1.41 with five options having a ratio of 1.0 or better.

The discount rate of ten percent is that used by the Federal Bureau of Transport Economics and other Australian and international public agencies including the World Bank, to test the socio-economic worth of projects and reflects the cost of borrowing. Current semi-Government borrowing rates are about nine and a half percent, much lower than rates available to the private borrower. Under these circumstances, a discount rate of ten percent per annum is justified, particularly in an era when funds for capital works projects are in short supply, and must be rationed among competing claims on the taxpayer.

One major cost input that was not quantified is the notional "replacement" price for areas of park land. If this was based simply on the adjacent residential land values, then it could be strongly argued that it is too low. Any option involving park land acquisition on that basis should be re-assessed as to Benefit/Cost ratios. An upwards revision of the "notional replacement price" would lead to a reduction in Benefit/Cost ratios.

The currently officially proposed LRT route involves acquisition of about 1.06 hectares of the City Park Lands.

An LRT from Tea Tree Plaza along this route through the City has Benefit/Cost ratios, with a ten percent discount rate, in the range 0.74 (high speed LRT) to approximately 0.82 (low speed LRT). That is, benefits would only be 74% or 82% of costs.

These NEAPTR economic analyses excluded the costs of noise control, landscaping, "high standard" stations and more costly rolling stock over and above the basic funds required to make the LRT run. These would add 19 to 27 per cent to construction costs in the case of the LRT route through the North Adelaide Park Lands. Incorporation of these costs into the economic analysis would substantially reduce the range of Benefit/Cost ratios of this option.

The NEAPTR consultants considered the sensitivity of the estimates of the various components and concluded that the Benefit Cost ratios fell within the range of ± 10 percent of the estimated values.

It is important to note that 10 percent confidence limits of the five top rated projects overlap and that the first three fall within a 12 percent range.

These are:-

- . LRT/Low Standard
Corridor - Ninth - Mackinnon - King William
- . Pull-on Busway/Low Standard
Corridor - Hackney - Grenfell
- . Heavy Rail (diesel-electric)
Northfield extension to Ingle Farm

The latter option was evaluated on the assumption that feeder bus services would not be introduced to Ingle Farm. The reason for this assumption is not known. It is likely that a re-assessment, which included patronage from feeder buses, would lead to a significantly higher Benefit/Cost ratio for this project. The project as evaluated did not yield any positive benefits to public transport users or to road users. The benefits obtained accrued from reduced operating costs. It is likely that increased patronage would yield positive benefits to both public transport and road users.

Finally, an evaluation was carried out on the economic worth of the four lane freeway option. This was evaluated for peak and off-peak conditions; on the basis that 1996 road capacities in the peak will have increased 10 percent due to improved vehicle design, driver behaviour and minor traffic management improvements.

Benefit/Cost ratios of the freeway, most favourable (low speed) LRT and most favourable busway at a discount rate of 7 percent were evaluated as 2.81, 1.41 and 1.29 respectively. For a 10 percent rate the ratios were 1.76, 0.95 and 0.84 respectively. Notwithstanding this, the freeway would have greater social and environmental impacts on the Torrens River Valley than an LRT or busway and presumably was rejected because of this.

Because of doubt on the validity of some of the inputs and the possibility of Benefit/Cost ratios being marked down in the event of a re-assessment, questions arise as to the need to spend the \$67 million (1977 values) more that the LRT would cost over and above an all bus system; or the \$54 million (1977 values) more that the LRT would cost over and above a system incorporating a rail extension to Ingle Farm (see Table 3 in Appendix 12).

Consequently, it seems reasonable to suggest that further work should be carried out concerning the detailed planning, social benefits and economic worth of the moderate change options. The assessment of the moderate change options in Working Paper No. 25 was as follows:-

"The moderate change options include the introduction of bus priority measures on radial roads and additional cross-suburban bus services. Demonstration projects are currently being considered, designed to test the benefits and efficiency of these changes. The information thus obtained will determine whether or not such changes should be continued or extended. The moderate change options are not considered further in this report."

However, as no scheme except a freeway was found to have a favourable Benefit/Cost ratio at a 10 percent discount rate, it would now be reasonable to examine the moderate change options in some detail and make a socio-economic Benefit/Cost assessment of them in direct comparison with the LRT.

To make a fair comparison, it would be essential to combine together, in a single overall system for the North East, a number of "moderate changes" that NEAPTR treated as mutually exclusive. Such a system would use improved buses (including modern articulated buses) on improved roads (with improved intersections and signals, minor road widenings and realignments). It would feature both bus priority arrangements to speed people on radial routes to the City and extra cross-suburban bus services, combining these in one system instead of treating them as mutually exclusive options. A rail extension to Ingle Farm served by feeder buses might also prove to be a valuable part of this relatively low cost system.

APPENDIX NO. 4

RELATIVE PUBLIC TRANSPORT PATRONAGE FOR VARIOUS ALTERNATIVE PUBLIC TRANSPORT SYSTEMS.

Several consultants were employed to carry out studies to estimate 1996 travel demand in the North-East Area. The initial study is described in Working Paper No. 21, Travel Model Analysis of Radial and Cross-Suburban Options. This paper developed a set of travel models to analyse five of the eleven basic NEAPTR route options and to compare these with the existing system. Projections were made of how many people, on an average weekday in 1996, would use:-

- . The existing 1976 public transport system, without any change, serving the 1996 population.
- . The existing system with basic improvements to existing services as proposed by the Bus Service Planning Group.
- . Cross-suburban or cross-town option - additional cross-suburban bus services operating at 15 - 30 minute headways.
- . Rapid transit option - this covered introduction of a new rapid transit facility into the Modbury Transport corridor. It assumed that all bus services in the outer North-East Area, except cross-town services, would feed into the corridor facility at Tea Tree Plaza and Darley Road. This basic option was used to cover LRT, busway and heavy rail options in the corridor. The corridor facility was assumed to operate at an average speed of 47 km/hour, giving a journey time between Tea Tree Plaza and the City (presumably Victoria Square) of 19 minutes, with stops at Grand Junction Road, Darley Road and O.G. Road.

It did not allow for different methods of distribution within the City, nor did it allow for different headways and waiting and transfer times. These were developed subsequently as a refinement of the basic models.

- . Northfield Railway extension to Tea Tree Plaza - this assumed outer area radial bus services to feed into stations at Tea Tree Plaza and Northfield with intermediate stops at Grand Junction Road, Walkleys Road and Cavan, with a total journey time between Tea Tree Plaza and the City of 25 minutes.
- . Bus on Freeway - a four lane freeway in the Modbury Corridor with a bus service sharing road space on the new facility, and operating in conjunction with feeder bus services. The assumed travel time from Tea Tree Plaza to the City is not stated but is assumed to be lower than for buses on an exclusive right-of-way. Through-running of feeder buses on to the freeway does not appear to be assumed.

Table No. 1 shows a summary of public transport trips produced in the study area based on the initial assumptions made to produce the basic travel model. These were based on a forecast population increase of 66,000 from 273,000 to 339,000 between 1976 and 1996, in the North East area.

Table No. 1

DAILY PUBLIC TRANSPORT TRIPS PRODUCED IN STUDY AREA - 1996

	Total	City Oriented	Other
Existing system unchanged	86,018	40,970	45,048
Basic improvement	88,754	43,541	45,213
Cross-town option	93,473	42,329	51,144
Northfield Railway to Tea Tree Plaza	94,541	41,389	53,152
Rapid Transit	94,440	45,190	49,250
Bus on Freeway	94,913	44,676	50,237
Existing system (1976)	70,500	38,000	32,500

It is noted that the cross-town option produces less city-bound trips than the basic improvement which suggests that some "city-oriented" trips are actually change of mode trips. However, in all cases the proportion of "other" public transport trips is projected to be much higher (51 to 56 per cent of total) in 1996, than in 1976 (46 per cent of total). The "City oriented" trips are estimated to increase by between 8 and 19 per cent to 1996, while the "other" or cross town trips are estimated to increase by between 39 and 63 per cent over the same period.

The corridor assignments show higher usage of rapid transit compared with bus on freeway due to higher speeds and less variance of headway. For the traffic volumes assigned to the freeway, 64,526 vehicles per day at Park Terrace, this would be the case.

However, better bus service on the freeway could be obtained by ramp metering at entrance ramps for all vehicles other than buses, and provision of priority entrance and exit lanes for buses. This would control the volume of traffic on the freeway during peak hours so that bus operating speeds were not impeded.

APPENDIX NO. 5

DIFFERENT PROJECTIONS OF FUTURE PUBLIC TRANSPORT PATRONAGE.

Examination of the frequencies, routes and patronage of the existing bus services serving the North-East Area in 1974 as listed in Working Paper No. 10 indicates that about 15,000 and 10,000 passengers per day would have used rapid transit facilities in the corridor, or from Ingle Farm via Northfield respectively, if they had been in existence in 1974. Table No. 2 summarises.

Attainment of the population growth estimated by the NEAPTR Working Papers for the outer areas, would lead to increases by 1996 of the order of 8,000 and 5,000 passengers per day for the Corridor and Ingle Farm respectively, from areas served by Bus Routes 504 - 507 (50% increase), 540 - 544 (80% increase), 550 - 551 (50% increase) and 490, 502, 503 (50% increase). This would indicate total patronage of about 23,000 and 15,000 passengers per day for the two options.

Table No. 1 compares the 1966 passenger patronage assigned to the various facilities using three different methods.

Table No. 1

COMPARISON OF ESTIMATED FACILITY PATRONAGE

	Working Paper 21	Working Paper 25	Estimates Based on Working Paper 10
Corridor Rapid Transit	33,000	36,290 - 37,889*	23,000
Bus on Freeway	29,000	36,282	23,000
Northfield to Tea Tree Plaza Extension	23,000	30,301	-
Northfield to Ingle Farm Extension (no feeder buses)	12,500	15,389	-
(with feeder buses)	-	-	15,000

* busway or LRT

It must be emphasised that the estimates based on Working Paper No. 10 are indicative only and would need further review following more detailed examination of the bus route system and the current and future populations of the areas served. However, there is sufficient discrepancy between them and the estimates obtained by computer modelling as reported in Working Papers 21 and 25, to warrant a re-examination of the estimates currently being used for economic evaluation by NEAPTR.

Any downgrading of NEAPTR's LRT 1996 patronage estimates would have significant adverse effects on the already low benefit cost ratios associated with the corridor transitway (LRT or bus) option.

Another practical factor deserving consideration, is the patronage of the Glenelg tramline. This has been in operation for many years linking Glenelg to Victoria Square, a distance of about 10 kilometres.

Within the past few years this tramway has been upgraded with boom gates and lights installed at road crossings to give priority to the trams. This tram track serves an area with high population densities by Adelaide standards. Questions requiring resolution include:-

- . To what extent has the upgrading improved patronage?
- . How does the patronage compare with the population served?

TABLE NO. 2: SUMMARY OF BUS OPERATIONS 1974

SERVICE	ROUTE(S)	PEAK HOUR FREQUENCIES 1974 AM		WEEKDAY INBOUND PASSENGERS	POTENTIAL DIVERSION TO NEW FACILITY		ESTIMATED DIVERSION TO NEW FACILITY				
		In	Out		1965	1974	Corridor	Northfield	Corridor	Northfield	
VIA LOWER NORTH ADELAIDE											
Gilles Plains Ingle Farm	7E, 20 7F, 7G, 20	13	4	4864	4633	Low Nil	(10%)	Nil Low	(20%)	300	500
		15	6								
Madison Park, Salisbury East Para Hills, Carinya Heights	504, 507 505, 506	5	1	892	2151	Med High	(40 - 60%) (80 - 100%)	High High	(80 - 100%) (60 - 80%)	1800	2000
		7	2								
Hillcrest	520	2	1	185	211	Nil		Nil		-	-
Dernancourt, Beefacres, Felixstowe	530, 531	8	2	457	886	Med	(40 - 60%)	Nil		500	-
Surrey Downs, St. Agnes, Redwood Park, Tea Tree Gully, Fairview Park	540 - 544	15	5	1733	2308	High	(100%)	Med	(40 - 60%)	2300	1400
Mannum	800, 801	5	1	Not stated		Low	(20%)	Nil		200	-
VIA NORTH TERRACE											
St, Peters Paradise, Newton	8, 18 9, 9C, 17	8	4	5102	4460	Nil Nil		Nil Nil		-	-
		14 est.	5 est.								
Tea Tree Plaza Athelstone, Athelstone Park	550, 551 571 - 573	15 est.	4 est.	Not stated 296	581	High Med	(80 - 100%) (40 - 60%)	Low Nil	(20%)	2000 300	500 -
VIA LE FEVRE TERRACE											
Elizabeth Downs Para Hills, Salisbury East	490 502, 503	4 est.	2 est.	Not stated		Nil		Med	(40 - 60%)	-	500
		8 est.	3 est.	Not stated		Nil		Low	(20%)		
TOTALS (rounded)		ONE WAY								7500	5000
		TWO WAY								15000	10000
											51.

APPENDIX NO. 6

EFFECT OF VARIOUS OPTIONS ON ARTERIAL ROAD TRAFFIC.

One of the principal conclusions of NEAPTR Working Paper No. 21, Travel Model Analysis of Radial and Cross-Suburban Options, was that with the exception of the freeway option, all projects tested are unlikely to have any significant effect in reducing traffic volumes on the arterial roads in the study area.

Table No. 1 is extracted from that Working Paper, and illustrates this point with the predicted numbers of motor vehicle trips and the relationship of these for the various options expressed as a percentage of the basic improvement option which is merely the upgrading of existing services to serve new areas.

Table No. 1

MOTOR VEHICLE TRIPS PRODUCED IN STUDY AREA

	Total	City Oriented	Other
Existing system	287,133	41,387	245,746
Basic improvement	285,306 (100.0)	41,679 (100.0)	243,627 (96.9)
Cross-town option	281,447 (98.6)	41,346 (99.2)	240,101 (98.5)
Northfield Railway	281,726 (98.7)	41,590 (99.8)	240,136 (98.6)
Rapid Transit	278,149 (97.5)	40,138 (96.3)	238,011 (97.7)
Bus on Freeway	276,522 (96.9)	40,486 (97.1)	236,036 (96.9)

This same analysis came to the conclusion that the construction of the proposed North-South freeway and the Dry Creek expressway as recommended in the MATS Plan is likely to significantly reduce traffic volumes on the radial arterial roads leading into the City from the North-East.

Studies of traffic on the northern approaches to the City of Adelaide indicate a continuing growth of traffic on this corridor, and that the capacity of King William Road and King William Street would be adversely affected by a Light Rail Transit system operation along those streets. On this basis, some bypass facilities of the City will be required some time in the 1980s.

As a Transportation Corridor has already been reserved for the North-South freeway on the western side of the City, there appears to be some justification for a fresh investigation in a Metropolitan context of the need for a new road facility along part or all of this corridor.

Working Paper No. 25, Operational Analysis of Radial Options, produces similar results concerning effect of various options on traffic and the findings are summarised in Table No. 2.

Table No. 2

EFFECT OF OPTIONS ON VEHICULAR TRAVEL IN STUDY AREA

Option	Average Daily Vehicle Miles of Travel	Percent change compared with:	
		1976	Base Case Option 2
1976 Actual	3,272,650	--	--
Base Case Options 1996			
1) no improvement	3,684,660	+ 12.6	- 0.25
2) upgrade and expand into new areas	3,694,080	+ 12.9	--
3) (2) plus priority roads	3,690,683	+ 12.8	- 0.09
4) (2) plus cross- town services	3,657,720	+ 11.8	- 0.98
Light Rail Option	3,626,677 to 3,629,688	+ 10.8 to + 10.9	- 1.82 to - 1.74
Corridor Busway Option	3,629,436 to 3,633,143	+ 10.9 to + 11.0	- 1.75 to - 1.65
Pull-on Busway Option	3,614,232 to 3,618,229	+ 10.4 to + 10.6	- 2.16 to - 2.05
Corridor Rail Options	3,631,210	+ 11.0	- 1.70
Northfield/Tea Tree Plaza Rail Option	3,648,380	+ 11.5	- 1.24
Northfield/Ingle Farm Rail Option	3,694,080	+ 12.9	--

Comparison of the 1996 situation covering all options compared with 1976 indicates that a dramatic rise in overall traffic is not expected. It is expected that the relative increases will be greater in the outer areas on existing and new roads than in the inner areas. This is consistent with existing trends of traffic growth.

Changes of this magnitude (10 to 12 percent) should be capable of being generally absorbed by improved traffic management measures including co-ordinated traffic signals, clearways and minor intersection improvements.

Comparison of the various 1996 options indicates that no option would have any real impact on the total vehicle miles of travel within the corridor.

No one option is significantly better than any other in conservation of fuel and petroleum products, or would make any significant difference to air pollution.

APPENDIX NO. 7

POSSIBLE ALTERNATIVES FOR BUS ROUTING WITHIN THE CITY IF NO LRT
IS BUILT BY 1996.

Buses serving the North-East area have three basic approach routes to the City. The approximate distribution of buses on these three routes is shown in Table No. 1.

Table No. 1

BUS VOLUMES ON NORTH-EASTERN APPROACHES TO CITY (1974)

(Morning Peak Hour - Inbound)

Approach Route	Limited Stop North-East Area	Local North-East Area	Other	Total
Lower North Adelaide	40	30	0	70
Payneham Road-North Tce.	15	22	23	60
Lefevre Terrace	12	0	4	16

About 120 of the above buses per morning peak hour serve the North-East Area. Even given that the North-East area will grow at the rate projected by NEAPTR, it would be expected that the number of peak hour bus movements oriented to the City from the North-East would increase from about 120 per hour to 150 per hour. This estimate is based on maintenance of existing standards of comfort concerning seating and the number of passengers having to stand. The estimated increase of 30 buses per hour could be doubled, given a policy of providing enough buses to provide seats for all passengers. The increase through Lower North Adelaide would be about 30 percent (20 - 22 buses per hour) for maintenance of existing seating standards and 60 percent (40 - 45 buses per hour) for significantly improved standards. Almost all of this increase would be in express or limited stop services.

Introduction of articulated buses onto the heavier volume routes would reduce these estimated volumes. The effect of this needs further study.

Most of the projected increase will be in the development and extension of the Routes 540 - 544 services serving Tea Tree Gully and which now operate through Frome Road and Mackinnon Parade. In fact it is expected that the 15 peak hour buses in 1974 would double by 1996 given a continuation of existing seating standards to serve the estimated increased patronage.

The principal services now operating in Melbourne Street are the Route 7 - Route 20 services to the inner and intermediate suburbs and the

Route 504 - 507 services to the Salisbury - Para Hills area. A basic 50 percent increase in the latter would require an additional eight buses per hour. A potential offsetting factor is the planned rationalisation of the St. Peters services (Routes 8 - 18) and the Dernancourt - Felixstowe services (Routes 530 - 531) to operate via Harrow Road and North Terrace and not through Lower North Adelaide. Currently about eight buses per hour use Routes 503 - 531. Improvement of seating standards would lead to an additional eight to ten buses per hour over and above the projected increase in the Route 504 - 507 services.

Thus the growth in bus services necessary to serve the expanded North-East area as forecast by NEAPTR would lead to a significant increase in the number of buses on Mackinnon Parade and a moderate increase in Melbourne Street if no re-routing from Mackinnon Parade were to occur.

This would not lead to any major need to upgrade Melbourne Street as a major bus route because of natural increases in bus volumes. However, the attractiveness of the Mackinnon Parade route has been somewhat reduced through new traffic management measures at the intersection of Melbourne Street and Mann Terrace. These measures favour Melbourne Street at the expense of Mann Terrace and could lead to a move to re-allocate some Mackinnon Parade buses to Melbourne Street.

A proposal to establish peak hour priority bus lanes in Melbourne Street and to re-route to Melbourne Street those buses now using Mackinnon Parade has recently been studied by the bus operating authorities. Studies carried out by the Adelaide City Council in 1978 showed that buses were averaging 24.4 and 27.4 km/hour including stops, during the morning and evening peak periods.

These speeds compare more than favourably with reported average schedule speeds of 14 km/hour and 23 km/hour for local stopping services inside and outside the City boundaries respectively, and with 23 km/hour for limited stop services averaged over the whole trip.

Analysis of traffic counts at the Melbourne Street - Jerningham Street intersection indicated that this intersection was operating at significantly below saturation conditions during the peaks. A 20 percent increase in evening peak flow along Melbourne Street could be accommodated before saturation conditions would be encountered.

Currently there does not appear to be a prima facie case for establishing a bus lane in Melbourne Street unless bus volumes increase substantially through natural growth of the North-East area or the need to divert limited stop buses from Mackinnon Parade is demonstrated.

Further investigation should be undertaken concerning traffic volumes, bus volumes, speeds and delays, and parking capacity and occupancy of the kerbside lanes during the morning and evening peak hours before any decision is made concerning bus lanes.

The other alternative that should be examined is the feasibility of re-routing some buses along Hackney Road and Botanic Road to North Terrace.

No buses are currently routed along Hackney Road, notwithstanding the fact that the distance from the intersection of North Terrace and Frome Road to the Buckingham Arms corner (Northcote Terrace, Robe Terrace, Park Terrace and Mann Terrace) is almost identical via either the Frome Road - Lower North Adelaide route, or the Botanic Road - Hackney Road route. Hackney Road between Hackney Bridge and Botanic Road is a high capacity under-utilised road with no kerbside parking on the main carriageway, wide medians with right-turning bays at important intersections and generally low traffic friction.

Similarly, Botanic Road is a wide six-lane road between East Terrace and Hackney Road. However, the strength of a traffic route, like that of a chain, is only as strong as its weakest links. On the North Terrace, Hackney Road, Park Terrace route, there are several. These are:-

- . The intersection of Botanic Road and Hackney Road.
- . The Buckingham Arms corner with the necessity to restrict right turns from Park Terrace into Northcote Terrace.
- . The section of Hackney Road and Park Terrace between Hackney Bridge and the Buckingham Arms corner.

The Botanic Road - Hackney Road intersection is currently operating under saturation conditions during the morning and evening peaks. Marginal improvements could probably be achieved by relocation of a bus stop in Botanic Road, peak hour prohibition of right-turns from North Terrace and more flexible demand actuated signal control equipment.

Major improvements for buses during the evening peak could be achieved through declaration of a bus lane along Botanic Road. Potential for bus operation along Hackney Road during the morning peak is more obscure.

The bottlenecks at the Buckingham Arms intersection in particular and north of the Hackney Bridge generally could be solved by widening Hackney Road and Park Terrace between Hackney Bridge and the Buckingham Arms corner, or preferably by converting Mann Terrace and Park Terrace into a one-way pair and widening the section of Hackney Road linking the pair to the Hackney Bridge.

Following completion of these improvements, it should be possible to re-direct evening peak hour express bus and limited stop bus services from Frome Road and Lower North Adelaide to Botanic Road and Hackney Road. Whether the corresponding morning peak hour services could be diverted would require further investigation. In any case, there is no reason why morning peak hour express or limited stop bus services could not continue to operate along a transit lane in Melbourne Street (if a transit lane is found to be necessary) during the morning peak when interference to local business-oriented parking would be insignificant.

Redirection of evening peak buses from Frome Road - Lower North Adelaide to Botanic Road - Hackney Road would obviate the need for a bus lane or transit lane in Melbourne Street during the 4.00 p.m. to 6.00 p.m. peak period. It should be noted that only the limited stop or express buses

are envisaged as taking separate routes between the Buckingham Arms corner and the City during the morning and evening peaks. As these buses are in fact express buses, this should not be of any consequence. Local buses would still continue to operate along Melbourne Street.

APPENDIX NO. 8

POTENTIAL FOR UPGRADING CROSS-SUBURBAN BUS SERVICES.

Examination of Working Paper No. 10, Transport Facilities and Traffic Trends in the North East Area, indicated that in 1971 approximately 32 percent of the work trips from the Study Area were to the City and a further 26 percent were trips to the western industrial regions. About 29 percent of the work trips were to work places within the Study Area.

More significantly the proportion of work trips to the City tended to decrease with increase of distance of origin from the City and correspondingly the proportion with jobs in the western regions tended to rise. More importantly, the proportion of people living in the Outer Study Area and working in the Western Region was greater than those working in the City. Those working in the Northern Region were almost one half as many as those working in the City. Table No. 1 summarises.

Table No. 1

LOCATION OF WORKPLACE FOR RESIDENTS OF THE STUDY AREA

Region of Residents	Location of Workplace (number and percentage)					Total
	City	(4) Western Region	Study Area	(5) Northern Region	Other	
Inner (1) Study Area	6,300 (36.8)	3,300 (19.3)	5,200 (30.7)	600 (3.5)	1,600 (9.7)	17,000 (100.0)
Central (2) Study Area	11,900 (33.4)	9,600 (27.1)	10,000 (28.0)	1,200 (3.3)	2,900 (8.2)	35,500 (100.0)
Outer (3) Study Area	5,200 (26.1)	5,700 (28.3)	5,800 (28.9)	2,200 (11.1)	1,100 (5.6)	20,000 (100.0)
TOTAL TRIPS (ROUNDED)	23,500 (32.2)	18,500 (25.6)	21,000 (28.9)	4,000 (5.5)	5,500 (7.8)	72,500 (100.0)

Local Government Areas

- (1) Prospect, Walkerville, St. Peters, Kensington and Norwood.
- (2) Enfield (part), Campbelltown, Payneham.
- (3) Salisbury (part), Tea Tree Gully.
- (4) Enfield (part), Port Adelaide, Woodville, Hindmarsh, Thebarton, West Torrens, Henly and Grange.
- (5) Salisbury (part), Elizabeth, Munno Para.

This indicates a latent cross-suburban demand for public transport services which appears to so far be unfulfilled. Notwithstanding that it is easier to provide public transport services to serve concentrated areas of employment such as the Central Business District, the latent demand for cross-suburban public transport services to serve those without access to private cars is sufficient to warrant further attention.

In this regard it is understood that the recently introduced Circle Bus service is attracting about 5,500 passengers per day, in spite of the overall decline in public transport usage.

Examination of Working Paper No. 25 would suggest that probably less than five percent and possibly as low as three percent of all cross-suburban work trips in 1976 were by public transport. By contrast between 12 and 15 percent of all trips in the Adelaide Metropolitan area are by public transport. Even after allowing for the fact that the highest proportion of public transport trips is to the City, it would still appear that there is a latent demand for about 10 percent of cross-suburban trips to use public transport if such services were to be provided.

The assignment figures produced in Working Paper No. 25 indicate a potential 115 percent increase in cross-suburban patronage compared with the minimum practicable option of merely maintaining an existing level of service into new areas.

Notwithstanding that a proportion of these would transfer in the City, the diversion of the balance from road to public transport and the provision of services to those previously unable to make cross-suburban trips is potentially sufficient to warrant the expenditure incurred in introducing additional services. A by-product of the exercise is that the removal of those needing to transfer in the City during peak hours would decrease the radial requirement on the existing radial routes and could lead to deletion of a small number of buses from the more heavily used radial routes.

This assessment has backing from the public opinion surveys conducted by NEAPTR. Lack of cross-suburban services was often cited by respondents to these surveys as one of the principal public transport deficiencies of the North-East area.

APPENDIX NO. 9

NORTHFIELD TO INGLE FARM RAILWAY EXTENSION.

Doubts on the viability of this option began to be cast by NEAPTR as early as the preparation of Working Paper No. 16 which commented that "such an extension would be of no direct transport benefit, however, to the southern part of the Study Area". While this cannot be denied, it is also quite likely that the LRT transit facility in the corridor would have little benefit to most places south of the corridor, in particular places like Campbelltown, Felixstow, etc., which are south of Darley Road, the feeder bus route. It is understood that these areas will continue to be served by radial buses to the City, even if an LRT is built.

This Ingle Farm option was not included in the basic selection of options analysed for Working Paper 21. However, the need to include it was seen, following initial investigations and it was determined that the potential 1996 patronage demand could be of the order of 12,500 per day with most of the increased patronage likely to transfer from radial bus services. Whether feeder buses were included in the analysis is not known.

The option was further studied in Working Paper No. 25 which noted that it would "terminate at Ingle Farm in the vicinity of the large shopping complex at Montague Road". The analysis of the feasibility of this option was based on the assumptions that no intermediate stops were planned for the section, and that no feeder bus network would connect to the Ingle Farm terminus. It is assumed that patronage would be mainly obtained from the radial bus services and "walk in" passengers. The reasons why no feeder bus network would connect to the Ingle Farm terminus were not stated.

In spite of this, the assigned patronage was 15,389 although it is doubtful whether all of these would have been assigned to the City. A reasonable proportion would have used the link as part of a cross-country trip to the industrial north-western corridor. Nevertheless, the patronage is sufficient to warrant further investigation.

Even with the low assigned patronage, the option performed well in the economic evaluation carried out by R. Travers Morgan Pty Ltd in Working Paper No. 25, Economic Assessment. In making the evaluation, the consultant noted that "a detailed design of bus services to complement the heavy rail would improve the benefits". Examination of the distribution of costs and benefits between public transport users, road users, public transport operators and the community at large indicates that it would take only a small net diversion of patronage from road to public transport to yield a significantly beneficial change in benefit cost ratios for this option, the extension of the Northfield Railway to Ingle Farm.

APPENDIX NO. 10

ENERGY FOR TRANSPORTATION

The potential of a future shortage of oil energy for transportation is often used as a strong argument for upgrading public transport, particularly electrically-operated rail or light rail systems. It is often used as an argument for preferring a light rail system with its inherent inflexibility, to more flexible bus systems.

However, the potential savings in oil energy that might result from a light rail system in the Modbury corridor compared with a busway or other bus system are not significant compared with those that might be achieved from other oil-conservation measures. This is because the LRT would not attract any significant number or percentage of people to switch from private to public transport.

The NEAPTR working papers indicate that diesel bus operation in total represented only 0.34 per cent of all vehicular travel in Adelaide in 1971-72, compared with 92 per cent by cars and car derivatives and 6.2 per cent by trucks and other commercial vehicles. Another statistic provided by the NEAPTR papers is that in 1970-71, buses accounted for about 1.25 per cent of the total energy consumption on roads, with trams accounting for a lesser figure. Cars accounted for about 70 per cent of road consumption and 55 per cent of all consumption including rail, air and sea. These proportions are unlikely to have altered significantly since 1970-71.

The NEAPTR papers then go on to compare the relative energy efficiency of transport vehicles in terms of mega-joules per passenger/kilometre. It is beyond the scope of this study to research the validity and consistency of the source material except to note that it was recognised that the energy efficiency of a transport vehicle can vary considerably, and that the figures quoted in the NEAPTR papers and other publications should be used as a rough guide only.

Accepting these qualifications, it appears that light rail is more energy-efficient than diesel buses and that both are considerably more energy-efficient than the current model private car for the range of load factors that would currently be normally encountered.

NEAPTR developed estimates of the relative energy consumption within the corridor for the different transport options and concluded that there is little reason to favour any of the options on the basis of transport energy consumption. This view is supported and the following comments reinforce it.

To date, almost all transportation infrastructure has been developed on the basis of an unlimited supply of cheap oil. Before the oil crisis of 1973 the actual well head cost of the oil in the world's petrol was generally between one and two cents per litre, that is, between five and

ten cents per gallon. The corresponding pump prices generally ranged from eight cents to 25 cents per litre (35 cents to 110 cents per gallon) with the difference between well head and pump prices being absorbed in transportation, refining, profits and excise taxes. For many years prior to the oil crisis of 1973 this latter component has formed a large component of the total retail price in many countries of the world including Australia.

Currently, OPEC oil sells at about \$12 Australian per barrel (i.e., between seven and eight cents per litre) at the well head and up to 50 cents per litre at the pump for different countries throughout the world. Prior to the 1978 Budget, oil consumed in Australia was costing an average of about four cents per litre (\$6 Australian per barrel) at the well head compared with pump prices of 15 to 19 cents per litre. Following the Budget and the pricing of Australian crude oil at OPEC prices, the pump prices have since risen to 19 to 24 cents per litre. If OPEC prices were to escalate to \$30 per barrel (in constant 1978 dollars), and no other costs or taxes, apart from percentage profit margins, altered, then the likely retail price would be about 35 to 40 cents per litre. This is about double the Australian retail price adopted by NEAPTR for estimating the effect of rising oil prices on travel demand and is comparable to existing prices in many European countries.

At these prices, oil is very likely to be capable of extraction from coal and various shales. In addition, alcohol additives or substitutes are very likely to be obtainable from sugars and other related products. There is little or no justification for assuming that the era of vehicles driven by petrol, diesel fuel or similar distillate is approaching the end. What is happening is that the era of CHEAP petrol or diesel fuel has just about finished.

In short, petrol is likely to continue to be available in close to unlimited supply from new sources at prices between two and three times (depending on Government taxation policies) of those prevailing in mid 1978. This is the most optimistic future situation that should be considered.

Economic studies indicate that the price elasticity of petrol is about 0.3. Consequently, a 100 per cent increase in the retail price to about 35 cents per litre in 1978 prices would lead to a 20 per cent drop in consumption per capita if applied over time, and a 30 per cent drop if applied suddenly. A subsequent 50 per cent increase over time to the equivalent of 50 cents per litre in 1978 prices would lead to an overall drop of about 30 per cent in consumption per capita compared with 1978 levels.

This drop in consumption is likely to be achieved initially by reductions in the size of private motor vehicles being used. Currently, the average Australian car gets about nine kilometres per litre (25 mpg). Target reductions of 15 and 20 per cent in consumption have been set as goals for the Australian motor industry to achieve by 1983 and 1987 respectively. If the 1987 target is reached the average car will get nearly 11 km/litre (30 mpg). This target should be achievable. The United States Government

has set a target of about 11.8 km/litre (33 mpg) for all cars sold in the USA by 1985. Industry sources doubt whether this lower consumption figure will quite be achieved, but in any case a 20 per cent reduction in fuel consumption for Australian cars should be achievable through smaller vehicles, better design and use of light-weight materials. Taxation penalties for larger cars could see the Australian targets achieved ahead of time if this were to become necessary.

Given the prospect of increasing petrol prices to double current levels, the price elasticity of petrol is such that this reduction in fuel consumption could be achieved simply by a switch to smaller cars without any appreciable change in travel habits or mode of travel. A further increase in petrol prices to three times the current level could lead to an overall drop in travel demand by private cars of 10 to 15 per cent.

The proportion of work trips that might switch from car to public transport is not known at present. It would not be unreasonable to assume that the private vehicle trips likely to be foregone are those which can switch to public transport and the shorter trips which could be substituted by walking.

Work trips comprise about one-third of all trips so an overall reduction of 10 per cent of private vehicle usage could lead to a reduction of 20 per cent of work trips made by private vehicles through increased usage of public transport or by car pooling. In areas where public transport is readily accessible and easily augmented, this switch could be higher. In any case, a reduction of road traffic of this magnitude would allow for much less restricted operation of public transport on surface streets than currently postulated.

However, it must be restated that a trebling of petrol prices in terms of constant dollars is not a foregone conclusion for Australia and need not necessarily occur.

A doubling of petrol prices appears inevitable but this price level allows petrol to be developed from substitute sources which are readily available in Australia. All NEAPTR projections already assume a doubling of petrol prices. Price elasticity of petrol is such that the anticipated drop in consumption can be achieved through use of smaller, more economical vehicles without any significant change in travel habits.

A further argument that might be advanced is that electrical energy can be generated from alternative indigenous reserves of energy, and for this reason, an LRT system should be preferred. The most pessimistic NEAPTR projection presented concerning the effect of future oil reserves and prices still estimates 95% of 1996 energy consumption within the North East Corridor as being by private car. As public transport would still only use five percent of all energy consumed and as buses would still consume the bulk of this five per cent, even if the LRT were built, the total savings of imported energy that might be saved through use of electric traction is very low in the overall context.

APPENDIX NO. 11

STUDIES OF BUS OPERATION IMPROVEMENTS.

There is considerable scope for improving bus service running times and reliability through low cost traffic management and bus priority schemes as advised by various consultants in preparing demonstration projects. Many of these recommendations have yet to be implemented. The appropriate time to decide finally on the need for a high cost public transport facility, such as an LRT, is after the low cost schemes have been progressively implemented, monitored and evaluated.

A number of bus operations studies for the City of Adelaide and Metropolitan Adelaide have been carried out by consultants for State Government Authorities since 1974. Five such studies have been reviewed and their recommendations noted. These are:-

- . Adelaide Bus Operations Study, September 1974.
- . Traffic Management Improvements for Buses at the Maid and Magpie Intersection, May 1976.
- . Traffic Management Improvements for Buses around the Retail Core of Adelaide, June 1976.
- . Bus Demonstration Project - Adelaide to Tea Tree Plaza, September 1976.
- . A Study of Alternative Bus Priority Improvements on Payneham Road, July 1976.

Following is a summary of the consultants' principal findings and recommendations, together with relevant observations in parenthesis concerning those findings and recommendations.

Bus Operations Study

- . Bus speeds in Grenfell Street and Currie Street were generally higher than in King William Street, perhaps indicative of less traffic movements and less bus routes using the same street. It was also noted that the tendency for routes having fewer people boarding and alighting is to have higher average bus speeds.

(It is understood that since the closure of Rundle Street to vehicular traffic that bus speeds, particularly westbound, have dropped in Grenfell Street.)

- . The average boarding time for the passenger was observed to be 7.2 seconds and the average alighting time 2.5 seconds.

In the light of the above findings, it was deduced that if boarding times could be reduced to approximate average alighting times in the study, a saving of about 4.7 seconds per passenger would be achieved.

For an average bus load of 50 passengers, boarding evenly over a route, this time saving would be between 2½ and 5 minutes per bus which is a 10% - 20% improvement in running time on many routes. To achieve this improvement, a radical change having wide implications to the present charging system would be required.

(What was not stated, but which is relevant, is that most of the time saved on outbound trips would occur while loading in the City where scarcity of kerb space is a factor. As most bus trip lengths are less than 10 km and the range of fares is not great, this scheme has much to recommend its implementation.)

- . Another potential general improvement was the provision of priority for buses at traffic signals, particularly where bus routes do not cross.
- . King William Street had the highest bus volumes of any city street and therefore from that point of view it could justify an exclusive bus lane. However, because buses skip stops and therefore bus queues would develop, little benefit was seen as likely to be achieved by making the kerb lane an exclusive bus lane. It was observed that the kerb lane could be left as is and the second lane made an exclusive lane in peak periods, thus tending to formalise what occurred at that time.

(Analysis of lane counts carried out by the City Council indicate that this is not the case and that some use by private cars of the second lane is necessary, unless improved bypass roads are built.)

- . It was suggested that instead of the double alternative traffic signal linking system in King William Street being designed to minimise delays to all vehicles, it might be worthwhile to investigate the effects of different linking systems on buses and cars by using different simulation techniques.
- . The possibility for either reducing the number of bus stops in the park lands or restricting their use to off-peak periods should be investigated.
- . The potential for introducing exclusive bus lanes or clearway along Main North Road and O'Connell Street between Fitzroy Terrace and Kermode Street should be examined particularly if the existing limited stop services could be diverted from Le Fevre Terrace.
- . Use of Park Terrace and Mann Terrace as a one-way pair and construction of a left turn lane from Walkerville Terrace into Park Terrace would improve the capacity of the Buckingham Arms corner. In addition, the number of stops between North Terrace and the Buckingham Arms corner appeared to be excessive and it might be possible to reduce the number of stops in this section without any undue inconvenience to patrons because of the low usage of some of these stops.

- Due to excessive delays being experienced on Payneham Road between O.G. Road and Lower Portrush Road, it was suggested that Payneham Road could either be widened or marked with five lanes and reverse flow operation used in the peak periods.

(This was investigated in detail in 1976 and the findings are summarised subsequently in this review.)

- Large queue delays on North Terrace between East Terrace and Stephen Terrace were noted and it was indicated that these could also be reduced if reverse flow operation was used between East Terrace and Fullarton Road - Magill Road. Reference was made to a proposed Magill Road deviation which should also ease congestion in this section.

(It is understood that this Magill Road deviation refers to a scheme prepared some years ago to divert Magill Road from its intersection with Sydenham Road to form an intersection with the Rundle Street - Fullarton Road junction.)

It was recommended that this scheme be reassessed as an alternative to reverse flow in North Terrace. One or other of these schemes might improve running speeds from Fullarton Road to the City along either route.

(If the Magill Road deviation was constructed, it would be necessary to realign the Rundle Street route across the park lands to link with Grenfell Street instead of Rundle Street at East Terrace. This was recommended as a longer term objective in the City of Adelaide Plan.)

Traffic Management Improvements for Buses at the Maid and Magpie Intersection

This is the colloquial name for the intersection of Payneham Road, Magill Road and Fullarton Road. The study reviewed five possible improvement schemes which could be implemented at this intersection. It was found that four of the five schemes could be implemented at low cost and yield high benefits. These basically involved retiming of traffic signals to more effectively serve morning and evening peak operations in lieu of the existing compromise timings, and some new signal equipment to serve revised traffic lane allocations that were proposed.

Traffic Management Improvements for Buses Around the Retail Core of Adelaide

This report outlined 22 proposals that should be investigated, including:-

- Simplification of the fare collection system.
- Legislation to require traffic to give way to a bus pulling out of a bus stop.
- Experimentation with a bus priority computer program (Transyt/5) designed to improve bus travel within the City's traffic co-ordinated signal system.

The other 19 proposals included such measures as clearways, bus lanes, relocation of bus stops, bans on parking in certain areas, special left-turn lanes, removal of some parking meters, intersection improvements, extension of bus stops, relocation of pedestrian crosswalks. Some of these measures have been carried out, some are under review and others have been found to be not practicable for local reasons not apparent at the time of the study.

Bus Priority Demonstration Project - Adelaide to Tea Tree Plaza

This study describes how a bus priority demonstration project should be implemented along the Adelaide to Tea Tree Plaza corridor for evaluating the effectiveness of such treatment on traffic operations in general and buses in particular. Costs of implementing the demonstration project were estimated to be about \$417,000 (based on 1976 costs). The principal features of the recommended scheme were:-

- . Extensive use of with-flow kerbside bus lane treatment to apply during the periods 7.30 a.m. to 9.00 a.m. and 4.30 p.m. to 6.00 p.m. on weekdays along the following sections of the corridor:- King William Road, Melbourne Street and Main North East Road. Special bus detection equipment and associated equipment to give traffic signal operation in favour of buses to be provided at five intersections along Main North East Road and at the intersections of Walkerville Terrace and Stephen Terrace, and of Melbourne Street and Jerningham Street.
- . The Transyt/5 computer program to be used to develop traffic signal timing patterns for existing or proposed groups of co-ordinated traffic signals, e.g., King William Road between North Terrace and Sir Edwin Smith Avenue; Frome Road between North Terrace and the Zoo; Main North East Road and Northcote Terrace between Ascot Avenue and Walkerville Terrace. The Transyt/5 program derives optimised signal timings taking into account the general flow of traffic on each intersection approach with special allowance for bus movements.

(Within the City it may need to be modified to maintain adequate protection for pedestrians while keeping vehicle speeds down.)

- . New traffic signals to be installed at the intersection of Walkerville Terrace and Smith Street on this route, currently used by routes 7E, 7F, 7G, 530 and 531 buses. Alterations to traffic signal phasing to be implemented at the intersections of Main North East Road and Nottage Terrace, and Main North East Road and O.G. Road.

Other findings listed in the report were:-

- . Interstate and overseas experience had shown that the principal benefits arising from bus lane projects were bus passenger travel time savings and bus passenger waiting time savings.
- . The Sydney transit lane project introduced in 1974 had reduced average bus travel times by 46% and the standard deviation of bus travel times by 78%.

- . Bus lane schemes (with-flow or contra-flow) can be effective over a wide range of circumstances in reducing bus travel times.
- . The extent to which people will transfer from motor to bus as a result of such schemes depends not only on the magnitude of bus travel time reductions but also upon the extent to which car travel is penalised by the scheme.

(The findings of this report indicate that congestion may not be sufficiently great to deter traffic even though bus travel times may be improved. Perhaps the thought that such a scheme might be premature at this stage could be the reason why no attempts have been made to experiment with such a scheme in spite of its low cost of implementation. If this is the case, there does not appear to be much justification for an immediate decision to build a high speed transit way in the North East Corridor. It appears that a further build-up of traffic volumes on Main North East Road would be necessary before bus priority or bus lane schemes would become really effective.)

- . Review of the parking restrictions through Lower North Adelaide indicates that there are no special peak hour clearway restrictions in this area. Clearway restrictions are in force along Main North East Road only as far as Hampstead Road and Lower Portrush Road.

(This is a tacit recognition of the fact that traffic delays to either buses or private motor vehicles are not particularly serious beyond Hampstead Road. Analysis of the traffic flow in this area indicates the traffic drops off considerably north-east of Hampstead Road. In other words, the real problem is from Hampstead Road to the Park Lands. The cross-section of Main North East Road from Hampstead Road to Sudholz Road consists of dual carriageways each with two moving lanes aggregating 6.4 metres in width and a parking lane of 2.13 metres, these carriageways being separated by a painted median of 1.83 metres in width. Such a cross-section has a high capacity to carry traffic. Therefore, if there is no need for a Clearway beyond Lower Portrush Road, a transit lane to assist buses would be of little benefit.)

Specific bus priority and traffic management treatments were listed as follows:-

- . Traffic signals along Frome Road be included in the overall city traffic signal co-ordination system prior to the implementation of any other proposal. (Since carried out.)
- . The computer program Transyt/5 be used to provide some priority for buses along these sections of road. (Currently being investigated by Adelaide City Council.)
- . An exclusive bus lane be implemented along each kerb of King William Road and Sir Edwin Smith Avenue to North Terrace, these operating only in the appropriate peak period. (City Council counts do not support the need for this.)
- . The traffic signals at Kermode Street and Brougham Place be linked together without being co-ordinated within the overall City of Adelaide signal co-ordination system. (Since carried out.)

- . In Melbourne Street, an exclusive bus lane in the peak direction during the morning and evening peak periods together with re-routing the buses now using Mackinnon Parade, together with rearrangement of bus detectors at the intersection of Melbourne Street and Jerningham Street. (Currently being reviewed).

Other observations made were that no special treatments were considered necessary along Frome Road between War Memorial Drive and Melbourne Street and that the Highways Department, independently of any busway project along Main North East Road, proposed to co-ordinate six traffic signals along this route between the intersections of Robe Terrace - Northcote Terrace - Walkerville Terrace and Ascot Avenue (Lower Portrush Road) - Main North East Road. It was recommended that as part of this co-ordination project the computer program Transyt/5 be used to improve bus travel times through the system. No proposals were recommended at that stage along Mann Terrace due to the uncertainty of a proposed one-way couplet scheme for Mann Terrace and Park Terrace.

Examination of the bus route structure in the City indicated that improvements to services could be achieved by some re-routing. These improvements were considered to be dependent upon two factors:-

- . That bus services which now terminate in the City (those services formerly provided by private operators, but now taken over by the State Transport Authority) be restructured so that all City services are through-routed. It is understood that restructuring of these services in this way is presently under consideration by the State Transport Authority.
- . Accurate data on the distribution of City trip ends becoming available.

Consequently, no re-routing of buses within the City was proposed as part of that study. It was concluded that an improvement in bus services would be obtained by re-routing the services from Mackinnon Parade to Melbourne Street, particularly if peak hour bus lanes are declared along Melbourne Street. The report canvassed the option of either re-routing buses now entering the City via Frome Road from Frome Road to the alternative Sir Edwin Smith Avenue/King William Road route or re-routing those services now entering via Sir Edwin Smith Avenue to Frome Road. It was concluded that due to the already high volume of buses now operating along King William Street in the peak periods, the former of these options was not considered to be practical. In contrast, it was indicated that the Frome Road alternative appeared to offer some advantages in terms of routing within the City itself.

(Provision of an LRT along King William Street would replace all of the Frome Road buses and lead to the same adverse effect rejected in this report.)

Re-routing of bus services in the Walkerville area was also considered and certain changes recommended for review by the STA and local Councils. The progress made concerning dialogue between the STA and the Walkerville and other relevant Councils is not known.

Finally, it was observed that a reduction in bus passenger travel time is one of the prime objectives of the project. It was noted that reductions of up to 20% had been achieved elsewhere, but that an improvement of this order would normally arise only in situations where the movement of buses was severely restricted by a general lack of roadway capacity within the "before" situation. It was therefore deduced that a smaller improvement could be expected on this study route.

Study of Alternative Bus Priority Improvements on Payneham Road

The objective of this study was to identify a program of priority bus improvements on Payneham Road between the intersection at Magill Road and the intersection at Glynburn Road.

The most significant aspects emerging from the study were that bus priority measures were not considered to be required north of Avenue Road, but that serious consideration should be given to extending the bus priority test system to include North Terrace between Magill Road and Hackney Road. It was considered that bus priority measures would need to be applied in that section of North Terrace in order to gain full advantage from the recommended program.

Following is the assessment made of the traffic problems being incurred in 1976.

"There are two significantly different sections of Payneham Road at present. The section from O.G. Road north-east to Glynburn Road has a wide raised median and provides pavement width for two moving lanes of traffic with parking in each direction. Separate right-turn lanes are provided within the median at every intersection.

There was little evidence of delays to buses being caused by traffic conditions on this segment of road. For this reason, further consideration was not given to bus priority measures. The cross-section of this segment of the road is such that there is ample capacity to accept future traffic growth.

At a future time, when traffic volumes dictate, rearrangement of this section of Payneham Road would be possible to the extent of converting the parking lanes to transit lane operations. No justification can be made for immediate implementation of such measures.

This segment of Payneham Road has been excluded from the analyses and evaluations that are presented in this report."

Traffic growth between 1974 and 1977 was only two per cent per annum and consequently there would not appear to be any reason for the above finding to be changed.

The assessment of the second segment of Payneham Road was as follows:-

"The second segment of Payneham Road, between the intersections of Magill Road and O.G. Road, has no median, in general, and consists of two lanes in each direction with some provision for parking except in the peak direction during the peak hour, when clearway legislation applies. This segment of road is also a priority road and has a general pavement width of 14.1 m (46 feet).

It currently forms part of the Metropolitan Road Widening Scheme and property setbacks exist in places for the entire length of the route. All property-widening strips on both sides of the road are being actively acquired between O.G. Road and Portrush Road and the Highways Department have current plans for road reconstruction to 18.6 m (62 feet) pavement width for this section.

Traffic conditions also vary along the route with the worst delays being experienced at the Portrush Road and Magill Road intersections. These intersections, together with those at O.G. Road, Stephen Terrace and Glynburn Road are controlled by traffic signals.

There has been no attempt to provide co-ordination between the signal installations although the Highways Department is currently investigating this proposal."

The following five alternative schemes sharing a number of improvements in common were identified as being feasible:-

- Alternative 1 - Traffic operations improvements;
- Alternative 2 - Transit lane operations in four lanes;
- Alternative 3 - Four-lane reverse-flow operations with transit lane;
- Alternative 4 - Five-lane reverse-flow operations with transit lane;
- Alternative 5 - Metropolitan Road Widening Scheme with transit lane.

These are listed in the order in which they might be implemented if each stage were to be adopted, with the first alternative, which consists primarily of improvements to signal controls and intersection layout, being listed first as it could be implemented quickly and most cheaply. The fifth alternative, envisaging the implementation of the Metropolitan Road Widening Scheme for the entire route, could not be implemented for some years and is listed last.

The first alternative deals with standard operation improvements and envisages a series of improvements as follows:-

- . Revise signal timings to reflect the principle of minimum passenger delay (a specific example of how this would apply to the intersection of Stephen Terrace was given).
- . Intersection layout improvements to provide transit lane approaches to signalised intersections.
- . Traffic signal co-ordination.
- . Extension of clearway hours.
- . Turning restrictions at intersections and at entering sideroads.

APPENDIX NO. 12

COMPARISONS OF NEAPTR'S DIFFERENT TYPES OF PUBLIC TRANSPORT SYSTEMS FOR THE NORTH-EAST, USING NEAPTR'S OWN FACTS AND FIGURES (WITH COMPARATIVE STATISTICAL TABLES)

Council's consultants have sought to compare NEAPTR's own basic data on the costs, levels of service and environmental impacts of each of the many different public transport systems simulated by NEAPTR for the year 1996.

Following discussions with NEAPTR officials, their long list was narrowed down to seven.

The seven selected alternative systems fall into 3 categories:-

- A LOW COST SYSTEMS USING BUSES ON ROADS AND STREETS, AND THE EXISTING NORTHFIELD RAILWAY WITHOUT ANY EXTENSION.
- B MEDIUM TO HIGH COST SYSTEMS INVOLVING CONSTRUCTION PROJECTS.
- C HIGHEST COST, MOST CAPITAL INTENSIVE SYSTEMS INVOLVING MAJOR CONSTRUCTION PROJECTS.

Here are the seven alternative systems:

- A. LOW COST SYSTEMS USING BUSES ON ROADS AND STREETS.

-
- A1. Improved, Bus Services on Normal Roads and Streets, and the existing Northfield Railway without any extension.

NEAPTR calls this the "Moderate Change, Base Case Option 2". Details of how it would work in 1996 are given in Working Paper Group 21, "Travel Model Analysis of radial and cross suburban options" by Pak Poy and in Section 5 of Working Paper Group 25, "Operational Analysis of Radial Options", by De Leuw Cather.

In the "Economic Assessment" Working Paper, by Travers Morgan, this is called the "Base Case" but not evaluated in terms of socio-economic benefits.

- A2. Same as A1, but with bus priority lanes on the radial North East and Payneham Roads.

- A3. Same as A1, but with extra cross-suburban bus services between Tea Tree Plaza and the western, northern and eastern suburbs.

NEAPTR details what are here called A2 and A3 as Moderate Change Base Case Options 3 and 4, but does not evaluate them in terms of socio-economic benefits.

B. MEDIUM TO HIGH COST SYSTEMS INVOLVING CONSTRUCTION PROJECTS

- B1. Railway Extension Northfield to Ingle Farm, combined with radial and cross-town buses on ordinary roads.

This is the cheapest, simplest and most cost-effective of the Railway options evaluated by NEAPTR. It may have been unfairly treated by NEAPTR which did not propose to serve it with feeder buses. It may well carry more passengers than any other alternative system if provided with feeder buses to a new Ingle Farm Railway Station.

- B2. Busway (pull-on-type) in Torrens Valley Corridor, combined with some feeder buses, other radial and cross-town buses on ordinary roads.

A pull-on Busway is one where feeder buses run through suburbs and pull on to the Busway without stopping and forcing travellers to wait and change to "corridor" vehicles, as feeder buses to LRT stations must do.

This is the simplest and most cost-effective of all the Busway options.

C. HIGHEST COST, MOST CAPITAL INTENSIVE SYSTEMS INVOLVING MAJOR CONSTRUCTION PROJECTS

- C1. Freeway for all vehicles including buses, in Torrens Valley Corridor, combined with other radial and cross-town buses on ordinary roads.

This is the only system which, in NEAPTR's analysis, would yield any future socio-economic benefits in excess of costs at a discount (or interest) rate of 10 per cent.

- C2. Light rail transitways (medium to high speed) in Torrens Valley Corridor, combined with feeder buses to LRT stations, and other radial and cross-town buses as well.

NEAPTR and the State Cabinet strongly favour the LRT. They are now believed to favour a medium speed, partly grade-separated track, a compromise between the high and low speed options separately evaluated by NEAPTR, but with luxury vehicles costing \$500,000 each.

COMPARATIVE STATISTICAL TABLES

The Tables on the following pages seek to compare the costs and levels of service provided by each of the major types of alternative systems. The figures, except where specifically noted, come from NEAPTR's own Working Papers published over the two years ending December, 1977.

It should be noted that all money figures in NEAPTR's economic analyses, and in this report, are expressed in 1977 dollars.

These Tables were examined by the Director-General of Transport in their original draft form. They have subsequently been refined in the light of his technical critique of the drafts.

APPENDIX 12

TABLE 1: SUMMARY OVERALL COMPARISON
BETWEEN DIFFERENT SYSTEMS

PERCENTAGE DIFFERENCE, USING BASIC BUS SYSTEM A1
AS THE BASE CASE (100%)

		TOTAL CAPITAL TIED UP IN VEHICLES, LAND & CONSTRUCTION (See Table 3)	TOTAL ANNUAL COSTS (See Table 4)	1996 WEEKDAY PUBLIC TRANSPORT TRIPS TO CITY FROM N.E. (See Table 5A)	1996 MILEAGE OF HIGHWAY TRAFFIC (See Table 5B)
Low Cost	A1. Basic bus and existing rail system.	0	0	0	0
	A2. Same as A1, but with bus priority lanes on major radial arterials.	+2%	+0.5%	NA	-0.1%
	A3. Same as A1, but with additional cross-town bus services.	+1%	+1%	-2.8%	-1%
Medium to High Cost	B1. Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	+31%	-6%	NA	0
	B2. Pull-on Busway, with other parallel radial and cross- town buses.	+87%	+23%	+3.8%	-2.2%
Highest Cost	C1. Freeway with buses, plus other parallel radial and cross-town buses.	+151%	+31%	+2.6%	+0.1%
	C2. LRT with feeder buses, parallel radial and cross-town buses.	+151%	+25% one man operation +39% two man operation	+3.8%	-1.9%

See also Table 6 for detailed comparisons of operating characteristics, including average trip times.

APPENDIX 12

TABLE 2: COMPARATIVE CAPITAL COSTS OF VEHICLES

		1996 PUBLIC TRANSPORT ROLLING STOCK FLEET	UNIT COSTS	PURCHASE OR REPLACEMENT COST OF FLEET	PER CENT CHANGE FROM BASIC BUS SYSTEM A1
Low Cost	A1.	Basic bus and existing rail system	371 buses 4 rail power units 8 rail cars	\$37,100,000 3,000,000 2,280,000 <u>\$42,380,000</u>	0
	A2.	Same as A1, but with bus priority lanes on major radial arterials.	371 buses 4 rail power units 8 rail cars	\$37,100,000 3,000,000 2,280,000 <u>\$42,380,000</u>	0
	A3.	Same as A1, but with additional cross- town bus services.	354 buses 4 rail power units 8 rail cars	\$35,400,000 3,000,000 2,280,000 <u>\$40,680,000</u>	-4%
Medium to High Cost	B1.	Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	299 buses 4 rail power units 27 rail cars	\$29,900,000 3,000,000 7,695,000 <u>\$40,595,000</u>	-4.2%
	B2.	Pull-on Busway, with other parallel radial and cross-town buses.	402 buses 2 rail power units 6 rail cars	\$40,200,000 1,500,000 1,710,000 <u>\$43,410,000</u>	+2.4%
Highest Cost	C1.	Freeway with buses, plus other parallel radial and cross- town buses.	426 buses 2 rail power units 6 rail cars	\$42,600,000 1,500,000 1,710,000 <u>\$45,810,000</u>	+8%
	C2.	LRT with feeder buses, parallel radial and cross-town buses.	399 buses 66 LRT cars 2 rail power units 6 rail cars	\$33,900,000 19,800,000* 1,500,000 1,710,000 <u>\$56,910,000</u>	+34%

A11 estimates are taken from NEAPTR Working Papers and expressed in 1977 dollars.

* NEAPTR is now believed to be considering using LRT cars costing \$500,000 each.

APPENDIX 12

TABLE 3: COMPARATIVE TOTAL CAPITAL COSTS

		COST OF VEHICLES	VALUE OF LAND	TOTAL CONSTRUCTION COSTS	TOTAL CAPITAL TIED UP	PER CENT CHANGE FROM BASIC BUS SYSTEM A1
Low cost	A1. Basic bus system	\$42,380,000	Bus depot	\$2,500,000	\$44,880,000	0
	A2. Same as A1, but with bus priority lanes on major radial arterials.	\$42,380,000	Bus depot Priority lanes	\$2,500,000 1,000,000 \$3,500,000	\$45,880,000	+2.2%
	A3. Same as A1, but with additional cross-town bus services.	\$40,680,000	Bus depot	\$2,500,000	\$45,180,000	+0.7%
Medium to High Cost	B1. Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	\$40,595,000	\$ 470,000	\$17,690,000	\$58,745,000	+31%
	B2. Pull-on Busway, with other parallel radial and cross-town buses.	\$43,410,000	\$6,309,000	\$34,328,000	\$84,047,000	+87%
Highest Cost	C1. Freeway with buses, plus other parallel radial and cross-town buses.	\$45,810,000	\$8,054,000	\$58,645,000	\$112,509,000	+151%
	C2. LRT with feeder buses, parallel radial and cross-town buses.	\$56,910,000	\$7,317,000	\$48,366,000	\$112,593,000	+151%

All estimates are taken from NEAPTR Working Papers and expressed in 1977 dollars.

APPENDIX 12

TABLE 4: COMPARATIVE ANNUAL RUNNING COSTS

		ANNUAL COST OF CAPITAL AT 10%	ANNUAL OPERATING & MAINTENANCE COSTS	TOTAL ANNUAL COSTS	PER CENT CHANGE FROM BASIC BUS SYSTEM A1
Low Cost	A1. Basic bus system	\$4,488,000	\$15,388,000	\$19,876,000	0
	A2. Same as A1, but with bus priority lanes on major radial arterials.	\$4,588,000	\$15,388,000	\$19,976,000	+0.5%
	A3. Same as A1, but with additional cross- town bus services.	\$4,518,000	\$15,576,000	\$20,094,000	+1%
Medium to High Cost	B1. Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	\$5,874,500	\$12,835,000	\$18,709,500	-5.9%
	B2. Pull-on Busway, with other parallel radial and cross-town buses.	\$8,404,700	\$15,985,000	\$24,389,700	+22.7%
Highest Cost	C1. Freeway with buses, plus other parallel radial and cross- town buses.	\$11,250,900	\$14,747,500	\$25,998,400	+30.8%
	C2. LRT with feeder buses, parallel radial and cross-town buses.	\$11,259,300	\$13,636,000 with one man operation \$16,276,000* with two man operation	\$24,895,300 \$27,535,300*	+25.2% +38.5%

All estimates are taken from NEAPTR Working Papers and expressed in 1977 dollars.

* Two man operating costs estimated by Clarke and Casey.

APPENDIX 12

TABLE 5A: COMPARISON OF RIDERSHIP ATTRACTED TO ALTERNATIVE SYSTEMS

	Projections from NEAPTR Working Paper No. 21 "enable a valid comparison" - Director-General of Transport	1996 TOTAL WEEKDAY PASSENGER TRIPS ON PUBLIC TRANSPORT IN NORTH-EAST AREA	PER CENT CHANGE FROM BASIC BUS SYSTEM A1	1996 TOTAL WEEKDAY PASSENGER TRIPS TO & FROM CITY OF ADELAIDE	PER CENT CHANGE FROM BASIC BUS SYSTEM A1
Low Cost	A1. Basic bus system	88,754	0	43,451	0
	A2. Same as A1, but with bus priority lanes on major radial arterials.	Not published in NEAPTR Working Paper No. 21			
	A3. Same as A1, but with additional cross-town bus services.	93,473	+5.3%	42,329	-2.8% (-2,152 or 1,076 each way)
Medium to High Cost	B1. Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	Not published in NEAPTR Working Paper No. 21			
	B2. Pull-on Busway, with other parallel radial and cross-town buses.	94,440	+6.4%	45,190	+3.8% (+1649 or 825 each way)
Highest Cost	C1. Freeway with buses, plus other parallel radial and cross-town buses.	94,913	+6.9%	44,676	+2.6% (+1,135 or 568 each way)
	C2. LRT with feeder buses, parallel radial and cross-town buses.	94,440	+6.4%	45,190	+3.8%

APPENDIX 12

TABLE 5B: COMPARISON OF RIDERSHIP ATTRACTED TO ALTERNATIVE SYSTEMS

Projections from NEAPTR Working Paper 25 by De Leuw Cather, published by NEAPTR, December 1977.

		1996 TOTAL WEEKDAY PASSENGER TRIPS ON PUBLIC TRANSPORT IN NORTH-EAST AREA	PER CENT CHANGE FROM A1 or B1	1996 AVERAGE DAILY HIGHWAY VEHICLE MILES OF TRAVEL IN NORTH-EAST AREA	PER CENT CHANGE FROM BASIC BUS SYSTEM A1
--	--	---	--	---	---

Low Cost	A1. Basic improved all-bus system	136,538 (3.5% use rail)	0	3,694,080	0
	A2. Same as A1, but with bus priority lanes on major radial arterials.	137,208 (3.65% use rail)	+0.5%	3,690,683	-0.1%
	A3. Same as A1, but with additional cross-town bus services.	141,745 (3.5% use rail)	+3.8%	3,657,720	-0.1%
Medium to High Cost	B1. Ingle Farm Railway Extension with radial and cross-town buses, but no feeders.	135,184 (11.4% use rail)	0	3,694,080	0
	B2. Pull-on Busway, with other parallel radial and cross-town buses.	143,395 (28% use Busway)	+6%	3,614,232	-2.2%
Highest Cost	C1. Freeway with buses, plus other parallel radial and cross-town buses.	136,627 (26.6% use buses on Freeway)	+1%	3,697,960	+0.1%
	C2. LRT with feeder buses, parallel radial and cross-town buses.	141,195 (20.2% use Feeders & LRT) (6.6% use LRT only)	+4.4%	3,625,182	-1.9%

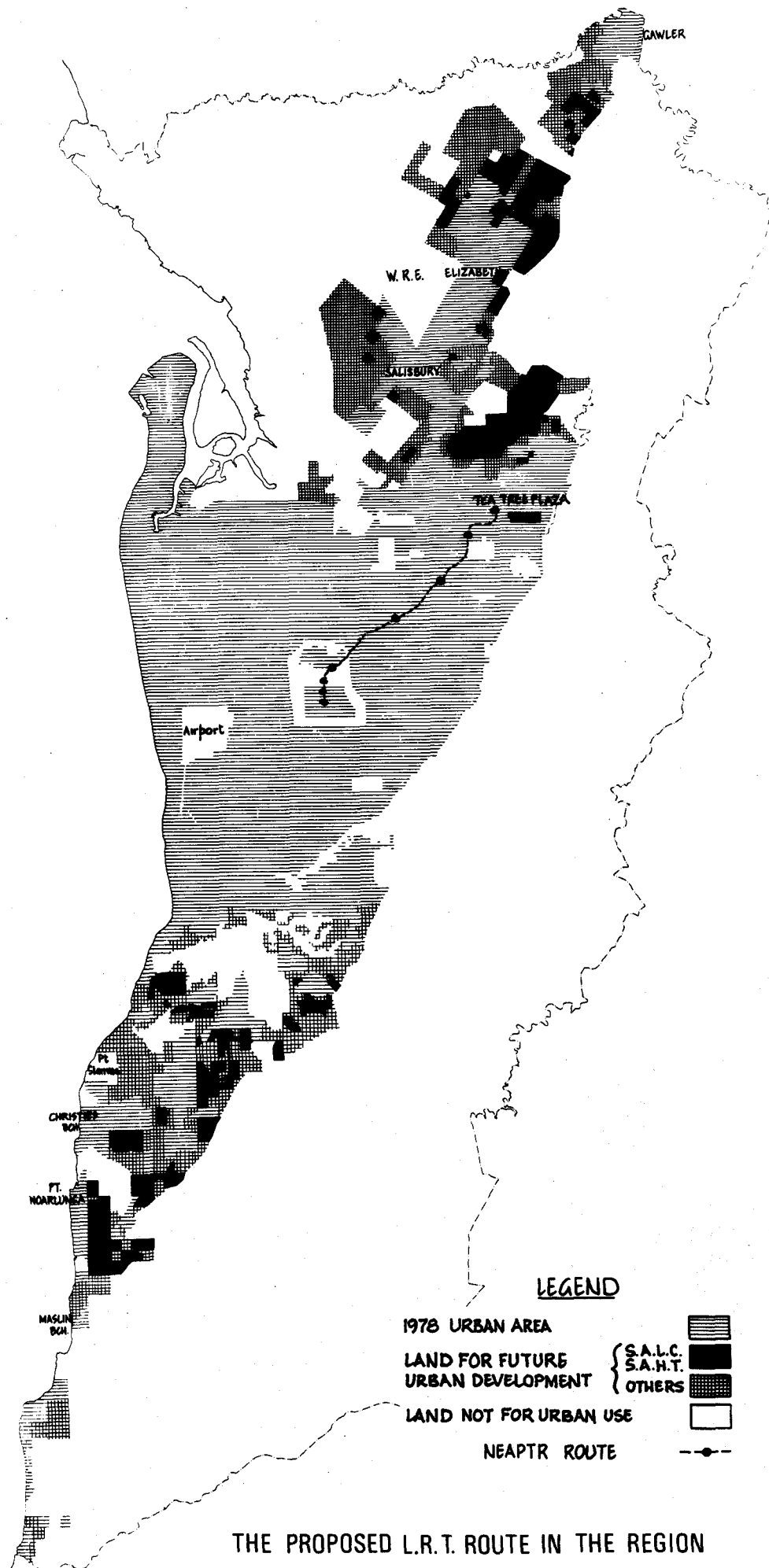
NOTE: The Director-General of Transport states that figures above and below the line above cannot be validly compared. Table 5A enables a valid comparison.

TABLE 6: SUMMARY OF OPERATING CHARACTERISTICS OF ALTERNATIVE SYSTEMS

Projections from NEAPTR Working Papers by De Leuw Cather, published by NEAPTR, December 1977.		TOTAL DAILY TRIPS	AVERAGE LENGTH (km)	AVERAGE RUNNING TIME (hrs)	AVERAGE RUNNING SPEED (kmph)	AVERAGE WAIT TIME (hrs)	AVERAGE TRIP TIME (hrs)	(mins)	AVERAGE WEIGHTED WAIT TIME (x 2.67) (hrs)	AVERAGE WEIGHTED TRIP TIME (hrs)
A1.	Inner Radial	70,075	4.74	0.264	18.2	0.034	0.298	18.0	0.080	0.355
	Outer Radial	47,906	8.66	0.390	22.2	0.039	0.429	25.7	0.104	0.494
	Cross-town	13,540	5.94	0.275	21.2	0.068	0.343	20.6	0.160	0.425
	Northfield Rail	5,017	14.47	0.242	60.3	0.083	0.325	19.5	0.222	0.464
A2.	Inner Radial	70,353	4.74	0.255	18.6	0.043	0.298	18.0	0.115	0.370
	Outer Radial	48,308	8.67	0.371	23.4	0.039	0.410	24.6	0.104	0.475
	Cross-town	13,540	5.94	0.275	21.2	0.068	0.343	20.6	0.160	0.425
	Northfield Rail	5,017	14.47	0.242	60.3	0.083	0.325	19.5	0.222	0.464
A3.	Inner Radial	61,729	4.49	0.251	17.9	0.038	0.289	17.3	0.101	0.352
	Outer Radial	45,824	8.26	0.372	22.2	0.042	0.414	24.8	0.112	0.484
	Cross-town	29,251	6.37	0.296	21.5	0.061	0.357	21.4	0.163	0.459
	Northfield Rail	4,941	14.20	0.237	59.9	0.083	0.320	19.2	0.222	0.459
B1.	Radial	106,266	5.86	0.292	20.1	0.050	0.342	20.5	0.133	0.425
	Crosstown	13,529	4.91	0.226	21.7	0.083	0.309	18.5	0.222	0.448
	Northfield Rail	15,389	14.33	0.240	59.7	0.083	0.323	19.4	0.222	0.462
B2.	Feeder and Corridor	5,470	15.68	0.480	32.7	0.090	0.570	34.2	0.240	0.720
	Pull-on Feeder	22,706	12.10	0.320	37.8	0.045	0.365	21.9	0.120	0.440
	Radial	63,607	4.23	0.231	18.3	0.044	0.275	16.5	0.117	0.348
	Cross-town	36,444	4.86	0.232	20.9	0.040	0.272	16.3	0.107	0.339
	Northfield Rail	3,255	10.68	0.192	55.6	0.083	0.275	16.5	0.222	0.414
C1.	Freeway Bus (Fdr. 27,307 Radial excluded)	36,282	13.82	0.470	29.4	0.061	0.531	31.9	0.163	0.633
	Radial	62,723	4.65	0.254	18.3	0.039	0.293	17.6	0.104	0.358
	Cross-town	34,372	5.10	0.244	20.9	0.053	0.297	17.8	0.142	0.384
	Northfield Rail	3,250	10.65	0.195	54.6	0.083	0.278	16.7	0.222	0.417
C2.	LRT (Feeder 28,493 Radial excluded)	37,889	14.52	0.384	37.8	0.052	0.436	26.2	0.139	0.523
	Radial	63,607	4.23	0.231	18.3	0.044	0.275	16.5	0.117	0.348
	Cross-town	36,444	4.86	0.232	21.0	0.040	0.272	16.3	0.107	0.339
	Northfield Rail	3,255	10.68	0.192	55.5	0.083	0.275	16.5	0.222	0.414

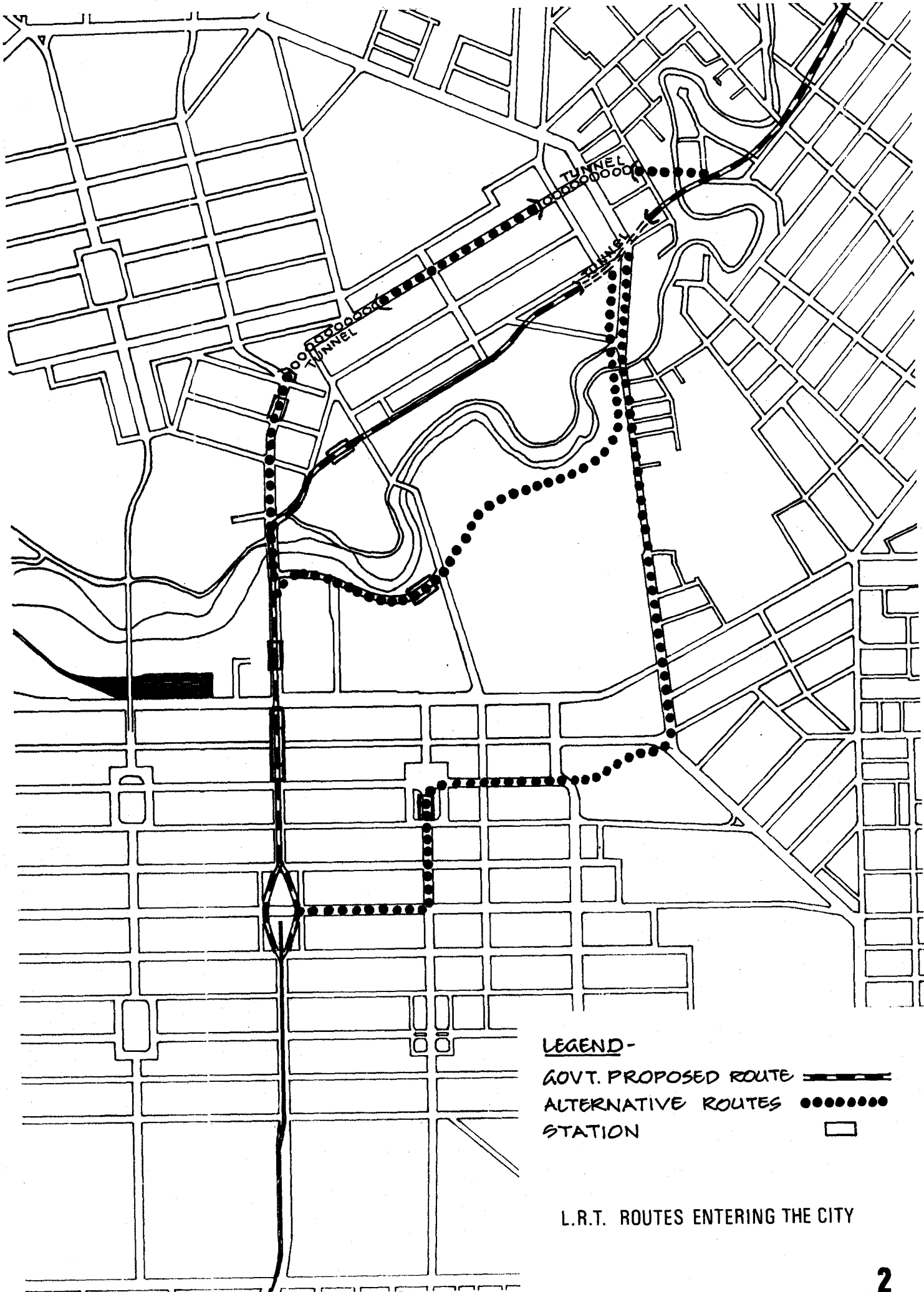
PLANS, PHOTOGRAPHS AND PHOTOMONTAGES

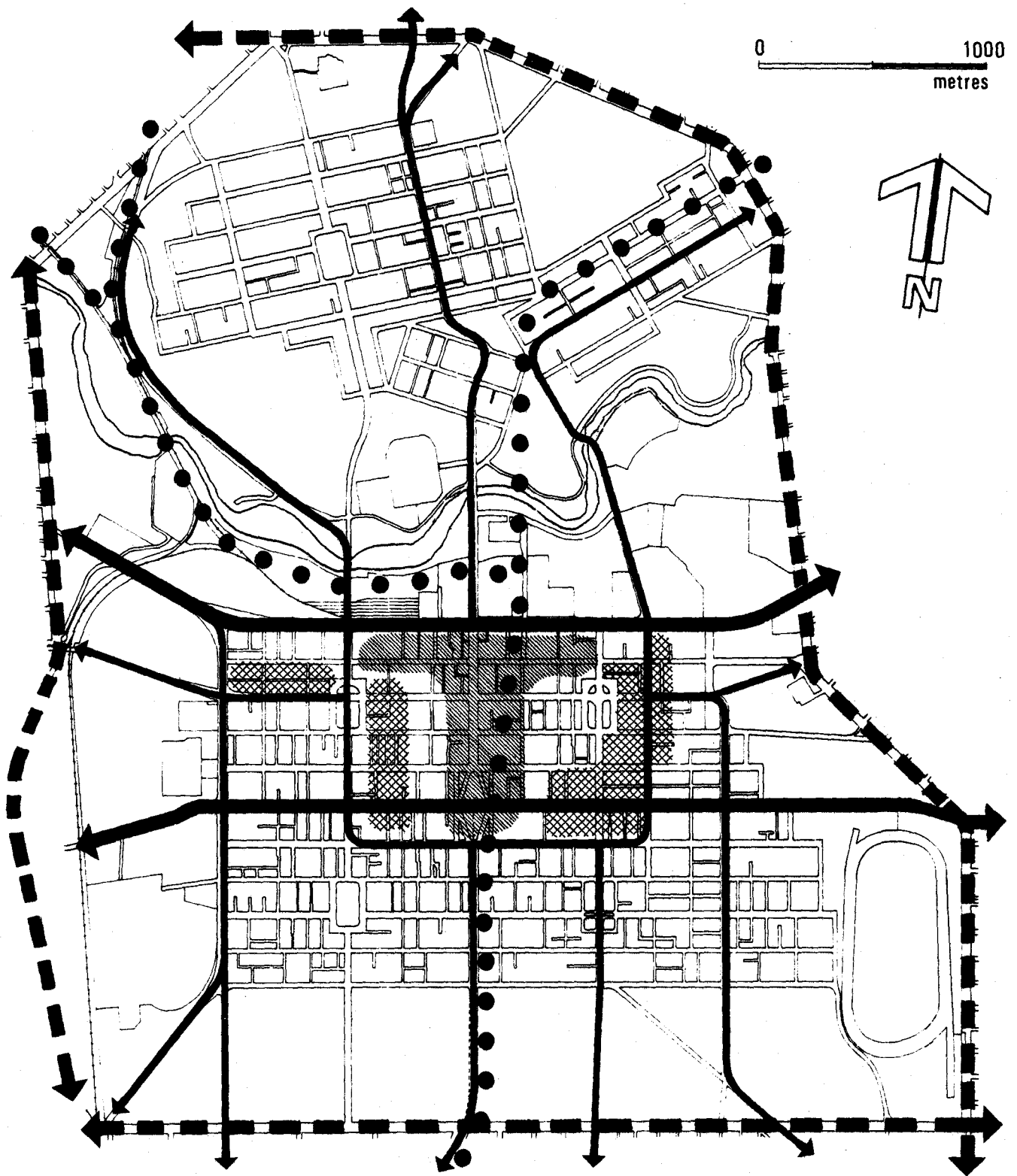
1. Metropolitan Adelaide, showing the proposed LRT line and Government owned land scheduled for development by the S.A. Land Commission.
2. City map showing the current officially proposed LRT route and stations within the City of Adelaide.
3. The 1976 City of Adelaide Plan's "Desired Future Overall City Movement System", showing the Government's proposed City underground rail transit tunnel and proposed Metropolitan Arterial Road Bypass on the west of the City.
4. Photograph of King William Street dug up for the laying of tramlines earlier this century.
5. Plans of officially proposed LRT route through the City, illustrating environmental impact:-
 - 5.1 Park Terrace to Dunn Street.
 - 5.2 Dunn Street to Kathleen Lumley College.
 - 5.3 Kathleen Lumley College to Frome Road.
 - 5.4 Frome Road to Sir Edwin Smith Avenue.
 - 5.5 Sir Edwin Smith Avenue to Elder Park.
 - 5.6 Elder Park to North Terrace.
 - 5.7 North Terrace to Pirie Street.
 - 5.8 Pirie Street to Victoria Square.
6. "Before" and "After" photographs and photomontages illustrating impacts of the LRT on the City.
 - 6.1 Mann Terrace to Bundeys Road (i).
 - 6.2 Mann Terrace to Bundeys Road (ii).
 - 6.3 Jerningham Street to Frome Road (i).
 - 6.4 Jerningham Street to Frome Road (ii).
 - 6.5 Frome Road to Sir Edwin Smith Avenue.
 - 6.6 King William Road.
 - 6.7 King William Street (i).
 - 6.8 King William Street (ii).



THE PROPOSED L.R.T. ROUTE IN THE REGION

-Showing Government owned land for development





LEGEND

Arterial roads
Metropolitan

Intra city

Major city distributor

Existing and possible future
rail transport

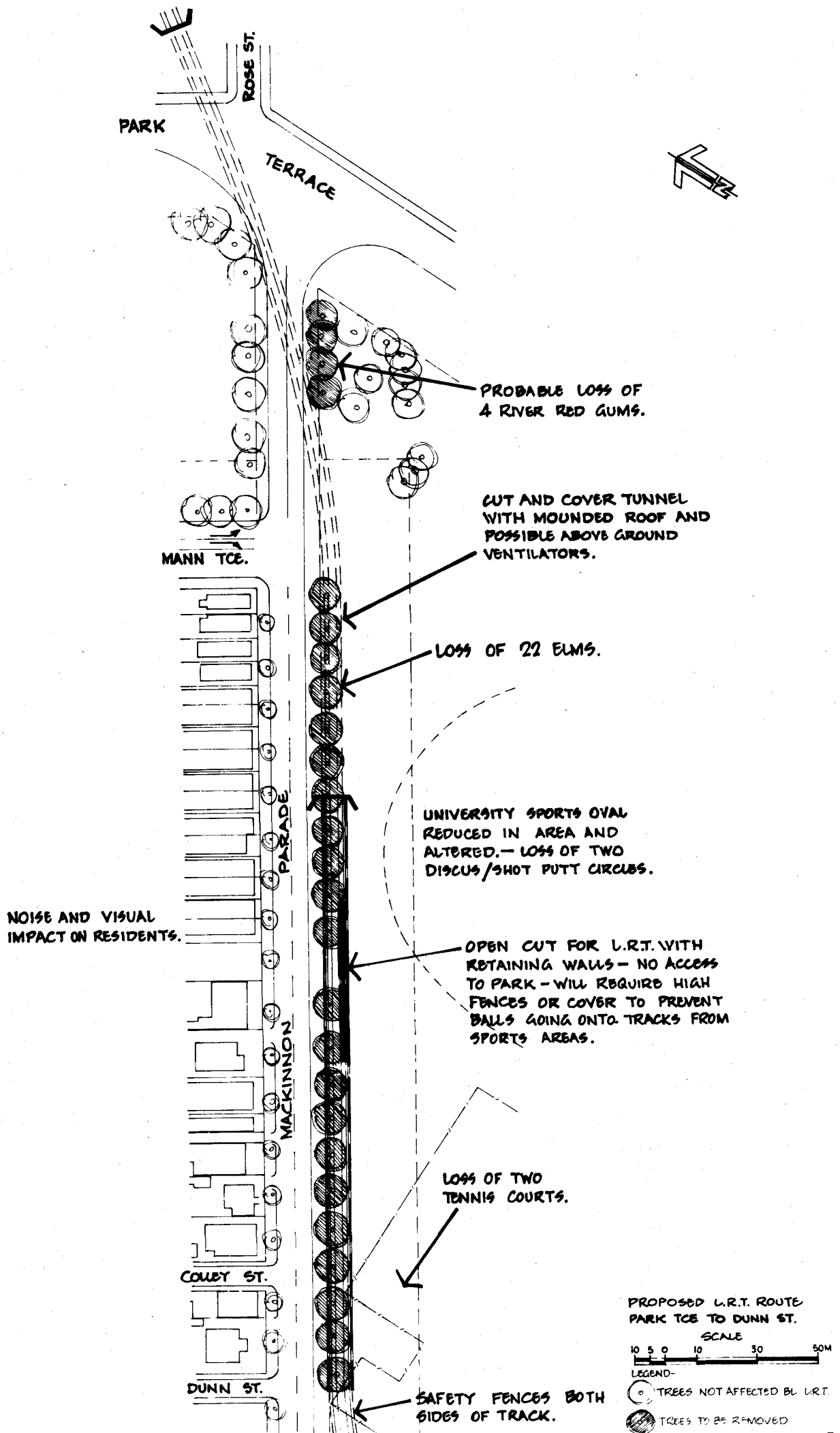
Major pedestrian areas

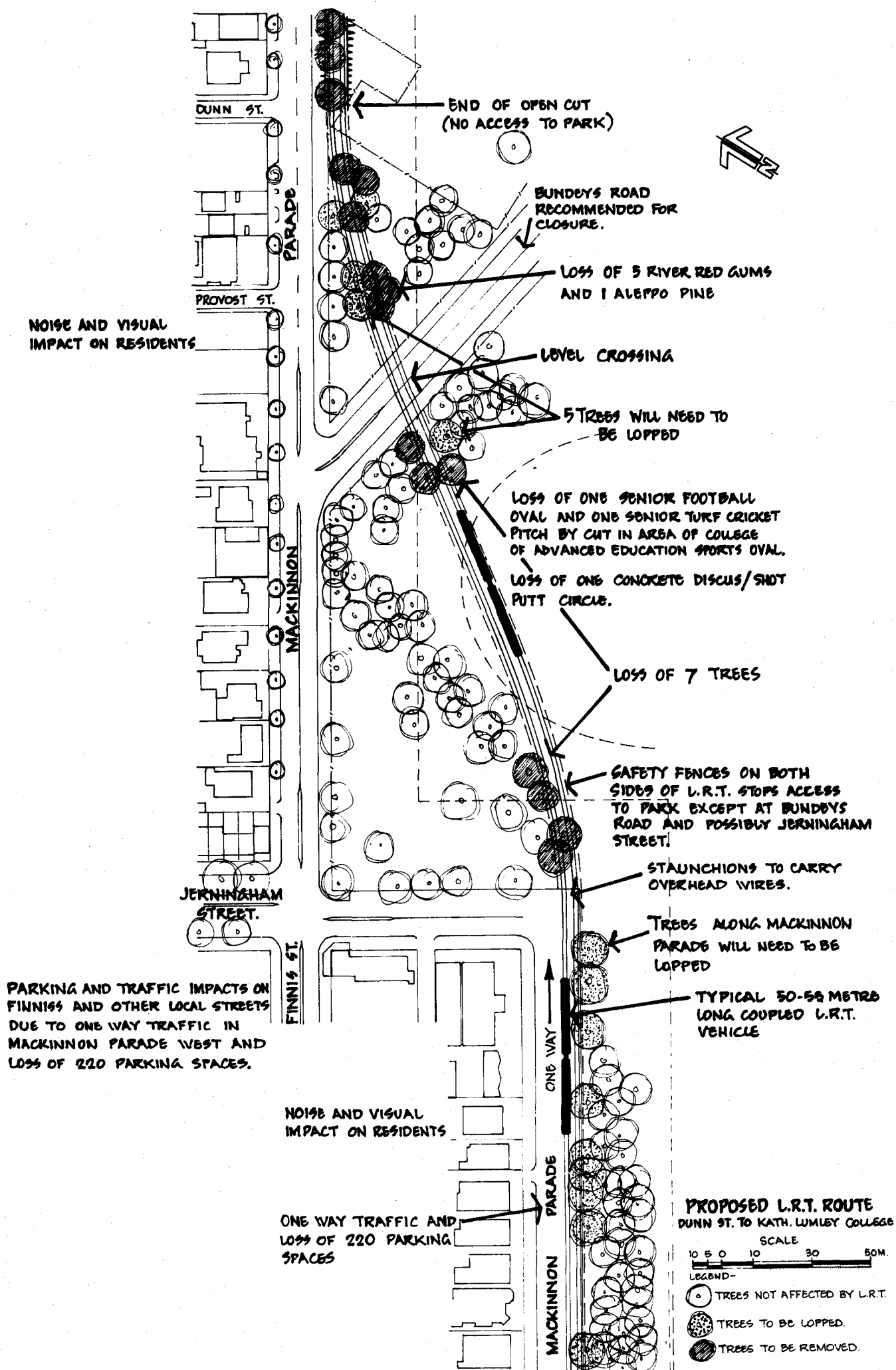
Major parking station areas

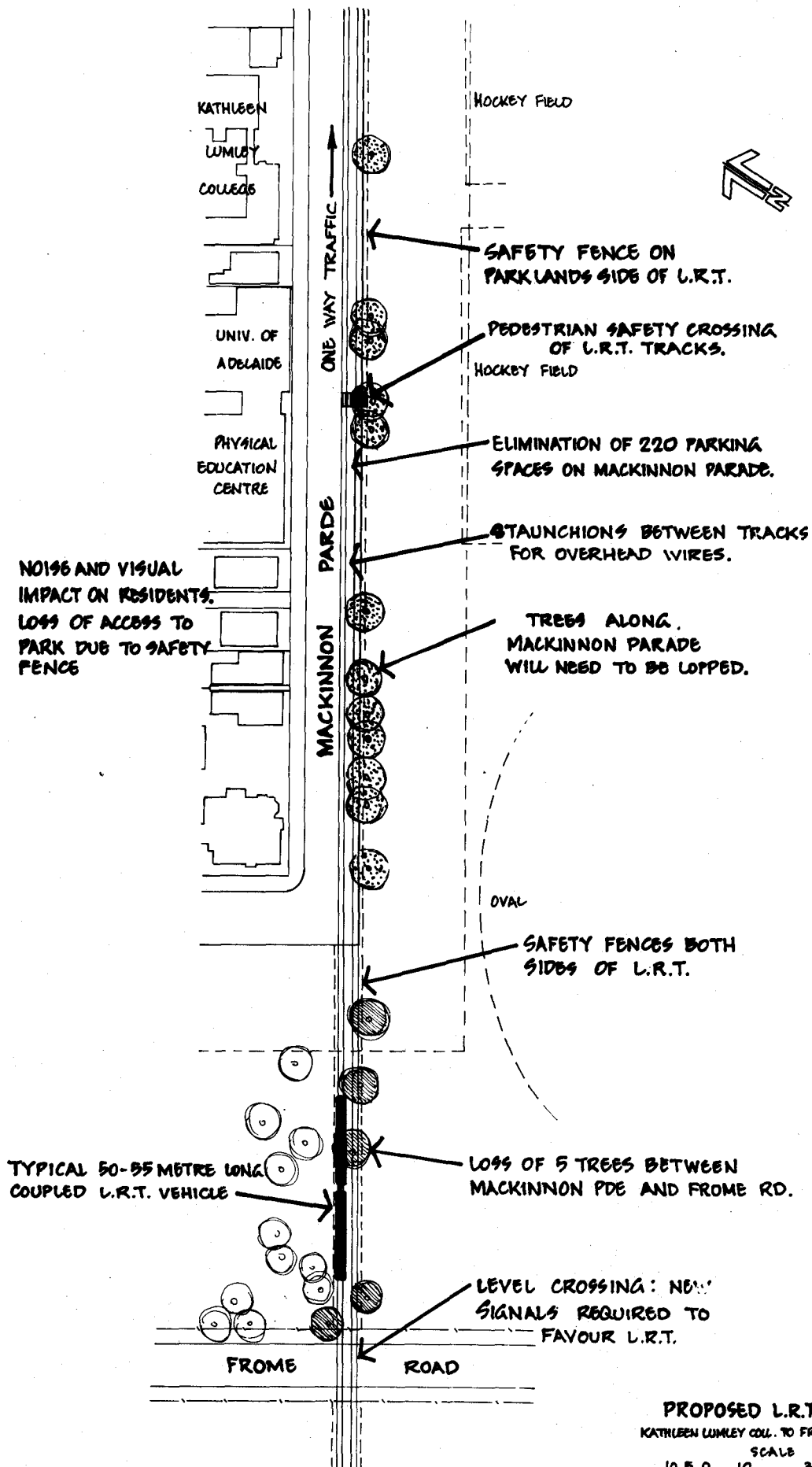


DESIRED FUTURE OVERALL CITY MOVEMENT SYSTEM

Diagram 4
City of Adelaide Plan
Adopted Oct. 1976



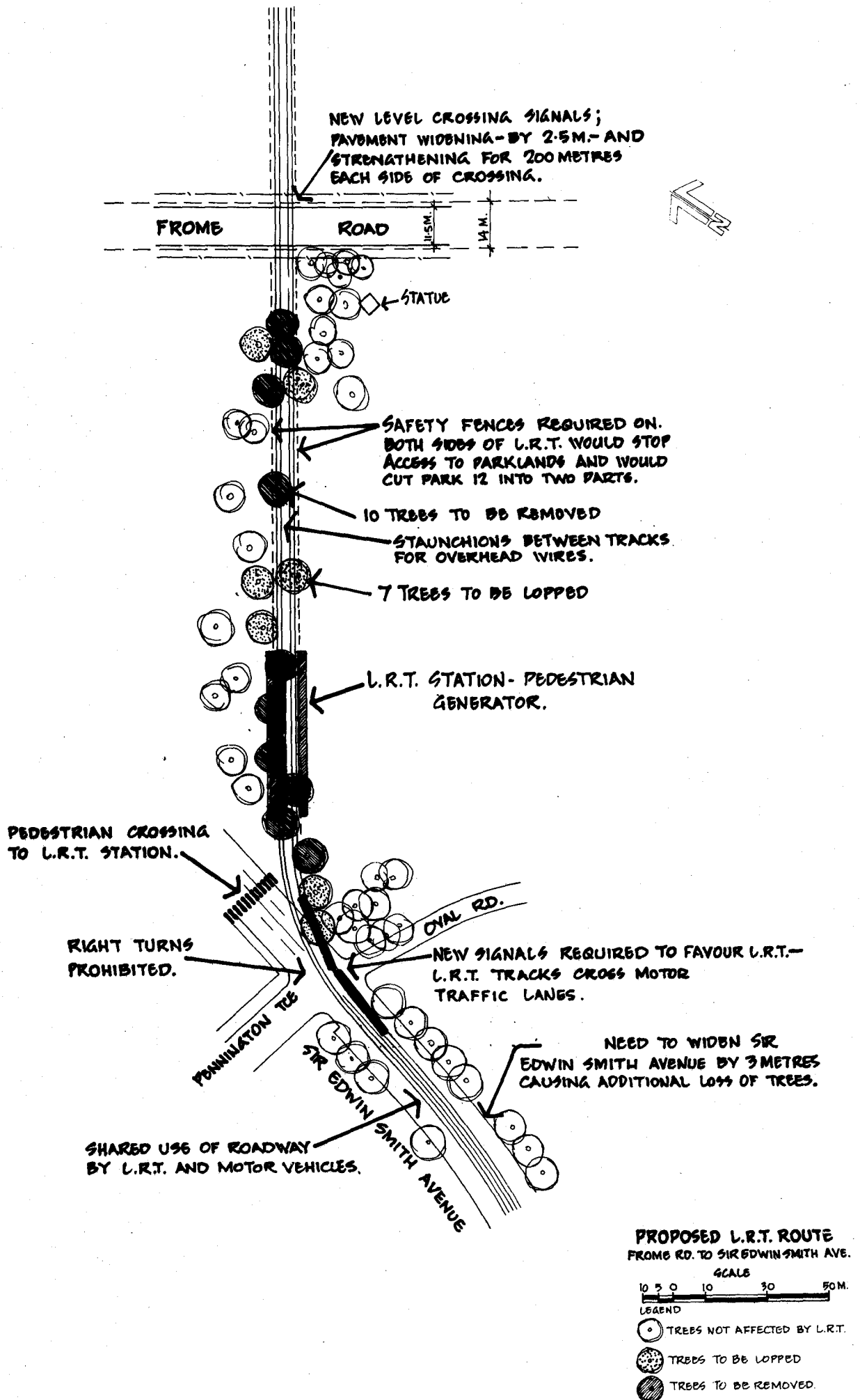


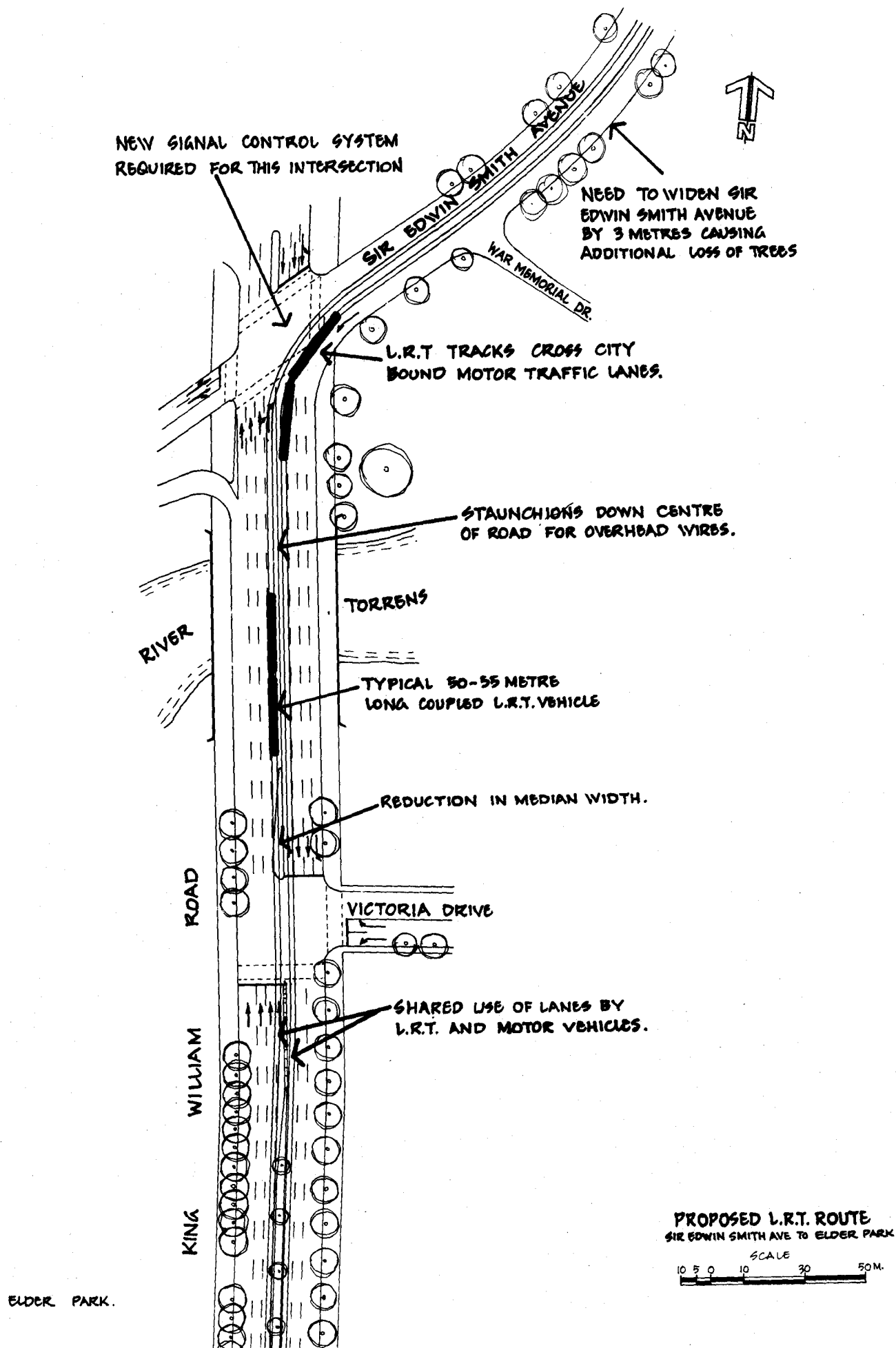


PROPOSED L.R.T. ROUTE KATHLEEN LUMLEY COLL. TO FROME ROAD.

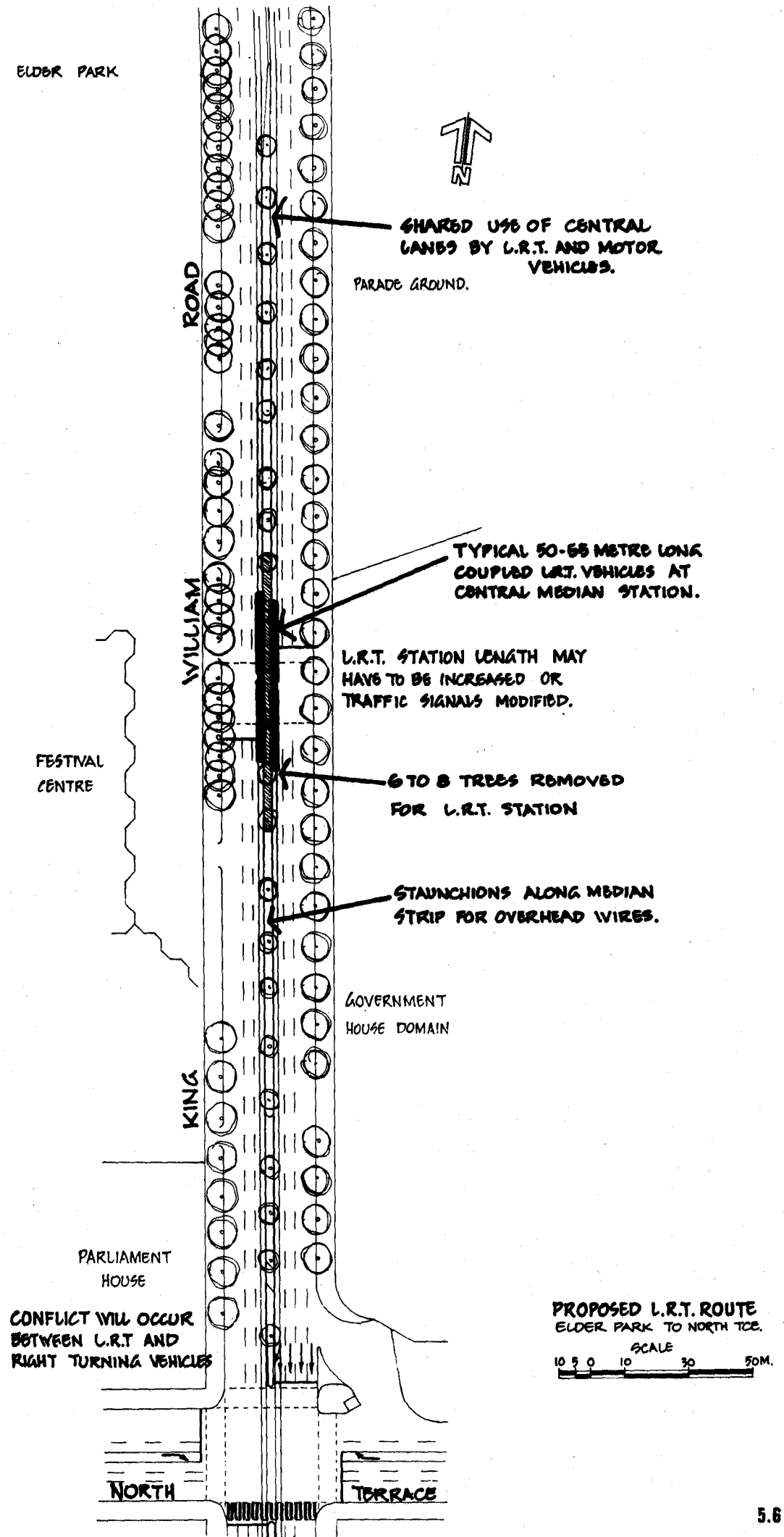
SCALE
10 5 0 10 30 50M.

- LEGEND-
- TREES NOT AFFECTED BY L.R.T.
 - TREES TO BE LOPPED
 - TREES TO BE REMOVED.

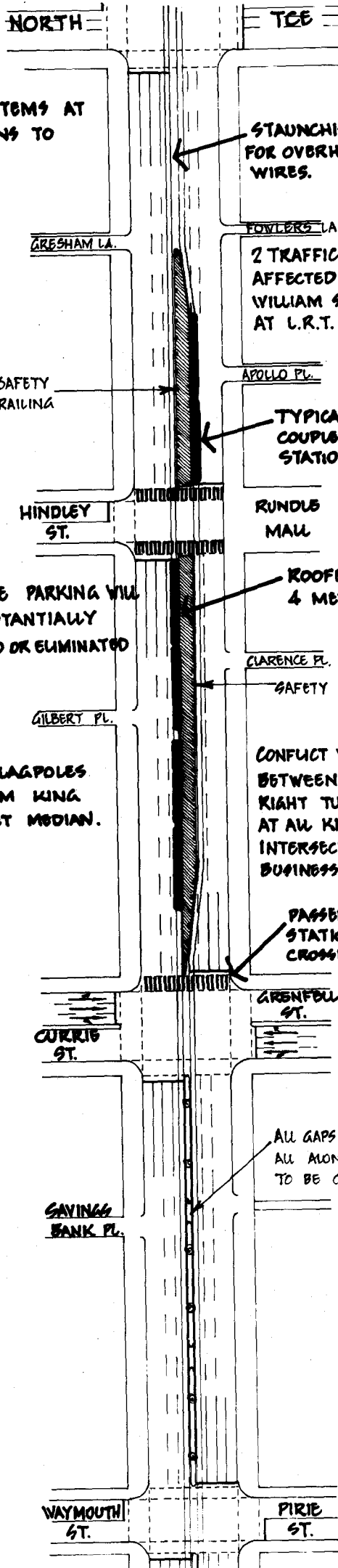




ELDER PARK



NEW SIGNAL SYSTEMS AT
ALL INTERSECTIONS TO
FAVOUR L.R.T.



STAUNCHIONS
FOR OVERHEAD
WIRES.



FOWLERS LA.

2 TRAFFIC LANES WILL BE
AFFECTED ALL ALONG KING
WILLIAM ST. AND 3 LANES
AT L.R.T. STATIONS.

GRESHAM LA.

SAFETY
RAILING

APOLLO PL.

TYPICAL 30-35 METRE LONG
COUPLED L.R.T. VEHICLE AT
STATION.

HINDLEY
ST.

RUNDUS
MALL

KERBSIDE PARKING WILL
BE SUBSTANTIALLY
REDUCED OR ELIMINATED

ROOFED STATION PLATFORM
4 METRES WIDE.

CLARENCE PL.

SAFETY RAILING

GILBERT PL.

TREES AND FLAGPOLES
REMOVED FROM KING
WILLIAM STREET MEDIAN.

CONFLICT WILL OCCUR
BETWEEN L.R.T. AND
RIGHT TURNING VEHICLES
AT ALL KING WILLIAM ST.
INTERSECTIONS IN
BUSINESS HOURS.

PASSENGERS WALK TO AND FROM
STATION PLATFORM VIA PEDESTRIAN
CROSSINGS AT INTERSECTIONS ONLY.

GREENFIELD
ST.

CURRIE
ST.

ALL GAPS IN MEDIAN STRIP
ALL ALONG KING WILLIAM ST.
TO BE CLOSED

SAVINGS
BANK PL.

PROPOSED L.R.T. ROUTE
NORTH TCE TO PIRIE ST.

SCALE
10 5 0 10 30 50 M.

WAYMOUTH
ST.

PIRIE
ST.

NEW SIGNAL SYSTEMS AT ALL
INTERSECTIONS TO FAVOUR
L.R.T. MOVEMENTS.

ADVERTISER

G.P.O.

TOWN HALL

LANDS DEPT.



FRANKLIN ST

FLINDERS ST

RESERVE
BANK

STATE
ADMIN.
CENTRE

E.G.W.S.

L.R.T. STOP

VICTORIA

SQUARE

AROTE ST

YAKFIELD
ST.

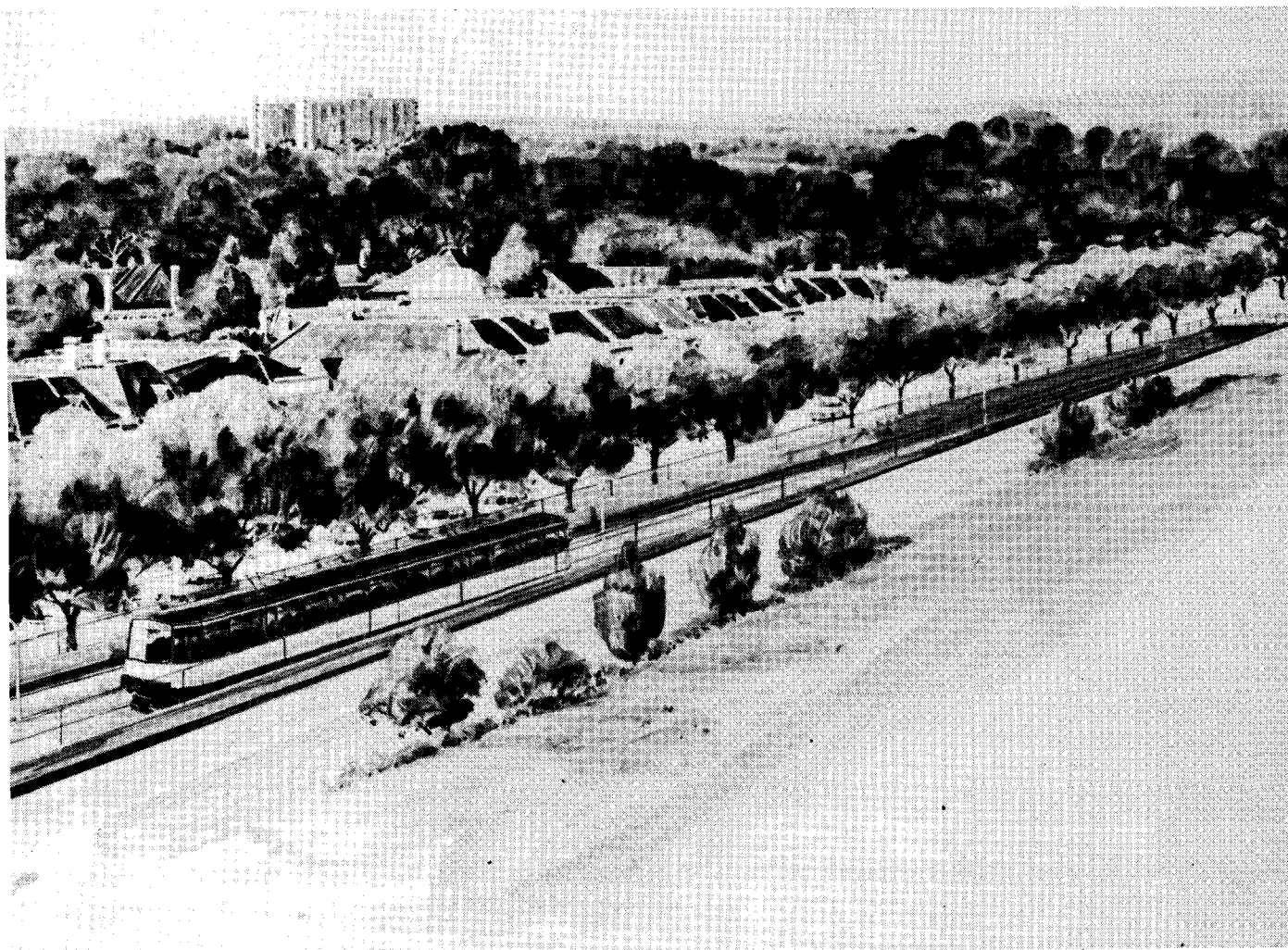
GOUGER ST

CONNECTION TO
QUEENSLAND TRAM LINE

CITY DEPT ACCESS → ANGAS ST.

PROPOSED L.R.T. ROUTE
PIRIE ST. TO VICTORIA SQUARE

SCALE
10 20 30 50M.



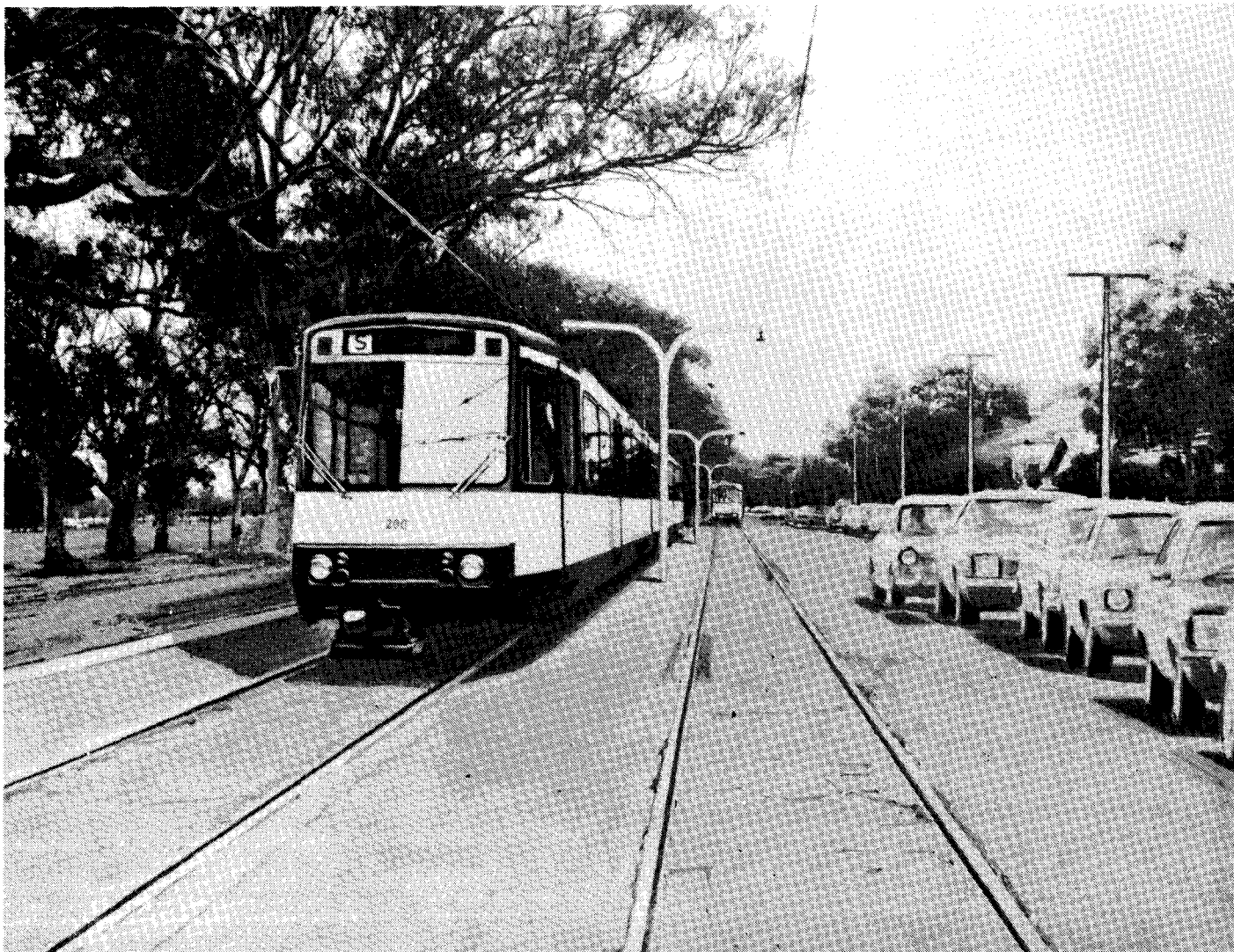
PARK LANDS ADJACENT MACKINNON PARADE EAST
BETWEEN MANN TERRACE AND BUNDEYS ROAD

The line of trees shown along Mackinnon
Parade would have to be removed for the L.R.T.



PARK LANDS ADJACENT MACKINNON PARADE EAST
BETWEEN MANN TERRACE AND BUNDEYS ROAD

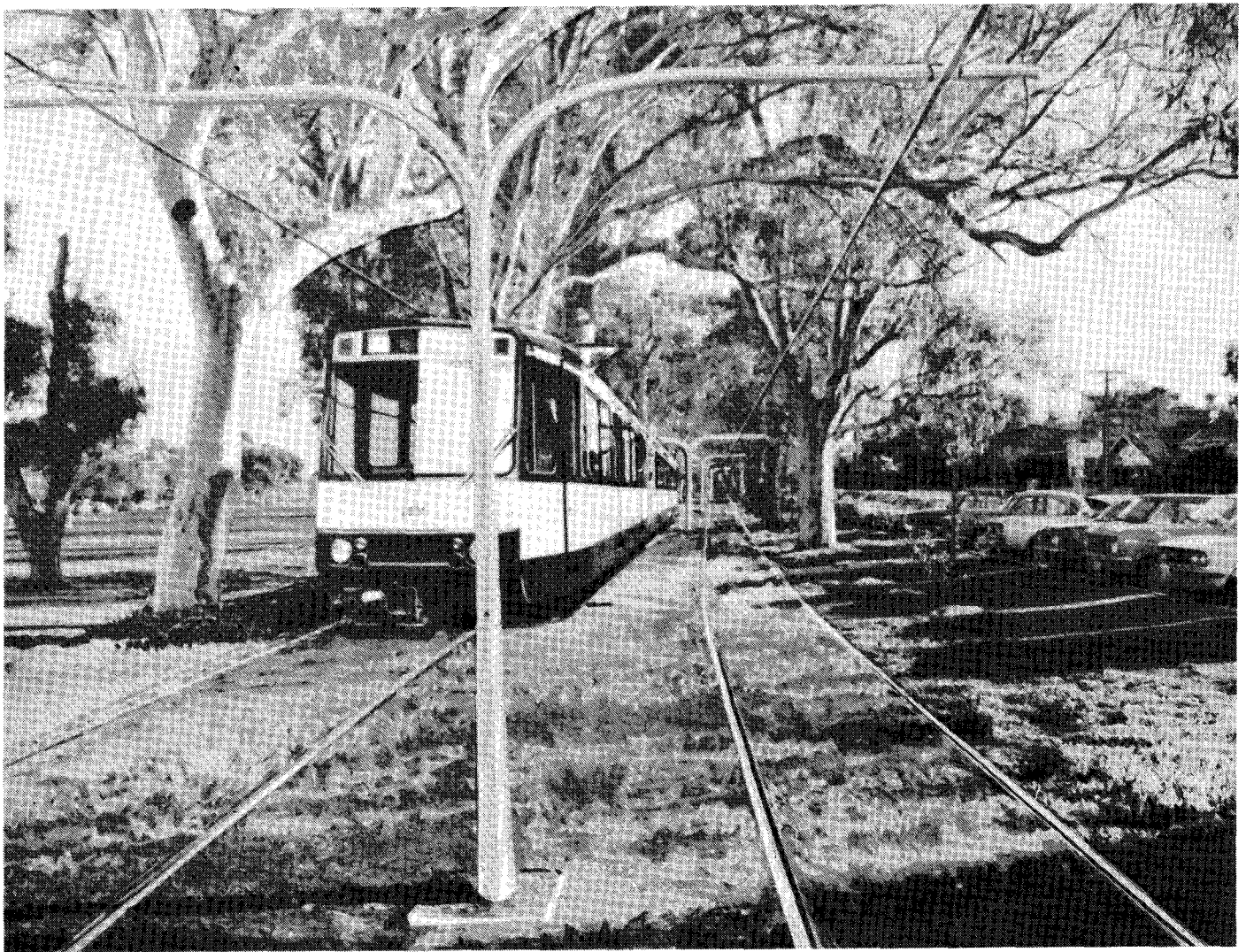
Two tennis courts would be lost as would this
row of trees.



JERNINGHAM STREET TO FROME ROAD

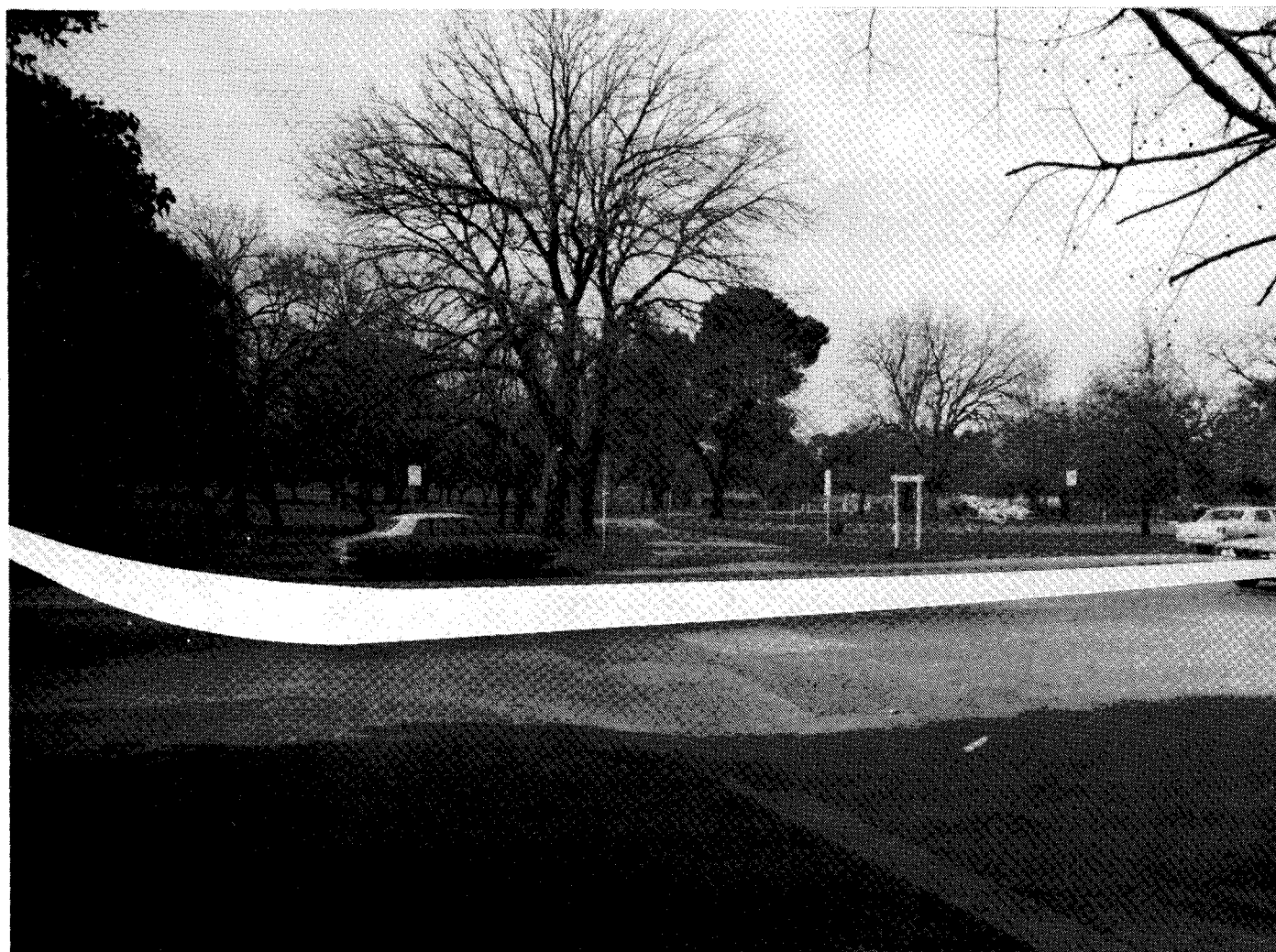
ON ROADWAY - 220 parking spaces will be eliminated; also safety fencing would need to be added on Park Lands side.





JERNINGHAM STREET TO FROME ROAD

ON PARK LANDS - 25 River red gums would be lost and about 50 others would need to be lopped; also safety fencing would be required on both sides of track.



FROM ROAD TO SIR EDWIN SMITH AVENUE

Showing emergence of L.R.T. from Park Lands
onto Sir Edwin Smith Avenue.



KING WILLIAM ROAD

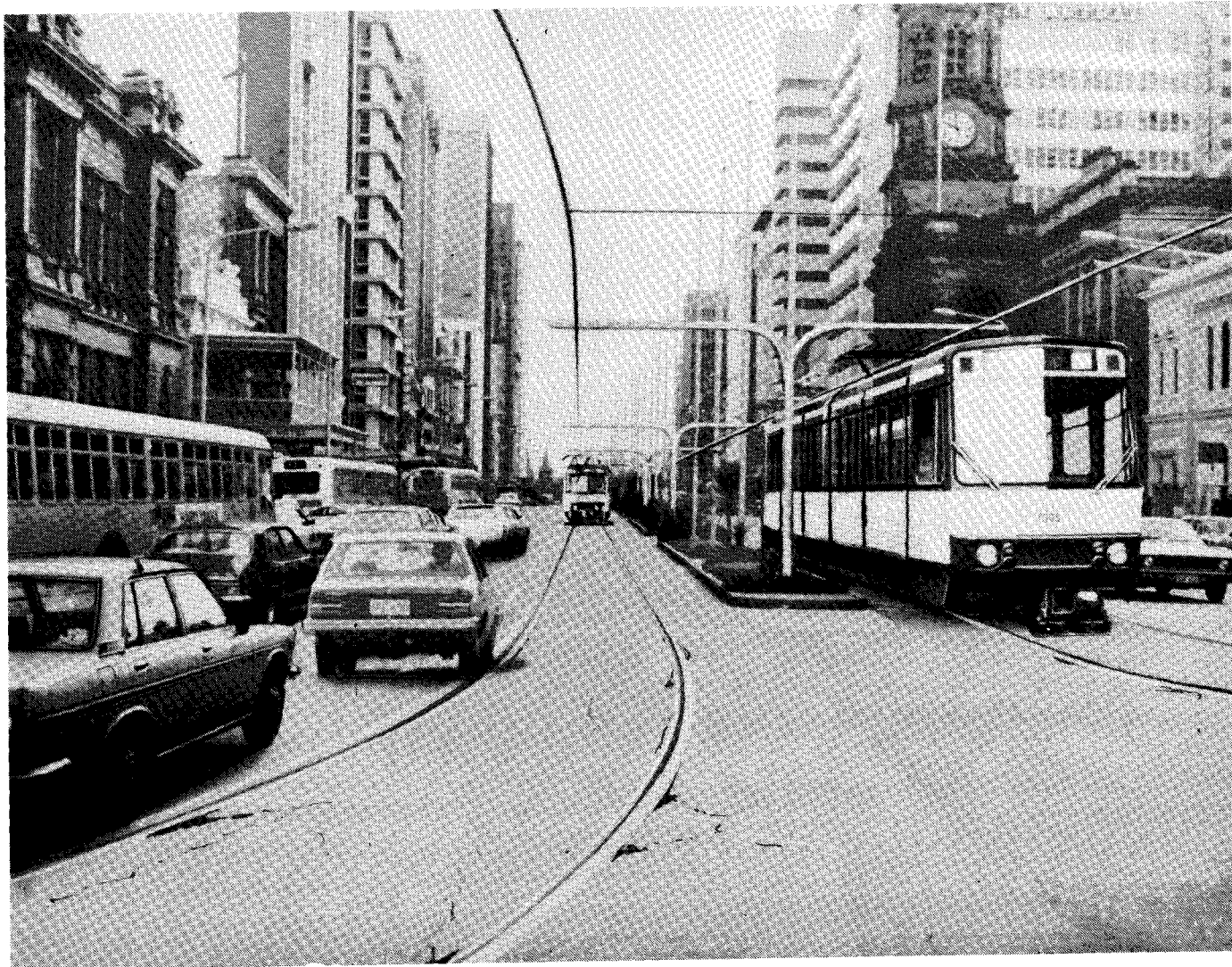
Showing the impact of the L.R.T. on
this thoroughfare



KING WILLIAM STREET

Congestion caused by island tram station.





KING WILLIAM STREET



CITY WEATHER

Fine.
Estimated max., 17°C.
Yesterday's temperatures:
Min., 6.4°C, max., 15.2°C.
September 28 last year:
Min., 13.1°C, max., 22.1°C.
Weather map, Page 45.

The Advertiser

Incorporating "The Register"

Television, Page 26

Charles,
the disco
prince
R25



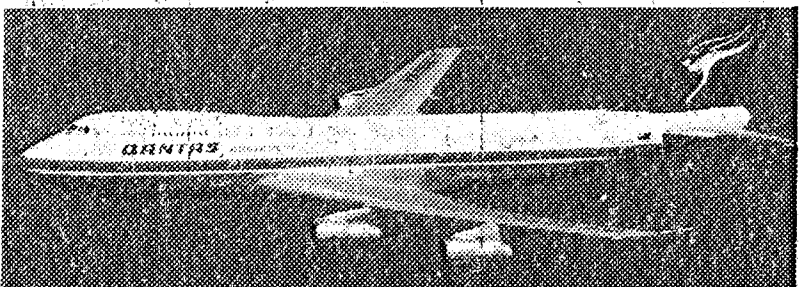
46 pages 15c

ADELAIDE, FRIDAY, SEPTEMBER 29, 1978

Phone 51



On the way out — the Boeing 707



Taking over — the 747 for which Qantas is retaining pilots as the Jumbo fleet grows.

Qantas paying surplus pilot

From our Staff Representative.

SYDNEY — Qantas is paying \$10,000-a-year retainer to each of 50 of its pilots who are at present "freelancing" with other airlines.

Qantas said yesterday the weekly retainer of \$200 paid to each was additional to whatever salary they earned with the airline they were currently flying with.

A Qantas spokesman said the pilots, mostly second officers, were being allowed to work elsewhere because the company did not need them at present.

But they would eventually be recalled to fly the airline's expanding fleet of 747 Jumbo Jets.

The company decided the pilots

were too valuable to lose permanently.

Each officer cost on average \$100,000 to train — a total investment of about \$5m.

They were all trained to fly the airline's Boeing 707s, which were being phased out.

The pilots have been given "freelance" status for up to two years at the end of which Qantas has the option of recalling them.

Meanwhile, they are free to earn whatever they can elsewhere, in addition to the retainer.

'Freelance' fliers get \$200-a-week retainer

They are working for airlines as far apart as Papua New Guinea and Ireland.

Qantas said the offer was made to the pilots because the airline's rapid switch from 707 to 747s has thrown up a surplus of officers whom we want to keep because of their training experience.

Qantas now has only three 707s, which will be phased out of service by 1980, compared with 16 of the much bigger 747s.

The airline's newest 747, the City

of Elizabeth, had an engine problem last week on its commercial flight, it was delayed.

A Qantas official said the delay occurred when the \$34m jet landed at Christchurch after flight from Brisbane.

One of the engines sucked some stony, hard material off the surface of the runway, which had been recently resurfaced.

A replacement engine was flown to Christchurch so the City of Elizabeth could continue in service.

Secret report hits transport plan

A report prepared for the Adelaide City Council is strongly opposed to the North East Area Public Transport Review's proposals.

The report says NEAPTR has not been bold enough and that in many matters it "did not see the forest for the trees."

The report, prepared by independent consultants, says none of the systems involving construction of a light-rail transit system, a busway or a freeway to serve Adelaide's north-east deserves further consideration.

It says the only systems which deserve further consideration are those which include a Northfield-to-Ingle Farm railway extension project, and the "all-bus on normal roads" system, which do not require any big construction projects.

The 13-page confidential report, which has not been released by the council, was the subject of a meeting between the Government and the council at Parliament House on Tuesday.

The draft Environmental Impact Statement on the NEAPTR proposal was issued by the Government on Wednesday.

The council report says a Northfield-Ingle Farm railway extension deserves more, and fairer, consideration than it has had so far.

It says a railway extension:

- Has the lowest capital cost of any of the systems involving construction projects.
- Would have the lowest annual operating and maintenance costs of any system — even lower than the "all-bus on normal roads" system.
- Would not have any bad environmental effects "that we know of."
- Would not run through the Torrens valley.

The report, "Choosing a public transport system for Adelaide's North-East," was prepared by George Clarke and Peter Casey, who did the City of Adelaide planning study in 1973 and 1974.

Messrs. Clarke and Casey say 5000 pages of highly technical working papers and public relations literature have been published over the past two years.

"We do not know of any other independent person (not employed by the SA Government) who has yet had the time to study, understand and evaluate the real significance of

the facts hidden like nuggets of gold in the mountains of NEAPTR paper," this report says.

"The public has been mostly informed by widely distributed booklets and literature which, perhaps by necessity, grossly over-simplify and often misrepresent or distort the facts documented in the detailed working papers."

The consultants say they are impressed with the comprehensiveness of the information produced by NEAPTR, but not with the way the facts and figures on so many alternative 1980 systems have been presented or interpreted.

"We find that minor statistics are often given the appearance of great import, so the key issues are obscured or ignored," their report says.

"In many matters, NEAPTR did not see the forest for the trees."

"NEAPTR has been bold, but not bold enough."

"A high-capacity transit line in a corridor would work well if each station was surrounded by high-density residential and commercial development, as in traditional European cities."

"But Adelaideans refuse to consider such densities in their suburbs."

The report says the "fatal weakness" of NEAPTR's work is that the simplest and most natural type of public transport system for a low-density area such as the north-east is not seriously presented as a possible alternative, or even evaluated in the economic cost-benefit analysis.

"The north-east is as low-density as any outer suburban area in the world," it says.

"The expected future residents are substantially from middle to upper-middle-income groups."

"Their travel needs are not concentrated on a single radial corridor towards the city centre because many work in the western, northern and eastern suburbs."

"Cross-suburban travel needs are high, and rising."

The report says the NEAPTR investigators started with the idea of radial travel to and from the city centre as the north-east's prime need.

• Contd. Page 6.

Report hits tram plan

• Contd. from P. 1.

The report to the council says it is unfortunate the empty radial corridor cannot be used to satisfy much cross-suburban travel demand.

It says that in view of the recession, recent drastic cuts in metropolitan population projections, and now an accelerating trend for computerisation to replace clerical workers, our long-term city-core job projections should be revised downwards for the 1980s and 1990s.

Bus systems could be improved, upgraded and extended, as population grows.

Refinements in traffic management, bus priority lanes, cross-town services and other improvements could be introduced.

The report says NEAPTR's precise projections show that none of the costly projects and systems would attract more than a tiny percentage of people to "switch" from private cars to public transport even by 1980.

"This is because significant 'switching' is prompted only by serious road traffic congestion and extended delays, which do not exist now in Adelaide's north-east and are unlikely to occur before 1986," it says.

The consultants say NEAPTR had available the essential information on several alternative low-cost "bus-on-roads" public transport systems, but did not treat them seriously.

Their report says the Cabinet-favored light-rail transitway would have bad environmental impacts on the parklands as well as the Torrens Valley.

"It seems to us that it could only be accepted as a \$50m. to \$80m. luxury for the less than 20,000 people who would ride it on weekdays and as a tourist attraction for Adelaide as a whole."

It says the parklands are sensibly cherished and even revered by many Adelaide people.

The impact of an LRT on King William Street would accelerate the need to spend large additional sums to build the Hindmarsh Boulevard or other major new bypass road to take north-south traffic out of city streets.

In the Assembly yesterday the Leader of the Opposition, Mr. Tonkin, said the consultants' report had to be made available for public discussion if all the factors were to be considered.

The Minister of Transport, Mr. Virgo, told Mr.

Tonkin the council would have to decide whether to issue the report.

"Whatever comments the Government has on it were comments unless the report was released," he said.

"I would not feel we had the right to release those comments unless the report was released."

Mr. Virgo told the Assembly the Government could not make any decision on a start to LRT work until it had gone through an environmental impact statement.

He said the total cost of the project on 1978 valuations was \$70m, but he could not give the final cost as it was a 31 year project.

In reply to a question from Mr. Allison (Lib. Mount Gambier), Mr. Virgo said he was not sure how much the Federal Government would contribute to the scheme.

The Parliamentary leader of the Australian Democrats, Mr. Milhouse, asked the Premier, Mr. Dunstan, whether the Government was "really serious" that it could find the money for the project.

Mr. Dunstan said: "Yes."

Mr. Milhouse had said Mr. Virgo hoped the Federal Government would provide two-thirds of the money for the scheme.

"My suspicion is that he is getting ready to say the Federal Government has pulled the plug out of the scheme and it therefore will not go ahead," he said.



Students in education protest

The full independence of \$45.13 a "poverty line" enquiry.

s, carrying banners criticising

the Federal Government, marched to the locked Stock Exchange and then to the offices of the Federal Treasury in the National Bank building in King William Street before dispersing.

A vice-president of the Adelaide

University Liberal Club, Miss Dunstone, said the number rally, compared with the nursing SA tertiary students, indicated the "vast majority" of students not critical of Federal Government education funding.

of rights at una, says report

By Ethnic Affairs Writer ROBERT BALL

The Federal Government is breaching the United Nations race discrimination convention in its treatment of Aborigines on SA's West Coast according to a UN report.

The report, issued yesterday by the UN Association of Australia, says the Federal Government is breaching at least two articles of the International Convention on the Elimination of Race Discrimination.

The report centres its findings on Ceduna, Thevenard, Yalata and Koonibba.

Australia is a signatory, through the UN, to the race discrimination convention.

The report says the Government also appears to be in breach of the international convention on economic, cultural and social rights on the West Coast.

Three UNAA representatives, including the national president, Mr. R. K. R. Alston, visited the West Coast last month for three

nity Relations, Mr. A. J. Grassby, alleging that "mutual apartheid" existed in the Ceduna area.

The UNAA report says: "If overall and ultimate responsibility rests with the Federal Government, then it is falling far short of its solemn commitments as a party to the international convention."

"If there are indeed 500 Cedunas throughout Australia, as Community Relations Commissioner Mr. Grassby has said, the extent to which Australia's international obligations are being breached must be considerable."

The report says the picture at Ceduna is not one of overt or conscious racism, but discrimination of a more pervasive and subtle form.

It says articles two and

clear and obvious differences in social and economic standing.

The Aboriginal unemployment rate of more than 80 p.c. and a housing shortage are particular problems which help to create a third problem — alcoholism.

Many stayed at the Half Way Camp where conditions are appalling.

The team also visited Yalata, about 200 kilometres west of Ceduna, and Koonibba, about 30 kilometres from Ceduna.

"The UNAA representatives were not impressed with the situation at Yalata, with the exception of the school," it says.

"The community seemed to operate as much as the

Quest winner gets title back

From Staff Representative JON PARRINGTON

WHYALLA — Miss Whyalla 1979, Ann Gow, has been reinstated as Miss Whyalla Charity 1979.

Miss Gow, 21, who was the highest money-raiser of the quest won both titles on Saturday. It was the first time this has happened here.

However, under the Whyalla quest rules, one girl is ineligible to fill the two roles and the runner up in the charity section, Jennifer Kittel, was crowned Miss Whyalla Charity 1979.

But the decision was reversed this week under the Miss South Australia Quest rules.

She would go to Adelaide with \$55,839.85 raised in Whyalla.

Mr. Darcy said Miss Gow was now eligible for the Miss SA and Miss Charity Queen title which had prizes worth about \$25,000.

But if she won both titles she would have to give up the Miss SA Charity Queen prize.

Miss Merritt said Miss Kittel would still be recognised here as Miss Whyalla Charity 1979.

And she could still attend the finals in Adelaide

It says the parklands are sensibly cherished and even revered by many Adelaide people.

The impact of an LRT on King William Street would accelerate the need to spend large additional sums to build the Hindmarsh Boulevard or other major new bypass road to take north-south traffic out of city streets.

In the Assembly yesterday the Leader of the Opposition, Mr. Tonkin, said the consultants' report had to be made available for public discussion if all the factors were to be considered.

The Minister of Transport, Mr. Virgo, told Mr.

CAPE TOWN, Thursday (AAP)

First cylind 17,000 with with steel stere

O MER

1977 2
1975 2
1975 2
1975 2
1975 2
1974 2
1974 2
1971 2
1970 2

A

api