

Review of Public Transport Investment Proposals for Australian Capital Cities, 1974/75

Report

This Report surveys proposals provided by the States for investment in urban public transport. As in previous reports, the BTE has limited analysis to benefit-cost and financial evaluations. While refraining from direct comment on the administration, planning, pricing and other activities, the BTE has attempted to ensure that the proposals put forward comprise an appropriate program consistant wih long term projections with regard to urban planning and social objectives.

Subject

Series

Date

A to Z

Search

Results

Print

Exit

CONTENTS

	<u>Page</u>
INTRODUCTION	1
CONSTRAINTS	2
PROCEDURES	4
SUMMARY	6
New South Wales Program	8
Victorian Program	12
South Australian Program	14
Western Australian Program	16
Tasmanian Program	17
PROJECT REPORTS	
NEW SOUTH WALES	
2/1 Bus Cleaning Equipment	
2/2 Bus Fuel Storage	
2/3 Bus Workshop Equipment	
2/4 Bus Recovery Trucks	
2/5 Bus Two-Way Radio	
2/6 Belmont Bus Depot Alterations	
2/7 New Uniforms	
2/8 Bus Wheel and Tyre Shop Modifications	
2/9 Bus Fare Collection Equipment	
2/10 Bus Waiting Shelters	
2/11 Train Cleaning Equipment	
2/12 Increased Facilities at Metropolitan Rail Depots and Workshops	
2/13 Upgrading Power Supply	
2/14 Meadowbank Bridge	
2/15 Blacktown-Riverston Electrification	
VICTORIA	
2/16 Ringwood Corridor	
2/17 Glen Waverley Model Line (Stage I & II)	
2/18 Signal Box Amalgamation (Newport area)	
2/19 Communications (Upgrading suburban network)	

INTRODUCTION

In 1972 the BTE produced a report "Economic Evaluation of Capital Investment in Urban Public Transport", which contained a survey of State proposals for investment in urban public transport and evaluations of a selected range of these proposals. Following this report the Australian Government decided to assist the States with the financing of selected public transport investments projects. Projects with expenditures commencing in 1973-74 were evaluated by the BTE in 1973 and reported in "A Review of Public Transport Investment Proposals for Australian Capital Cities, 1973-74".

As satisfactory economic return is one of the criteria being used in the selection of projects for financial assistance, projects are being subjected to BTE evaluations where appropriate, before consideration for inclusion in assistance programs. The BTE is currently evaluating projects which have not previously been evaluated by it, or which have been substantially changed since previously evaluated, as a preliminary to consideration of these projects for inclusion in the 1974-75 Urban Public Transport Improvements Program.

Only a portion of the projects expected to be submitted by the States have been received by the BTE. To enable decisions to be made as information becomes available, the BTE will issue a series of Progress Reports which will form part of a comprehensive report on the 1974-75 urban public transport proposals. The projects reviewed in this Progress Report are listed in the Contents page.

CONSTRAINTS

As in the previous reports, the BTE has limited analyses in this Progress Report to benefit-cost and financial evaluations of specific projects proposed by the State Governments. Although the BTE has refrained from direct comment on the administration of urban public transport, transport planning, pricing policies, urban development policies and changes in transport technology, it has, through consultation with State authorities, attempted to ensure that the proposals put forward comprise an appropriate program consistent with a long term program having regard to urban planning and social objectives. However, by the time and nature of its involvement the BTE has not been in a position to assess whether the submitted programs are fully compatible with these objectives. In other respects also the BTE has necessarily accepted the framework within which urban transport now operates. This acceptance does not imply that the BTE considers the existing situation to be optimal, nor that the range of projects proposed are exhaustive or necessarily the best means of improving public transport in each particular circumstances.

The BTE is most dissatisfied with the procedures adopted in 1974 for submitting projects for evaluation. In the interests of sound planning analyses and decision making it is clearly much preferable to distribute the workload relating to project selection, examination of alternatives and evaluation throughout the year. In 1974 the BTE has been given even less time than in previous years, (with the exception of Western Australian projects), to examine and evaluate projects. The current time constraints of necessity have affected the extent to which work can be undertaken in the verification of data, the examination of alternatives and the performance of evaluations which adequately represent all significant factors.

As in previous years the evaluations are generally based on travel data, cost estimates and passenger projections provided by State authorities. Although time has been limited, this information has been subjected to sufficient

critical review to provide reasonable confidence in the results of the reported evaluations. Where it has not been practicable to achieve this confidence, the BTE has not reported a formal evaluation.

PROCEDURES

The evaluation procedures are described in Annex A of the 1973 Report, and Annexes D and E of the 1972 Report. The economic analysis relates the net present value of a time stream of benefits and costs, generated by the implementation of the project, to the capital cost. This is expressed in the form of a benefit-cost ratio. Net present value and internal rate of return are also computed. In addition, a financial analysis is provided, where appropriate, to provide information on the likely effects on the finances of the operating authorities.

As time has not permitted the identification of all benefits accruing to particular projects, the benefit-cost ratios are only an approximate measure of the investment merit of various projects.

The parameters used in the BTE corridor model have been updated for inflation. Following a systematic review of the more important parameters, the BTE decided that inadequate evidence is available to justify any other changes in the parameter values. However, the BTE is aware that these values need continuing improvement. Work towards this objective is in progress, but results will now be unavailable for the 1974 evaluations.

The corridor model was originally designed in 1972 and amended to perform the 1973 evaluations. Experience with previous evaluations and continually evolving improvements in methodology have led the BTE to develop a substantially restructured model. Although work in this task is well advanced, the new model will not be available for the 1974 evaluations. The evaluation model is therefore identical to that used last year. While the new model would have improved the accuracy of benefit estimates, the existing model is considered adequate for the evaluations performed.

In the 1973 Report⁽¹⁾ the BTE expressed reservations about the bus maintenance cost function. Following investigations, a more satisfactory cost function has been developed. In effect this indicates that the benefits from earlier bus replacement were underestimated in the previous evaluations. The BTE is currently extending its investigations of bus maintenance cost functions so that in future it can advise on more detailed aspects of bus replacement policies.

(1) Op. cit. p.39.

SUMMARY

The following pages tabulate the State Urban Public Transport Improvement Programs received to date. Only those projects with expenditures commencing in 1974-75 have been included.

In this Progress Report a project number has been allocated only when the BTE has performed an evaluation or has made some substantial comments on a project. Where an evaluation provided with a State submission has been checked and found adequate, or where a previous BTE evaluation is still relevant, this is reported in the comments in the tables.

An estimated total cost has not been provided for projects of a continuing nature such as bus replacements. Accordingly, it is not appropriate to total the 'estimated total cost' column.

A number of projects are identified as not readily amenable to economic evaluation. This generally results from a high proportion of the benefits being of an intangible nature which are not readily quantifiable using data at present available. Such benefits are often associated with the amenity of the facility, and there are no behavioural studies available, to date, for predicting, in quantitative terms, the human responses to be anticipated in these circumstances.

The BTE has not attempted the evaluation of projects with small capital costs, because of current resource constraints and, in some cases, as detailed evaluation costs would be significant relative to the size of the proposed expenditure.

Where projects appear to be desirable as part of a total improvement program, or appear to be a prerequisite for the efficient operation of the remainder of the system, but the projects have not been evaluated for the reasons discussed above, the comment is made that they are complementary to the improvement program. This is a BTD assessment based on a knowledge of transport operations, and accordingly may be considered to be subjective.

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: NEW SOUTH WALES (TENTATIVE PROGRAM)

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
Bus Cleaning Equipment	2/1	492	40	Comments provided.
Bus Fuel Storage	2/2	175	175	Comments provided.
Bus Workshop Equipment	2/3	135	135	Comments provided.
Replacement of Sydney Buses				
(i) Completion of current order of 312 buses		7,888	1,844	Evaluated in 1972 as Project 22 and 1973 as Project N9. Revised eval- uation deferred pending decision by the IDC on the admissibility of this project for the 1974-75 program.
(ii) New order for 600 buses		21,000	10	1974-75 expenditure for planning and design only. BTE prefers to defer evaluation until improved data available.
Bus Recovery Trucks	2/4	203	203	Comments provided.
Bus Two-Way Radio	2/5	200	200	Comments provided.
Belmont Bus Depot Alterations	2/6	34	24	Comments provided.
New Uniforms	2/7	8,000	4,000	Comments provided.
Bus Wheel and Tyre Shop Modifications	2/8	52	52	Comments provided.
Bus Fare Collection Equipment	2/9	60	60	Comments provided.
Bus Waiting Shelters	2/10	13	13	Comments provided.
Bus Research and Development			30	Consideration deferred until planning and research program reviewed.
continued				
Bus Total			6,786	

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: NEW SOUTH WALES (TENTATIVE PROGRAM) (Cont'd)

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$1000	\$1000	
Train Cleaning Equipment	2/11		1,120	Comments provided.
Ticket Machines for Railway Stations		2,400	400	Awaiting data.
Increased Facilities at Metropolitan Rail Depots and Workshops	2/12	2,565	180	Comments provided.
New Suburban Rail Cars			20,010	Evaluated in 1972 as Project 23. Comments provided in 1973 as Project N5. Awaiting data for revised comments.
Inter Urban Double-Deck Cars (planning and design only)			10	Consideration deferred until planning and research program reviewed.
Upgrading Power Supply	2/13	2,170	655	Comments provided in 1973 as Project N14. Revised comments provided.
Strathfield-Hornsby Additional Tracks		35,520	70	Evaluated in 1972 as Project 8 and in 1973 as Project N2. Further data required before a revised evaluation can be completed.
Meadowbank Bridge	2/14	5,100	1,500	Included in Project N2 in 1973. Revised evaluation provided.
Gosford-Newcastle Electrification and Double-Deck Cars (planning only)		200	200	Consideration deferred until planning and research program reviewed.
continued				

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: NEW SOUTH WALES (GENERALISED REPORT)

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$:000	\$:000	
Woy-Woy Station Reconstruction		800	800	Outside Sydney Statistical Division. BTE action deferred pending IDC decision on admissibility.
Blacktown-Riverston Electrification	2/15	2,150	800	Evaluated in 1973 as Project N3. Previous evaluation reviewed.
Broadmeadow Signalling System		2,670	21	Enquiries in progress to ascertain whether primarily for Newcastle urban passenger traffic.
Sydney-Tempe-East Hills- Glenfield		21,440	102	
(i) Sydney-Tempe				Evaluated in 1972 as Project 1. Previous evaluation being reviewed.
(ii) Tempe-East Hills				Evaluated in 1972 as Project 4. Revised evaluation in progress.
(iii) East Hills-Glenfield				Evaluated in 1972 as Projects 5 and 6. Revised evaluation in progress.
Sutherland-Waterfall Electrification		5,740	500	Evaluated in 1972 as Project 2. Awaiting details of current project.
Eastern Suburbs Railway Part I		108,188	21,025	Awaiting data.
Campbelltown New City Station		450	198	Evaluation in progress.
Parramatta - New Railways		19,320	3,060	Awaiting data.
continued				
Rail Total			50,651	

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: NEW SOUTH WALES (TENTATIVE PROGRAM) (Cont'd)

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
Purchase of 4 Hydrofoils from 1st National City Bank - Waltons Finance Limited		1,400	1,400	Awaiting further information. Appears to be a transfer payment thus economic evaluation not appropriate.
Purchase of Hydrofoil Spare Parts from Port Jackson and Manly Steamship Company Limited		160	160	Awaiting further information. Appears to be a transfer payment thus economic evaluation not appropriate.
Purchase of 3 Ferries from Port Jackson and Manly Steamship Company Limited		75	75	Appears to be a transfer payment thus economic evaluation not appropriate.
Overhaul of Ferries		400	400	Awaiting further information.
Ferry Total			2,035	
Pitt Street Tramway		10,000	10	Evaluation in progress.
Tram Total			10	
Projects approved in 1973			13,268	
Grand Total			72,750	

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: VICTORIA

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$1000	\$1000	
Ringwood Corridor	2/16	4,718	4,028	Evaluation provided.
Glen Waverley Model Line (Stage I & II)	2/17	11,391	6,817	Evaluation provided.
Signal Box Amalgamation (Melbourne area)		6,000	800	Evaluation in progress.
Signal Box Amalgamation (Newport area)	2/18	1,100	200	Evaluation provided.
Communications (Upgrading suburban network)	2/19	4,500	30	Comments provided.
Melbourne Train Replacement			4,500	Evaluated in 1973 as Project V8. Only minor changes from project previously evaluated. No further evaluations proposed.
Replacement of M & MTB buses and trams (second year)			1,440	Evaluated in 1973 as Project V10. Evaluation review awaiting data.
Greensborough-Eltham (track duplication)				Awaiting data.
Eltham-Hurstbridge (power signalling)				Awaiting data.
TOTAL		27,709	17,815	

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
Christie Downs-Railway Extension	1/1	7,125	3,400	Comments provided on changes since 1972 evaluation.
Christie Downs-Interchange	1/1	1,820	800	Comments provided on changes since 1972 evaluation.
Christie Downs - Adelaide Electrification		4,300	1,800	Evaluated in 1973 as Project S1. Only minor changes from project previously evaluated. No further evaluations proposed.
Rolling Stock including Car Sheds and Depots			1,000	Cost evaluated as part Christie Downs- Adelaide Electrification project.
MTT Bus Replacements	1/2		1,730	Previous BTE evaluation reviewed and updated for new bus types.
Glenelg Tram Upgrading	1/3	1,130	820	Comments provided on changes from 1973 evaluation.
Other MTT Capital Works			260	Evaluation not appropriate, complementary to Improvement program.
Research and Planning	1/4		600	Comments provided.
Christie Downs-Continuous Track Welding	1/5	400	150	Evaluation provided.
Christie Downs-Curve Improvement	1/6	240	160	Comments provided.
MTT Purchase of Private Bus Companies		4,810	1,560	Expenditure is for transfer of ownership. Economic evaluation is not appropriate. Assistance for this project is considered a question of policy.
continued				

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: SOUTH AUSTRALIA (Cont'd)

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
New MTT Depots and Buildings		4,700	2,000	Not readily amenable to economic evaluation and no evaluations proposed. Complementary to improvement program.
Bus Stop Shelters			60	Not amenable to economic evaluation. Complementary to improvement program.
Circular Bus Route	1/7	250	190	Comments provided.
Bus Routes-Road Construction	1/8		480	Comments provided.
TOTAL			15,010	

URBAN PUBLIC TRANSPORT IMPROVEMENT PROGRAM: WESTERN AUSTRALIA

Project	Progress Report project number	Estimated total Cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
Planning and Research	1/9		165	Evaluation not appropriate but comments provided.
South Perth Ferry Jetties and Terminal Buildings	1/10	330	312	WA evaluation reviewed.
Buses	1/11		2,441	Previous BTE evaluation reviewed and updated for new bus types.
Rail Cars	1/12		330	Comments provided.
Innaloo Bus Transfer Terminal	1/13	140	140	WA evaluation reviewed.
Rockingham Bus Transfer Terminal		40	40	WA evaluation reviewed and found to be adequate.
Kwinana Bus Transfer Terminal		30	30	WA evaluation reviewed and found to be adequate.
Car Parks at Railway Stations	1/14		64	Evaluation provided.
Gosnells Bus Depot		300	300	WA evaluation reviewed and found to be adequate.
Whitfords Bus Transfer Terminal		20	20	Unchanged from evaluation in 1973 Report, Project W7.
Railway Electrification	1/15		100	Comments provided.
Bus Priority Traffic Management Measures	1/16		50	Evaluation not appropriate but comments provided.
Mitchell Busway Stage 1	1/17	2,520	290	Previous BTE evaluation reviewed and found to be adequate.
TOTAL			4,282	

Project	Progress Report project number	Estimated total cost	Estimated expenditure 1974-75	BTE action or comments
		\$'000	\$'000	
Purchase of 66 Leyland National Buses for Hobart	1/18		2,508	Previous BTE evaluation reviewed and updated for new bus types.
Purchase of 36 Hino Buses for Hobart	1/19		318	Comments provided.
Ticket Issuing Machines for Hobart	1/20		40	Comments provided.
Provision of 30 Bus Shelters for Hobart			36	Not amenable to economic evaluation. Complementary to improvement program.
Land for New Workshops and Bus Depots in Hobart			400	Not readily amenable to economic evaluation. Detailed support provided in Tasmanian submission.
Planning and Research	1/21		50	Comments provided.
Purchase of 24 Hino Buses for Northern Tasmania			636	Not evaluated. (a)
Ticket Issuing Machines for Northern Tasmania			40	Not evaluated. (a)
Provision for 20 Bus Shelters for Northern Tasmania			18	Not evaluated. (a)
TOTAL			4,046	

(a) No evaluations have been carried out pending notification of Australian Government policy regarding assistance to Burnie and Launceston.

BUS CLEANING EQUIPMENT

Description

The Bus Division of the New South Wales Public Transport Commission is proposing to install bus washing equipment at ten of their bus depots. The depots concerned are at Ryde, Brookvale, Willoughby, Burwood, Kingsgrove, Page-wood, Randwick, Waverley, Gordon Avenue (Newcastle) and Mona Vale.

The project is to initially install one machine at Ryde Depot for testing. The machine would be leased for six months and, if proved to be successful, the machine would be purchased. The decision to install machines at the other nine depots will be based on the performance of the Ryde installation.

Costs

The cost of design, installation and purchase of the installation is \$42,000. To this must be added \$900 for the initial six months lease. This expenditure will occur in 1974/75.

If bus cleaning equipment is installed in the other nine depots the estimated cost is \$450,000.

Evaluation

The evaluation was based on installing the one machine at Ryde. The evaluation period is 10 years. It is expected that bus cleaning costs will be reduced by \$14,200 per annum. It is expected that the machine will more effectively clean the bus exterior, leading to improved appearance. Bus downtime for cleaning will also be reduced. These benefits were not included in the evaluation.

Conclusion

The calculated benefit-cost ratios for the installation of the trial machine at Ryde are 2.5 at a 7 per cent discount rate and 2.3 at a 10 per cent discount rate. The net present values are \$60,500 and \$40,000 respectively.

If the trial demonstrates that the costs have been accurately estimated, the installation of the washing plants at the other nine depots would have a similar result.

INCREASED FUEL STORAGE AT BUS DEPOTS

The project is to increase the fuel storage capacity at the fifteen Sydney and Newcastle bus depots from 696,000 litres to 1,405,000 litres. This will increase the average holding capacity from 8 days to 15 days supply. The total estimated cost, including allowance for inflation, is \$175,000.

The main benefit envisaged by the NSWPTC is insurance against industrial disputes. In the past few years, industrial disputes in the oil industry caused bus services to be cancelled on a number of occasions. A further benefit may be reduced contamination of fuel by allowing a longer standing time. However this is considered to be of little significance.

To perform an economic evaluation it would be necessary to assign probabilities to the predicted incidence of future disputes and to determine increased costs and travel time for the patrons during disputes, plus the cost of lost production. Any figures devised would be based on a component of subjective assessment. In view of the magnitude of the total expenditure and the difficulties in performing an evaluation, it is considered that this project should be regarded as a question of management policy.

BUS WORKSHOP EQUIPMENTDescription

The project is the replacement of a number of obsolete items of equipment at both the Chullora and Randwick workshops of the Bus Division of the New South Wales Public Transport Commission. A number of new items are included for Chullora. The new equipment is expected to lead to improved efficiency at the workshops.

The Chullora workshops are the centre for major overhaul of all the buses operated by the NSWPTC. The Randwick workshops are based on the original tramway workshops, but the remaining facilities make products for the Bus and Rail Divisions. The Randwick workshops are required to quote for work from the NSWPTC in competition with private industry.

Chullora Workshops

Of the fifteen items listed, eleven are to replace existing equipment. These range from a heavy duty sewing machine costing \$1,000 to a towing truck costing \$20,000. The total cost of replacement items is \$54,000. The four items which will be new items are listed in Table 3.1

TABLE 3.1 - CHULLORA WORKSHOPS: NEW ITEMS

Item	Cost
	\$
Chassis Dynamometer	15,000
Bevel-gear testing equipment	1,000
Shock absorber testing equipment	5,000
Wheel alignment equipment	6,000
TOTAL	27,000

The wheel alignment equipment should be regarded as part of the improvements to the bus wheel and tyre workshop equipment (Project 2/8). The Chassis Dynamometer is a necessary item for checking bus exhaust emission with the engine under load.

It is believed that some of the items for Chullora may have already been purchased.

Randwick Workshops

The items to be purchased are three lathes costing \$54,000. These will replace five existing lathes. The new more sophisticated machinery will require less continual supervision and will greatly improve productivity.

The items for Randwick were the only items for which an evaluation was carried out. A conservative estimate of the increased productivity is \$12,000 per annum. An evaluation for a 10 year period produces benefit-cost ratios of 1.7 at a 7 per cent discount rate and 1.5 at a 10 per cent discount rate. The net present values would be \$36,200 and \$27,800 respectively.

BUS RECOVERY TRUCKS

Description

The NSWPTC, Bus Division, propose to replace seven heavy duty Matador trucks, used for recovery of defective or damaged buses, by new vehicles. Each new truck is estimated to cost \$29,000, thus the total cost for the seven proposed for purchase is \$203,000.

The Matador trucks are now nearly 40 years old. Spare parts for maintenance and general repairs are difficult to obtain. Often replacement parts are not obtainable and parts have to be manufactured in the Commission's own workshops. The trucks are mechanically unreliable and spend much of their time in the repair shops. The trucks are slow and they provide poor facilities for the operators by present day standards.

Evaluation

Insufficient information was provided to give an objective evaluation. The unreliability of the Matador would lead to high maintenance costs which no attempt was made to quantify. However, it would appear the replacement of the Matadors would not be premature.

The BTE has questioned the need to replace the Matadors by a similar number of new units. The new vehicles would be more reliable, and being faster vehicles would be able to cover a larger area. This aspect is still being examined by the NSWPTC.

BUS TWO-WAY RADIO

Description

The NSWPTC proposes to install two-way radio equipment in all buses in the Newcastle area. This will allow for communication between the bus drivers and a central control room.

Newcastle has been chosen for the initial venture as it will allow opportunities to develop the use of the equipment before introduction in the Sydney system. The project will require establishment of a base station with transmitter and antenna, a central control station, and the installation of transmitter/receivers.

Costs

The estimated cost of the project is \$200,000 and would be completed in the 1974-75 financial year.

Benefits

At present there is no direct system of communication between bus operating staff and supervisory staff, except at a few selected locations. The NSWPTC has given some examples of when the installation of two-way radio would be of advantage:

- . bus collisions or breakdown
- . late running
- . staff changeovers
- . drivers on unfamiliar routes
- . emergency diversions
- . security of operating staff

It is planned to introduce a number of bus interchange points in the Newcastle area as part of a program to rationalise bus services. The use of two-way equipment will enable better control of connecting buses and improve reliability for inter-changing passengers.

Conclusion

Centralised bus control systems are used extensively overseas⁽¹⁾ and are widely considered to be an essential part of modern operational management. A typical sequence for the progressive implementation of central control is the installation of radio telephone facilities, continuous electronic monitoring of the location of all buses, the monitoring of bus occupancy, and providing full communication with bus stops.

Electronic controls open up many possibilities for improving staff control, reducing operating costs, improving system performance, increasing passenger amenity and for efficient planning.

At this time it is not practicable to quantify the potential benefits of the Newcastle project with sufficient accuracy to present a formal evaluation. However, it is likely to be well warranted. It would be useful to regard the proposal as a demonstration project, so that a controlled experiment could be made to assess changes in travel times, operating costs and other factors affected by the central control system.

(1) UITP 40th International Congress, 1973, The Use of Electronic Systems with a View of Improving the Operations of Surface Public Transport.

BELMONT BUS DEPOT ALTERATIONS

Description

The bus services operated by the Bus Division of the New South Wales Public Transport Commission serve the southern suburbs of Newcastle, operating from the bus depots at Gordon Ave. (Hamilton) and Belmont. The project is to expand the capacity of the Belmont Depot so that more services can be operated from that depot rather than from Gordon Avenue.

The plan is to increase the capacity of the Belmont depot from 38 double deck buses to 53 underfloor single deck buses. The expansion is required partly because of the replacement of double deck buses by single deck vehicles, and partly because of the increased demand for bus service in the Belmont area.

Cost

The estimated cost of the depot alterations is \$34,000.

Evaluation

The evaluation is based on transferring nine buses from Gordon Avenue Depot to Belmont. The estimated saving is \$4,945 per annum through reduced bus travel. The base case used in the evaluation assumes that the alterations are deferred for five years while the project case assumes that they are made in 1974-75.

Conclusion

The calculated benefit-cost ratios are 1.4 at a 7 per cent discount rate and 1.2 at a 10 per cent discount rate with the net present values being \$11,900 and \$7,700 respectively.

NEW UNIFORM - NSWPTC

Description

The Public Transport Commission of New South Wales propose to introduce a new uniform for bus and rail operating staff. The new uniforms are considered necessary to improve the public image of the Commission which is an important aspect of marketing of the Commission's services.

The new uniform will apply to nearly all operating staff except for a few major exceptions, e.g. female bus drivers and conductors, rail information officers, patrolmen and signalmen.

Cost

The estimated cost of the uniforms is \$8.0m of which \$4.0m expenditure is proposed during 1974-75.

Evaluation

The provision of new uniforms is not amenable to economic evaluation.

BUS WHEEL AND TYRE SHOP MODIFICATIONSDescription

In 1972 a modernisation program was begun to upgrade the bus wheel and tyre facilities of the NSWPTC, Bus Division. Approximately \$90,000 have already been spent on new equipment for the Randwick Workshops, and already significant increases in productivity have been obtained. A further \$52,000 are requested to complete the modernisation of the Randwick plant, and \$6,000 to obtain wheel alignment equipment for the Chullora Workshops. A significant increase in tyre life is expected to result from the new equipment.

Evaluation of the Complete Project

The complete program commenced in 1972 will cost an estimated \$148,000. The evaluation allowed for employing three additional men to operate the new equipment and an additional plant maintenance costs of \$7,000 per annum. The evaluation allowed for an increased productivity and a reduction in the purchase of new tyres. The benefit-cost ratios for the complete project in a 10 year period are 3.2 at 7 per cent and 2.9 at 10 per cent discount rates with net present values of \$599,000 and \$477,000 respectively.

Evaluation of 1974 Program

The costs of the 1974-75 program are given in Table 8.1.

TABLE 8.1 - COST ESTIMATES

Item	Cost
	\$'000
Wheel balancing equipment	12
Addition tyre moulds	32
Additional delivery truck	6
Lifting appliances	2
Wheel alignment equipment - Chullora	6
TOTAL	58

The additional tyre moulds will allow the plant to cater for vehicles of the Rail Division as well as vehicles of the Bus Division. All of the other equipment is required only for the Bus Division.

The benefits of the project will be an increase in tyre life and a reduction in the number of tyres retreaded prematurely because of extreme unbalance of the tyre and wheel assembly. The evaluation of the improved tyre life was based on an increase in tyre life of only 10 per cent. This is believed to be conservative as the Bus Division are expecting to achieve a figure well in excess of this.

Conclusion

The evaluation of the 1974 expenditure produced benefit-cost ratios of 1.9 for a 7 per cent discount rate and 1.7 for a 10 per cent discount rate with net present values of \$117,000 and \$95,000 respectively. The evaluation was for a period of only 10 years, and used very conservative estimates of improved tyre performance.

NEWCASTLE-BUS FARE COLLECTION EQUIPMENT

Description

The NSWPTC proposes to introduce on Newcastle buses a one-man bus-fare collection system similar to that operated in Adelaide by the Municipal Tramways Trust. The system uses a coin dispensing machine and a ticket cancelling machine, operated by the driver. The system will reduce bus stop time by improving the issue of change to passengers.

Costs

The estimated cost of the project is \$60,000 and expenditure would occur during the 1974-75 financial year. It would allow all 210 buses in Newcastle to be equipped for the fare collection system.

Evaluation

The new fare equipment will reduce the average boarding time for passengers. The current average boarding time for one-man buses in Sydney is 6 seconds and the Newcastle figure is expected to be similar. It is expected that the practice of entry and exit by the front door will continue so there is not much opportunity for a marked reduction in boarding. However a small reduction is anticipated.

In 1973 the "Auto fare" system was proposed for Sydney buses (Project N15). The NSWPTC, after a visit to Adelaide, consider the Adelaide system is more appropriate for Newcastle, because of the similar characteristics between the two bus systems.

SYDNEY BUS WAITING SHELTERS

Description

It is proposed to provide about twenty bus waiting shelters each year at busy stopping places which still lack such facilities. The program would be carried out in conjunction with local Councils under which the NSWPTC contributes half the cost. The Councils will be responsible for maintenance and cleaning of these shelters.

Costs

The cost of each shelter is estimated to be a maximum of \$1,300 each. It is proposed to erect twenty shelters in 1974-75 resulting in a maximum expenditure of \$26,000. The NSWPTC proportion would be \$13,000.

Evaluation

The proposed work is not readily amenable to economic evaluation but the provision of such facilities is considered to be complementary to a public transport improvement program.

TRAIN CLEANING EQUIPMENTDescription

The purchase of train cleaning equipment is proposed by the Rail Division of the NSWPTC to more regularly clean the exterior of Sydney suburban and inter-urban electric trains. This will lead to improved exterior appearance of the trains, and thus enhance the market appeal of train travel.

All suburban trains are currently washed at the one plant located at Punchbowl Depot. This requires trains to be rotated between the four Sydney depots so that trains will be at Punchbowl once a week for washing. The project is to install washing facilities at the other three depots, i.e. Flemington, Mortdale and Hornsby. This will allow trains to be washed regularly every second day, rather than weekly.

The inter-urban electric trains are now cleaned manually at Flemington. These trains will only be cleaned by the washing plant proposed for Flemington.

Costs

The estimated costs of purchase and installation of the three machines, scheduled for completion during the 1974-75 financial year, are listed in Table 11.1.

TABLE 11.1 - ESTIMATED COST OF TRAIN WASHING MACHINES

Location	Cost
	\$'000
Flemington	450
Mortdale	320
Hornsby	350
TOTAL	1,120

Benefits

The project will lead to an improved external appearance of trains. It will save rotating trains between depots, thus reducing the present restrictions on train scheduling. The new equipment would require only a small increase in cleaning staff. However if trains were to be washed every second day without installing new washing machines, an increase in cleaning staff at an estimated cost of \$900,000 per annum would be required.

INCREASED FACILITIES AT RAIL DEPOTS AND WORKSHOPSDescription

The NSWPTC propose to improve the facilities for maintenance and repair of suburban and inter-urban rolling stock at their four existing depots. The expenditure is for workshop equipment plus additional depot facilities.

Workshop Facilities

The replacement and additional workshop equipment to be purchased is listed in Table 12.1. All the expenditure is proposed for 1974-75 .

TABLE 12.1 - WORKSHOP EQUIPMENT

Item	Cost
	\$'000
Armature balance machine	18
Wheel press	30
Wheel borer	45
Commutator under cutter	10
Sundries	7
TOTAL	100

No details have been supplied to enable an evaluation of replacement of these items.

Depot Facilities

The increased facilities are required to maintain and to repair increasing numbers of suburban and inter-suburban rolling stock to the required standards, and to eliminate excessive downtime for maintenance and repair. The additional facilities required are given in Table 12.2.

TABLE 12.2 - ADDITIONAL DEPOT FACILITIES

Item	Cost	Expenditure 1974-75
	\$'000	\$'000
Two car, high level inspection roads ⁽¹⁾ :-		
Mortdale	25	25
Hornsby	25	25
Punchbowl	25	-
Flemington - three road shed with new brake roads, and improved yard drainage	2,020	20
Flemington - new amenity block	250	-
TOTAL	2,345	70

The only depot with high level inspection roads is Flemington. The project will install facilities at the other three depots. The remainder of the project is to cater for expansion at the Flemington Depot.

Evaluation

The projects are not readily amenable to economic evaluation. The projects are directly aimed at providing improved train maintenance facilities and are complementary to the overall improvement program.

(1) In railway terminology roads means rail tracks.

UPGRADING POWER SUPPLY

Introduction

In 1973 the upgrading of some electricity sub-stations for the Sydney railway systems was reported as Project N14. Details of sub-stations submitted for upgrading are included in Table 13.1 together with the estimated 1974-75 expenditure.

TABLE 13.1 - 1973 PROGRAM FOR POWER SUPPLY UPGRADING

Location	Cost	1974-75 Expenditure
	\$:000	\$:000
Sutherland	330	290
Cabramatta	330	290
Lewisham	350	20
Sefton	320	30
Contingency	130	130
TOTAL	1,460	760

Expanded Program

The 1974 program has been expanded to include a number of other sub-stations as well as improvements to the power distribution system in the Parramatta area, and setting up a central control system at PA Siding to cover the whole of the electrified system. Details of costs and the 1974-75 expenditure are given in Table 13.2.

TABLE 13.2 - ADDITIONAL IMPROVEMENTS

Location	Cost	1974-75 Expenditure
	\$'000	\$'000
Epping	300	170
Belmore	300	205
Strathfield	750	-
Power distribution -		
Parramatta area	250	-
Central Control System	400	200
Contingency	170	80
TOTAL	2,170	655

The Epping, Belmore and Central Control System projects are ones on which some work has already commenced. The Parramatta area power distribution and Strathfield projects are in the design stage.

The Strathfield sub-station is a very complex sub-station on a restricted site. Its replacement is planned over a three year period. The improvements to the Parramatta power distribution system are a product of changes in supply patterns and will be necessary to cope with future demand. The Centralised Control System will allow any problems that do occur to be dealt with from the one point. This would lead to better control and a more reliable power supply.

Evaluation

The projects are part of a continuous program of sub-station modernisation to considerably improve equipment reliability, particularly under the increased loads which are expected to result from improved urban rail services. Apart from maintenance cost savings it would be difficult to estimate benefits from sub-station improvements. As for Project N14 last year, no evaluation has been attempted.

MEADOWBANK BRIDGE REPLACEMENT

Background

The existing Meadowbank Bridge across the Parramatta River was constructed in 1886. It consists of six continuous wrought iron girder spans, for two railway tracks. In the early 1950's work was started on a new bridge upstream of the existing bridge. After the building of the new piers and abutments had almost been completed, work was stopped. The plan at the time was to transfer rail traffic to the new bridge allowing major reconstruction of the old bridge. This would have then provided four tracks across the Parramatta River as part of the quadruplication between Strathfield and Epping.

The Meadowbank Bridge carries suburban rail traffic of the Hornsby via Strathfield services. In addition it carries interurban traffic to Gosford and country passenger and freight traffic to Newcastle, Brisbane and Northern New South Wales.

Proposed New Bridge

The existing bridge is reaching the end of its life and will have to be replaced soon on safety grounds. With changes in bridge building techniques investigations have shown that the new bridge piers will be capable of taking a four tracked structure, with suitable modification to the piers and abutments. The initial plans are for construction of approaches, piers and abutments for four tracks, but with provision of spans for only two tracks, but with provision for the other two to be added later. It is proposed to use separate steel box girders with a composite deck for each track. The old bridge will be able to be used by road traffic, as the old bridge will be capable of meeting the lesser mechanical requirements of road traffic.

Costs

The costs of the project are given in Table 14.1.

TABLE 14.1 - COST ESTIMATES

Item	Cost
	\$1000
Main bridge	3,800
Approaches to bridge	600
Trackwork	100
Signalling and overhead wiring	100
Contingencies	500
TOTAL	5,100

Evaluation

The replacement of the bridge should be regarded as a special project and should be assessed on technical rather than on economic grounds. If the bridge became unsafe, requiring at the least banning of goods traffic, it would produce a chaotic situation. Any evaluation that took this as a base case is considered to be unrealistic.

The existing bridge has a 30 mph speed limit. This delays passenger and freight trains. While a value can be attached to this delay, it is of minor significance when the safety aspects are considered.

Conclusion

The BTE has examined a 1971 report prepared for the then Chief Civil Engineer, New South Wales Government Railway by the Structural Engineer in reporting on the condition of the existing Meadowbank Bridge. It recommended that immediate steps be taken to replace the bridge for reasons of safety. The BTE cannot find any grounds for disagreeing with this recommendation.

ELECTRIFICATION OF BLACKTOWN-RIVERSTONE RAILWAYDescription

The electrification of the Blacktown-Riverstone section of the Richmond railway was evaluated in 1973 as Project N3. The estimated cost of the project has risen substantially and a review of the previous evaluation is necessary. The project is presently under construction and should be operational in 1975.

Costs

The estimated cost has risen from \$1.25m to \$2.1m. The reason for this increase is still being investigated by the BTE. However, the current figure is based on design drawings and should be accurate. A breakdown of the estimate is contained in Table 15.1.

TABLE 15.1 - 1974 COST ESTIMATES

Item	Cost
	\$'000
Trackwork	310
Stations	350
Electrification	1,150
Signalling	340
TOTAL	2,150

Evaluation

The new evaluation was carried out using updated railway operating costs. In all other respects the evaluation was basically the same as carried out in 1973.

Conclusions

The revised benefit-cost ratios are 2.2 at a 7 per cent discount rate and 1.6 at a 10 per cent discount rate, with net present values of \$2.4m and \$1.3m respectively. The internal rate of return is 20 per cent. As the evaluation took no account of any increase in patronage the evaluation is conservative.

RINGWOOD CORRIDORIntroduction

In the 1973 Report the Ringwood Corridor was included as Project Vi2. At that time the information supplied was insufficient to enable an economic evaluation to be undertaken. The project has been included in the 1974-75 program and sufficient information has been provided to allow economic evaluation.

Description

The Ringwood Corridor currently has train loads consistently higher than any other corridor in the Melbourne urban area. The single track sections from Ringwood to Croydon and Ringwood to Bayswater, and the associated, somewhat antiquated signalling prevent the extension of some trains beyond Ringwood and result in significant delays to trains on these branches.

As recommended by the Melbourne Transportation Committee⁽¹⁾, the project consists of the following elements:

- (i) At Ringwood: Provision of additional platform, re-arrangement of tracks and stabling and associated re-signalling.
- (ii) Between Ringwood and Croydon: Duplication of track and power signalling.
- (iii) Between Ringwood and Ferntree Gully: Duplication of track and power signalling between Ringwood and Bayswater. Power signalling on the existing double track between Bayswater and Ferntree Gully.
- (iv) South Croydon and Lincoln: Construction of new stations.
- (v) Stabling Sidings: Construction of twenty eight additional train stabling sidings.

(1) Melbourne Transportation Committee Report, Vol 3, The Transportation Plan.

There are differences in cost between this and last year's submission due firstly to the completion of some parts of the project quoted in the 1973 Report and secondly to improved cost estimates.

Costs

The preliminary estimates of costs of the project are detailed in Table 16.1.

TABLE 16.1 - COST ESTIMATES

Item	Total Cost	Cost 1974-75
	\$'000	\$'000
Route construction - works and way (incl. power signalling, third platform at Ringwood)	3,918	3,918
Power signalling - Bayswater to Ferntree Gully	110	110
Twenty eight additional train stabling sidings	490	-
Construction of two stations (South Croydon, Lincoln)	200	-
TOTAL	4,718	4,028

Benefits

The provision of a third platform at Ringwood will reduce delays caused by terminating trains and the effect of the junction.

The duplication of track and provision of power signalling will increase the capacity of the lines to Lilydale and Ferntree Gully and will permit trains currently operating to Ringwood to continue over these sections of line. Further to this, the duplication of track and provision of power signalling will allow trains serving the corridor to be more efficiently scheduled to meet passenger demand, reduce overcrowding, reduce

transit times and provide a higher quality of service to passengers. Table 16.2 provides a breakdown of the present value of the various benefits for 7 and 10 per cent discount rates.

TABLE 16.2 - DISCOUNTED BENEFITS

Item	Benefits	
	7%	10%
	\$1000	\$1000
Existing public transport users	5,744	2,900
Generated public transport users	39	30
Converted road users	1,132	779
Public transport operators	3,681	3,213
TOTAL	8,596	6,922

Travel Estimates

The travel estimates for the project were derived from the Melbourne Transportation Study 1985 traffic assignment and recent public transport patronage. The rail patronage, at present 19,000 trips per day in the section between Ringwood and Croydon/Bayswater, is expected to rise to 20,887 trips per day by 1985. However, this latter figure is considered to be conservative in the light of the recent Cabinet Decision⁽¹⁾ authorising the location of 3,000 Australian Government Public Servants in Ringwood. By not taking account of this potential increase, the evaluation will tend to understate the benefits of the project.

Evaluation

The base case represented a continuation of the current service with its very low growth of patronage caused by the fact that the lines east of Ringwood are operating close to capacity.

(1) Cabinet Decision No 2180.

It was assumed in the project case that patronage would increase as a result of improvements in transit time by rail and that this increase in patronage would be derived from the conversion of road users to rail and the generation of new passengers.

The assumptions used in establishing the base and project cases are expected to result in a conservative evaluation since the increased crowding of the trains under the assumptions of the base case would cause discomfort costs which have not been quantified.

Conclusion

The calculated benefit-cost ratios for the project are 2.5 and 1.9 at 7 and 10 per cent discount rates respectively. The corresponding net present values are \$6.35m and \$3.7m. The internal rate of return is 22 per cent.

The project has financial net present values at 7 and 10 per cent borrowing rates of \$-1.269m and \$-1.493m respectively over 20 years.

GLEN WAVERLEY MODEL LINE

Introduction

The existing dual track Glen Waverley line (18.7 km) has a 65 km/h alignment and at-grade intersections with Burke Road, Glenferrie Road and Toorak Road.

The majority of stations along the line are of unattractive weatherboard construction with unpaved gravel platforms and gravel car parks with little or no provision for "bus-and-ride" and "kiss-and-ride" passengers.

Because of poor communications and control between stations there is no co-ordination between stations and no integrated passenger information system. Passenger information systems, such as they are, consist of manually operated platform indicators and only the major stations are equipped with a public address system.

The objective of the project is to upgrade the existing line to a standard of service, amenity and appearance which will serve as a model for future rail developments in the Melbourne urban area.

The choice of the Glen Waverley line was made because it is an isolated corridor with an established traffic growth pattern and potential for future expansion.

Description

The proposed improvements are as follows;

(i) Route Construction

- Upgrading of track and signals to an 80 to 100 km/h alignment.
- Construction of a line control room and improved communications system to co-ordinate train movements.
- Provision of an integrated passenger information system and platform train describer system to give passengers up to the minute information on train running.
- Lineside beautification.

(ii) Passenger Interchanges

- Reconstruction and renovation of stations, construction of improved fencing, bitumen sealing of platforms and car parking areas, landscaping of station areas.
- Modal interchanges at stations; provision of bus shelters and covered walkways for "bus-and-ride" and "kiss-and-ride" passengers.
- Modal interchange and multi-level car park at Glen Waverley. The interchange will contain a bus terminal and will give direct, covered access to the platform.
- Public address systems for stations.

(iii) Road/Rail Grade Separation

- Grade separation at Burke Road (Gardiner Station), Glenferrie Road (Kooyong Station) and Toorak Road (Tooronga Station).

(iv) Purchase of Rolling Stock

- Purchase of eighteen stainless steel rail carriages.

Costs

The preliminary cost estimates for the project are detailed in Table 17.1.

TABLE 17.1 ~ COST ESTIMATES

Item	Cost	Cost 1974-75
	\$'000	\$'000
<u>Route Construction</u>		
(a) Trackwork	142	
(b) Signalling	160	
(c) Communication and control facilities	135	
(d) Lineside beautification	516	
	<u>953</u>	<u>734</u>
<u>Passenger Interchanges</u>		
(a) Station reconstruction, renovation, fencing, platform and car park paving, landscaping	418	
(b) Modal interchanges (excluding Glen Waverley)	33	
(c) Modal interchange and multi-level car park (Glen Waverley)	1,000	
(d) Public address systems	12	
	<u>1,463</u>	<u>1,463</u>
<u>Rail/Road Grade Separation</u>		
(a) Burke Road	2,500	
(b) Glenferrie Road	2,500	
(c) Toorak Road	1,500	
	<u>6,500</u>	<u>2,145</u>
<u>Rolling Stock</u>		
Eighteen stainless steel electric cars	2,475	2,475
TOTAL	<u>11,391</u>	<u>6,817</u>

Benefits

As a part of the improvements a new timetable for the line has been prepared for introduction early in 1975 giving a greater train frequency, and lower transit time than at present. This will result in significant reductions in waiting and travel time and will provide a higher quality of service. The upgrading of stations, provision of improved modal interchanges and use of new stainless steel carriages on all trains serving the line will significantly improve passenger comfort and convenience.

The provision of a line control room and improved interstation communications will have significant benefits through more efficient control of trains along the line.

Table 17.2 provides a breakdown of the present value of the various quantifiable benefits.

TABLE 17.2 - DISCOUNTED BENEFITS

Item	Benefits	
	7%	10%
	\$'000	\$'000
Existing public transport users	7,166	5,539
Generated public transport users	62	48
Converted road users	1,430	1,038
Public transport operators	-2,200	-1,724
TOTAL	6,438	4,901

Travel Estimates

The travel estimates for the project were derived from the Melbourne Transportation Study 1985 traffic assignment and recent public transport patronage. The rail patronage, at present 14,214 trips per day in the Glen Waverley area, is expected to rise to 16,424 trips per day by 1985.

Evaluation

The base case represented a continuation of the current service with its low growth of patronage.

It was estimated in the project case that patronage would increase as a result of reduction in transit time by rail and reduced waiting time brought about by the greater frequency of trains. This increase in patronage was assumed to be derived from both the conversion of road users to rail and the generation of new travel.

The estimated benefits are expected to be conservative since the improvements to the stations and modal interchanges, and the exclusive use of stainless steel carriages on the line will have significant comfort and convenience benefits to passengers. These benefits were not quantified in the evaluation, nor were conversion or generation benefits resulting from the improved comfort and convenience.

Conclusions

The calculated benefit-cost ratios for the project are 1.1 and 0.8 at 7 and 10 per cent discount rates respectively. The corresponding net present values are \$0.637 and \$-1.664m. The internal rate of return is 7.7 per cent.

The project has a financial net present value at a 7 per cent borrowing rate of \$-8.972m over 20 years.

The calculated results do not include any benefits from the 30 per cent of the project cost which is for items designed to improve comfort and convenience.

NEWPORT - RAILWAY SIGNAL BOX AMALGAMATION

Description

The project is to amalgamate six signal boxes in the Newport area, in the western suburbs of Melbourne. The existing signal boxes are of mechanical, relay interlocked and hybrid types. The signal boxes to be amalgamated are at Spotswood, Newport A, Newport A Auxiliary 1 and 2 (Newport verandahs), Newport B (Champion Road) and Willerston. The new signal box will be built on top of the equipment room adjacent to the Newport A signal box, at the southern end of the Newport Station.

It is proposed in the future to also control the Yarraville signal box from Newport.

Cost

The cost of the project is estimated at \$1.1m and equipment would be installed between 1974 and 1977.

Benefits

The proposed signal box amalgamation will improve train co-ordination, and on-time running in the Newport area. A reduction will occur in operation and maintenance staff requirements, the estimated annual savings being \$39,000. Maintenance cost savings will occur with the elimination of the mechanical equipment and the existing timber signal box buildings. The Newport A signal box dates from the 1830's and is the second oldest in Victoria. The maintenance cost saving for the signalling equipment has been estimated at \$120,000 per annum. In addition an estimated \$67,000 would have to be spent on improving the foundations of five of the existing signal boxes, if they are not replaced in the near future.

Evaluation

The evaluation used a base case of delaying introduction of the project for 10 years compared with the project case. The benefit to the existing rail patronage is estimated at an

average improvement of on-time running of 15 seconds for the current peak hour patronage. This is possibly a conservative estimate. The results of the evaluation are provided in Table 18.1

TABLE 18.1 - DISCOUNTED COSTS AND BENEFITS

(\$'000)

Item	Discount Rate	
	7 per cent	10 per cent
Cost of Signal Improvements	977.4	932.3
Benefits		
- Reduced maintenance and operating costs	668.7	553.4
- Cost of rebuilding existing buildings avoided	62.1	56.8
- Benefits to existing patronage	60.1	49.6
- Residual value after 10 years	<u>496.9</u>	<u>359.5</u>
Total Benefits	<u>1287.8</u>	<u>1019.3</u>
Net Present Value	310.4	87.0

Conclusion

The calculated benefit-cost ratios are 1.3 at a 7 per cent discount rate and 1.1 at a 10 per cent discount rate, with net present values of \$310,400 and \$87,000 respectively.

COMMUNICATIONS EQUIPMENT

Description

Delays and inconvenience to rail patrons result from the antiquated communications systems existing in Melbourne. An upgrading program has been developed as detailed in Table 19.1.

TABLE 19.1 - COMMUNICATIONS EQUIPMENT

Item	Cost	Age of existing equipment
	\$'000	Yrs
<u>Automatic Telephone Exchange</u>		
Installation of a new cross-bar automatic exchange of 2,000 lines initial capacity and suitable for expansion to 3,000 lines.	1,000	40
<u>Cable Renewals</u>		
Replace existing open wire pole routes and old cables with 290 km of new cables.	1,000	30 (cables)
<u>Subscribers Carrier Equipment</u>		
Install 200 channels of carrier equipment to allow connection of distant stations to the automatic exchange.	200	
<u>Integrated Station Public Address Equipment</u>		
Install at 100 stations to provide patrons with improved information on train arrivals.	200	
<u>Train Control Network</u>		
Replace with modern selector apparatus, equipment in existing telephone network, for train control purposes linking signal boxes and stations.	350	35-40
<u>Automatic Omnibus System</u>		
Replace existing party lines and harmonic systems with equipment allowing automatic omnibus working (saves additional exchange and cable capacity).	500	50
<u>Signal Box Inter-communication Equipment</u>		
Replace existing central battery equipment for telephone communication from signal to signal-box and between signal-boxes	250	30-50
TOTAL	3,500	

Benefits

The new system would reduce maintenance costs by some \$201,000 per annum. Half of this amount would result from labour savings and half from material savings. As the existing equipment is obsolescent, replacement parts are expensive as they often have to be specially made.

In addition, a large benefit will be received by rail users. This benefit would comprise a number of elements, such as:

- improvement in on-time running of trains due to the provision of constant communication between train control, and signal-boxes and stations;
- increased passenger convenience through station staff being able to direct commuters onto correct platforms; and
- streamlined, accurate, and expedient communications for special train running instructions in cases of major system faults.

The Victorian Railways estimate that, on average, one-eighth of the suburban communication system is unserviceable every day. A conservative estimate of the value of annual passenger time savings for the 131,000,000 passenger journeys is \$150,000.

Conclusion

Evaluation of the project using conservative estimates of benefits gave benefit-cost ratios of 1.2 and 1.0 at 7 per cent and 10 per cent discount rates respectively. The corresponding net present values are \$585,000 and \$34,000,

The Australian Post Office uses a 40 year life in economic studies of switching equipment and its replacement program is geared to eliminating switching equipment older than 40 years. This supports the contention that the equipment has aged beyond its optimum economic life, particularly in view of the reliability requirements for on-time railway operation.