RESPONSE AND ATTITUDES OF THE PUBLIC AFTER ONE YEAR OF ADVISE DYNAMIC SIGNS

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ABSTRACT

The ADVISE traffic information system has now operated reliably for over one year on Canterbury Road, Melbourne, and has shown significant fuel savings and stops reductions with little change in travel times. Using tow truck allocation records and the existing accident database, especially in the business hours and the evening, significant reductions in accident calls have been found and, as well, accidents relative to nearby arterial roads are reduced. The fall in accident calls is uniform along the road, is free of seasonal effects, and overall is shown to be 25%.

Community savings show a benefit to cost ratio of over 20:1, yielding savings of $1 to $2 million to date and presage commensurate savings if applied metropolis-wide.

Following a telephone survey of 800 households, a detailed survey of 300 drivers from within these households was conducted one year after the ADVISE system came into operation. Results of the stratified survey indicate that a majority of drivers value the information and the accuracy of data provided and report that their driving changes made in response to ADVISE are positive and responsible.

INTRODUCTION

The ADVISE (Advisory Display of Variable Information for Speed and Economy) project arose from the fuel crisis of the 1970s but in the course of the investigation it was soon realised (Reid *et al* 1985) that potential environmental and safety benefits might be gained. Early work in Germany (von Stein 1961) showed traffic flow benefits, but fuel saving was not investigated until the work of Hammarstrom (1981), Doughty and Trayford (1982) and Trayford *et al* (1984). After using Malvern-Waverley Road, Melbourne, for a series of fuel, time and stop experiments (conducted using instrumented cars with a sufficiently large group of drivers), described by Trayford et al (1987), support was obtained for a demonstration and public evaluation of the system. Funding was obtained through a National Energy Research Development and Demonstration Council (NERDDC) research grant, and the ADVISE system was installed on Canterbury Road, Melbourne, from Surrey Hills to Mitcham. The objective of the demonstration was to quantify the expected fuel consumption and other environmental benefits, including safety. This paper describes the results of the demonstration after one year, reporting measurements made on the road and the surveyed public response.

SYSTEM OPERATION

The ADVISE dynamic driver-information system consists of a sequence of computer controlled roadside displays which convey road-user information, i.e. optimum through speed, messages such as 'prepare to stop' warnings and traffic conditions, speed tolerance limits, and look-ahead distance for the through speed displayed (Fig. 1.).

The computation backing the display comes from a short-term database of traffic signal timings held in the ADVISE computer. It is derived from real time data sent from the regional traffic management computer. This is then used to predict future signal timings and queue lengths. The regional computer is part of the RCV (Roads Corporation of Victoria) SCRAM (Signal Co-ordination of Regional Areas of Melbourne) system covering metropolitan Melbourne.

FUEL, TIME AND STOP RESULTS

To measure the changes in vehicle performance produced by the ADVISE system, two instrumented vehicles were operated systematically for similar periods both immediately before and six months after the installation of the system. The vehicles were used to 'calibrate' the traffic in either 'Float' or 'Chase' modes as described in Trayford *et al*. (1987).

For 'Float' and 'Chase' conditions, with a total of 512 Before trips and 512 After trips, the number of stops recorded by the public after the installation of ADVISE were 12% less than the stops recorded in the Before condition, while fuel consumption was reduced by 3 to 4% (normalised against road traffic volume) and travel time remained constant. When the test cars were driving in the 'Advised'

Fig 1. Display layout.

condition after installation and were compared with 'Float' and 'Chase' conditions before installation, fuel consumption was reduced by 9% for an increase in travel time of 4%, while the number of stops was reduced by 27% 'Chase' speeds, observed both before and after installation, show a small decrease which is especially noticeable for speeds greater than 85 km/h in the 60 speed limit zone (Trayford 1988).

ACCIDENT CALL AND ACCIDENT ANALYSIS

Until recently, fatality data was the only means of monitoring short-term accident trends in Victoria, because of the delays in the preparation of other more comprehensive data sets. For Canterbury Road however, fatality data is useless for time periods of the order of a year because of the low expectation of a fatality in the 10 kilometre section of road concerned. Haque *et al.* (1987) investigated five data sources with potential for meeting short-term monitoring requirements and concluded that the tow truck allocation scheme, as implemented in greater Melbourne and provided as a contract service by the Royal Automobile Club of Victoria (RACV), gave a consistent data set and had high correlation with the casualty accident pattern.

TOW TRUCK CALLS ON THE ADVISE SECTION OF CANTERBURY ROAD

Tow truck call allocation data was taken from each quarter of the Before Year (15 Nov. 86 to 14 Nov. 87) and the After Year (15 Nov. 87 to 14 Nov. 88). On each of the four corresponding quarters of the After Year there was a fall in the calls to Canterbury Road. Overall this reduction was 31%, the total calls falling from 193 to 134 (Fig. 2.). The reduction was consistent along the road covering both the eight major signalised intersections and the nine mid-block sections (Fig. 3.). For the 10 two-hour periods starting at 5.30 a.m. to 11.30 p.m. daily there was a corresponding reduction each period except for two peak periods, i.e. 7.30 to 9.30 a.m. (equal) and 5.30 to 7.30 p.m. (slight increase) (Fig. 4.).

The greatest reduction was in the business hours (9.30 a.m. to 3.30 p.m.) and the evening (6.30 p.m. to midnight), which showed a fall of 49% (113 to 58) (Fig. 5.). Alternatively, p.m. calls reduced 42% (130 to 75), whereas a.m. calls were steady (-6%, 63 to 59). Evening calls were down 55%, (51 to 23). The proportion of weekday to weekend and public holiday calls on the ADVISE section of Canterbury Road did not change (77% to 23%). The number of calls between 1.30 a.m. and 5.30 a.m. were too low to be useful for comparison.

From an examination of the RCV accident database it appears possible that mid-block calls not citing Canterbury Road as the first named road may have originated from Canterbury Road. Re-allocating these calls raises the Canterbury Road set from 327 to 396 and the quarters become

	Q1	Q2	Q3	Q4	Total
Before (Nov. 86 to Nov. 87)	50	45	65	66	226
After (Nov. 87 to Nov. 88)	37	43	49	41	170

which gives a reduction overall of 25%.

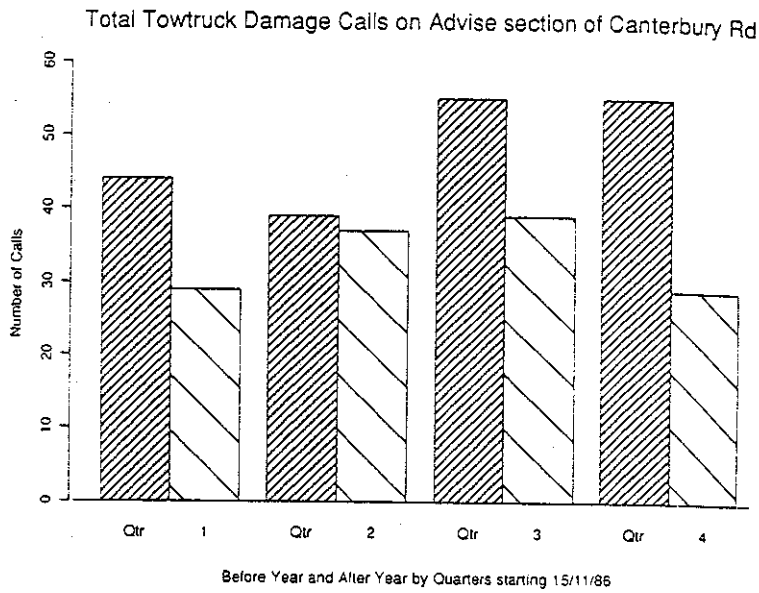

Fig. 2. Tow truck damage calls, by quarters.

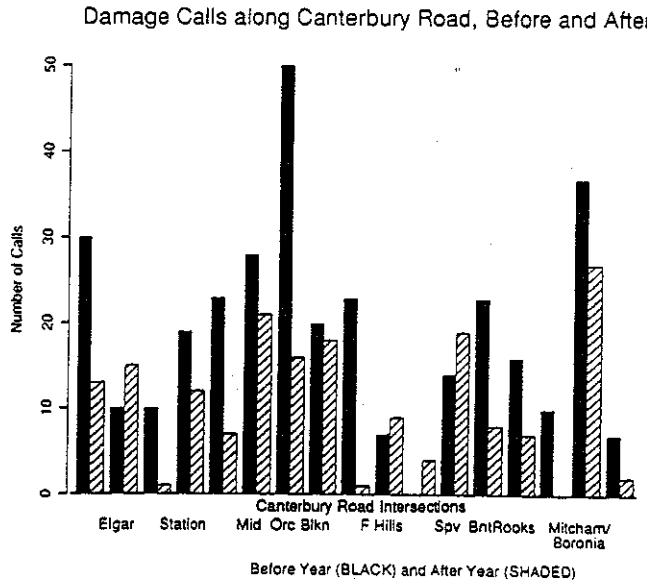

Fig. 3. Tow truck damage calls, by location.

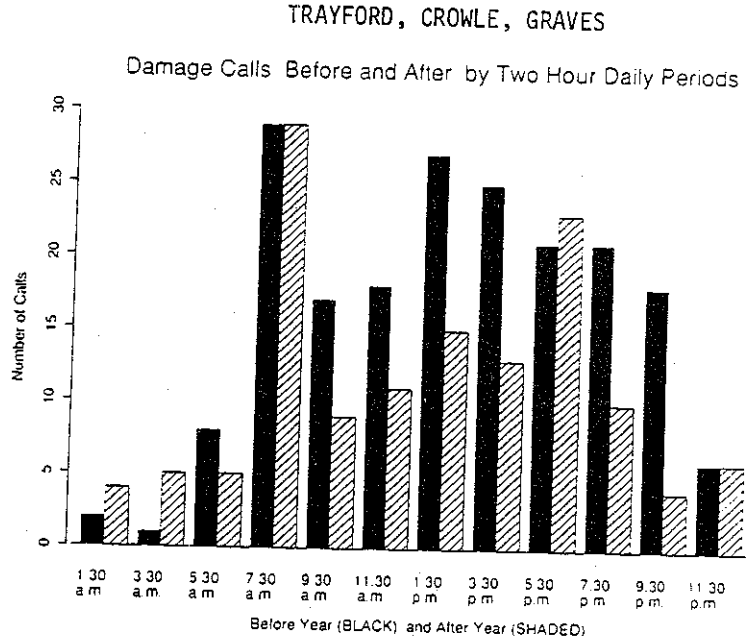

Fig. 4 Tow truck damage calls, by two-hour periods.

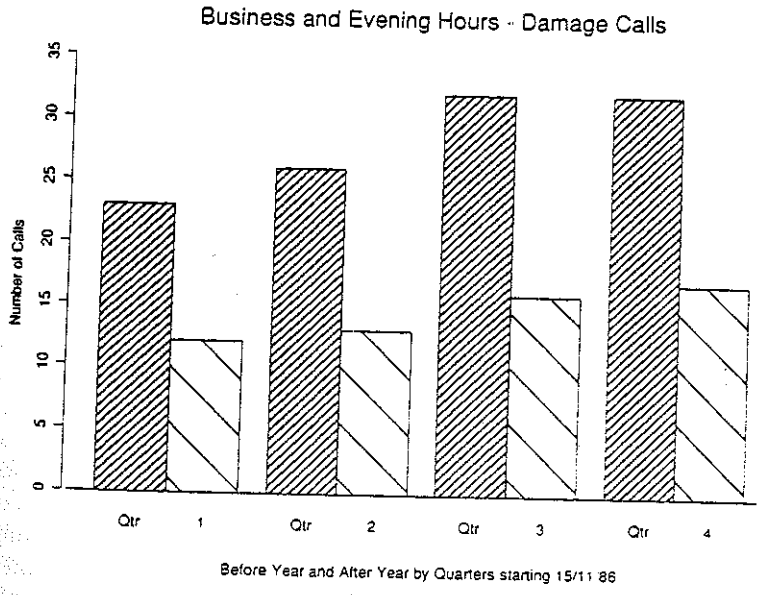

Fig. 5. Tow truck damage calls – business hours and evening.

Statistical tests using a generalised linear model based on the Poisson distribution show that the tow truck data has a significant reduction at the 5% level from the Before to the After Year and that this reduction is free of seasonal effects. There were also significant effects due to major time periods of the day, i.e. a.m. peak, business hours, p.m. peak and the evening.

In contrast to the above, the total metropolitan tow truck calls increased 3.5% (approx. 43 000 to 44 500), while traffic volume on Canterbury Road rose 10% for the period of the after on-road study. As traffic volume on the nearest arterial to Canterbury Road, i.e. Maroonday Highway, rose only 5% in the same period, this suggests that diversion due to ADVISE was not a problem.

ACCIDENT DATA AND ANALYSIS

Although tow truck allocation calls are complete, in contrast to accident database records which lag from 3 to 12 months, the accident database gives a truer indication of personal injuries, especially pedestrian and motorcyclist. To overcome the lag in the RCV accident database, data from three parallel arterial control roads in the vicinity were obtained for the Before Year and the After Year. Sections free of recent road works and similar in length to Canterbury Road were chosen. The volume data are typical of Before and After Year conditions.

There is a suggestion from recent RTA data that a tightening of accident compensation requirements has increased the number of accidents reported to police (and RTA) from mid-1987 by the order of 15%. However, the use of other roads in examing the accident data controls this effect.

Arterial road	Length (km)	Mean daily two-way volume* (vehicles)	Annual travel (veh. km x 10^7)
Doncaster Road	3.24	48 850	5.77
Maroondah Highway	7.04	52 000	13.36
High Street Road	6.48	20 000	4.73
Canterbury Road	9.38	44 400	15.20

* measured at or near the Springvale Road crossing of each control road.

The data were analysed in quarters by five daily periods, and also in quarters by type of accident (Personal Injury, PI, and Property Damage, PD). Table 1 shows the all-accident data by quarters, and Table 2 shows the combined business hours and evening accidents. On all roads, accident numbers have increased but from these data it was concluded that the number of accidents in the year after activation of ADVISE minus the number of accidents in the year before ADVISE was significantly less (5% level) in Canterbury Road compared to Doncaster Road or Maroondah Highway. The difference was particularly noticeable for the business hours and evening periods when ADVISE could be deemed most effective. There was no significant difference between Canterbury Road and High St Road.

Table 1. All accidents by quarters

	Before-Year					After-Year				
	Q1	2	3	4	Total	Q1	2	3	4	Total
Doncaster	18	16	33	23	90	34	30	31	25	120
Maroondah	37	48	54	54	193	39	56	66	67	228
High St	15	28	37	27	107	21	29	27	24	101
	70	92	124	104	390	94	115	124	116	449
Canterbury	47	33	53	52	185	40	35	57	39	171

Table 2. Business and evening period accidents by quarters

	Before-Year					After-Year				
	Q1	2	3	4	Total	Q1	2	3	4	Total
Doncaster	9	10	20	17	56	21	17	22	17	77
Maroondah	21	34	32	30	117	30	35	35	38	138
High St	8	19	30	17	74	12	21	21	12	66
	38	63	82	64	247	63	73	78	67	281
Canterbury	29	21	34	35	119	22	19	25	20	86

All-accidents increased 15.1% on the other roads but reduced 7.0% on Canterbury Road. For the business hours and evening periods combined, all-accidents increased 13.8%, but Canterbury Road reduced by 26.9%, making an even larger difference between Canterbury and the nearby arterial roads. It is possible that the severity of injuries in the business hours and evening is normally greater than that in the peak periods: for instance, only one of the nine fatalities quoted below occurred in a peak period, five occurred in the business hours, two in the early morning and one in the evening. This could be worth investigating. From Table 3 the PI accidents on the other roads increased 32.5% while on Canterbury the increase was only 10 8%, a relative change of (132 5/110 8) – 1, i.e. 19.6% in favour of Canterbury Road

When the data are normalised in terms of accident exposure per 10 million vehicle-kilometres, it can be seen that the roads other than Canterbury carried a much higher exposure and the differences increased in the year after ADVISE was introduced (Tables 4, 5 and 6).

Table 3 Personal injury accidents (including fatal) by quarter

	Before-Year					After-Year				
	Q1	2	3	4	Total	Q1	2	3	4	Total
Doncaster	5	6	16	9	36	11	19	12	14	56
Maroondah	17	18	23	22	80	18	22	23	28	91
High St	6	13	11	11	41	8	12	14	17	51
	28	37	50	42	157	47	53	49	59	208
Canterbury	20	15	16	23	74	16	20	29	17	82

Table 4 All accidents, exposure per 10 million vehicle-kilometres

	Before	After	Relative change per cent
Doncaster	15.6	20.8	
Maroondah	14.4	17.1	
High St	22.6	21.4	
Mean	17.5	19.8	
Canterbury	12.2	11.3	
Difference	(43.4%)	(75.2%)	22.2

Table 5 Business hours and evening, exposure* per 10 million vehicle-kilometres

	Before	After	Relative change per cent
Doncaster	18.1	24.9	
Maroondah	16.4	19.3	
High St	29.2	26.1	
Mean	21.2	23.4	
Canterbury	14.6	10.7	
Difference	(45.2%)	(118.7%)	50.4

* Calculated using business and evening fraction on Canterbury Road, 0.535

Table 6. Personal injury (including nine fatal on Doncaster and Maroondah), exposure per 10 million vehicle-kilometres

	Before	After	Relative change per cent
Doncaster	6.2	9.7	
Maroondah	6.0	6.8	
High St	8.7	10.8	
Mean	7.0	9.1	
Canterbury	4.9	5.4	
Difference	(42.9%)	(68.7%)	18.1

ANALYSIS BY ACCIDENT CATEGORY

Table 7 shows the three year before data compared to the after year for combined personal injury and property damage. The extra years allowed a significance test with two degrees of freedom on the accident category breakdown for both business hours and all daily periods. Six major sub-divisions covering all the codes listed in the RTA accident database were chosen. The tests indicate one significant fall in the business hours for rear-end accidents on Canterbury Road (at the 5% level for Personal Injuries) while at the same time for the other roads (Doncaster, Maroondah and High Street) two categories of accidents, other multi-vehicle and single vehicle, rose significantly (10% level). German experience with dynamic advisory systems, in Dusseldorf in particular, had already pointed to a reduction in rear-end accidents (Kaemmerer 1985, Pers. Comm.).

In short, similar roads in the After Year which formerly had a high exposure, became worse, or for one case, a little better; Canterbury Road which was comparatively safe, became safer.

These results appear consistent with the usability afforded by the ADVISE system, i.e. good visibility at night and opportunity to use the system in the business and evening hours but not as much in the peak periods.

COMMUNITY SAVINGS

The savings from ADVISE can be identified as those due to fuel, stops and accident reduction.

Latest traffic data show that a minimum of 34 200 vehicles per weekday travel along Canterbury Road through the two lanes each way at Elgar Road. Extrapolating for the length of the road and factoring by 6 for the weekly total and by 52 for the year yields 10.67 million trips. Even at the present saving of 3.5%, derived from car-following experiments, using 1 litre of fuel per trip on the 8.5 km ADVISE section, and with fuel at 50c per litre, this yields $186 732.

Table 7. Accident type changes from before (three years) to after (one year). Combined property damage and personal injury

	Other three roads				Canterbury Road ADVISE			
	Before 3 year mean	After change 87/88	After change %	Sig level	Before 3 year mean	After change 87/88	After change %	Sig level
Business hours								
Pedestrian	12.1	12.3	1.6		1.9	2.1	8.8	
Adj manoeuvre	21.8	20.6	-5.5		7.6	6.3	-17.1	
Rt turn	28.8	30.6	6.3		13.2	12.5	-5.1	
Rear end	41.6	41.9	0.7		18.1	9.4	-48.2	*10%
Other multi	31.0	40.6	31.1	10%	12.6	12.5	-0.7	
Single	14.1	27.0	91.9	10%	6.0	6.3	4.9	
Total	149.3	173.0	15.9		59.3	49.0	-17.4	
All daily periods								
Pedestrian	28.4	27.9	-1.7		3.6	5.0	38.9	
Adj. manoeuvre	53.7	59.6	11.1		22.5	24.2	7.2	
Rt turn	82.4	84.3	2.3		36.0	35.5	-1.4	
Rear end	104.6	105.7	1.1		47.7	45.2	-5.2	
Other multi	72.9	109.9	50.7	10%	29.3	35.2	20.3	
Single	44.7	61.5	37.5		21.7	25.2	16.1	
Total	386.7	448.9	16.1		161.0	171.0	6.3	

Notes

- Year starts on 15 November.
- Business hours – 9.00 to 3.30 weekdays, 9.00 to 6.30 weekends
- Approximately 10% uncoded (unknowns) mainly from 1986/87 before year, distributed in proportion, result in fractional entries.
- Significance test, Students t, 2 d.f.

* For Personal Injuries, significant at the 5% level.

Car maintenance savings from stop reductions are estimated at 3c per stop, discussed in Reid *et al.* (1985), and with one stop saved per trip yields $320,100 (0.03 * 10.67 million).

Early figures showed that ADVISE saved 59, or alternatively 56, tow truck allocation requests in the first year. Given no other road measures on Canterbury Road, a rise of 6 could have been expected, based on the increase in traffic volume. Taking the 59 requests and using estimates based on assumptions set out in the Appendix, these saved requests can be converted into dollar savings. Each request represents a number of tow trucks attending (mean 1.37) and a probability of fatalities, injuries and property damage, including vehicle damage.

From the Tow Truck Allocation Scheme area data the nominal number of tow trucks allocated on calls in the larger area Melbourne Statistical Division (MSD) can be estimated. For 1987 this was 43 000/0.9, i.e. 47 778.

From the pamphlet 'How Much do Road Accidents Cost?' put out by the Commonwealth Bureau of Transport and Communication Economics (BTCE) and RTA data, using the assumptions detailed in the Appendix, the number and cost of fatal, injury and property damage road accidents is known. For Australia this annual loss is estimated to be $5.7 billion. Half is attributed to the loss of economic expectation of the victim and to pain and suffering while the other half is set against accident generated activities, including emergency services, health care, legal and other on-going costs. Using the number of fatal accidents in the MSD for 1987 (a reliable figure), the number and cost of accidents in the MSD can be calculated. Given the number of allocation requests the community cost per call can be obtained and applied to the ADVISE section of Canterbury Road (Table 8).

Table 8. Community cost of an Allocation Request Call in Melbourne (Sources: 1987 BTCE and RCV data on accidents and associated costs)

Accident category	Australia number	Av. cost thousand	Melbourne number	Requests*	Cost/ call
Fatal	2 955	$450	327	106.6	$ 4 225
Major	11 956	92	1 980	17.6	5 271
Minor	219 000	10	38 638	1.69	11 548
Property damage	973 000	1.1	47 778	0 73	1 507
				Total	$22 969

* e.g. 47778/(1.37 x 327) = 106.6

At a reduction of 59 requests in the first year this yields $1 355 171, i.e. $1.35 million.

The total savings are:			
	Fuel	$ 186 732	10.0%
	Stops	$ 320 100	17.2%
	Accidents	$1 355 171	72.8%
	Total	$1 862 000	100%

or for the 8.5 km of the ADVISE section, $219 000 per km.

The direct cost of the ADVISE installation was in the vicinity of $280 000 and it has an annual maintenance cost of $25 000. The total yearly cost of Canterbury Road ADVISE over ten years is of the order of: Capital $28 000, Interest $28 000 and Maintenance $25 000, totalling $81 000, i.e. a benefit of $1.86 million – $81 000, equalling $1.779 million a year. This gives a benefit to cost ratio of 23:1.

The research costs of ADVISE are currently about $4 million and should not be solely written off against the demonstration system on Canterbury Road. Even so the research cost would be paid back within three years of operation ($4 million/$1.78 million < 3).

As the market approaches the size of Melbourne with its 3600 kilometres of arterial roads, this one-off research cost becomes a small part of the overall 10-year cost of $340 million ($9529 * 3,600 = $34 million/year). That is, the $4 million becomes a little over 1% of the 10-year cost and for larger markets becomes insignificant. The above benefit to cost ratio still applies.

If the ADVISE system were to be installed Melbourne-wide, then for the 3600 km of arterial roads in Melbourne at a benefit of $1.78 million/8.5 = $209 294 per km this yields $750 million per year. For Australia, the figure can be increased by at least three, i.e. $2.25 billion.

ROAD USER SURVEY: PURPOSE AND DESIGN

A road-user survey and questionnaire were designed to quantify public attitudes to the ADVISE system. It was specifically designed to find out how drivers reacted to the appearance, content, and visibility of the signs. The ability of the drivers to use the displayed information was queried, and any changes in driver behaviour or attitudes were sought.

User Survey Method

Initial contact with people living in the suburbs surrounding the test road was through random selection of telephone numbers. The questions asked during the telephone interview were sufficient to categorise the users of the test road into groups according to age, sex, and driving frequency of the test road. In particular the respondents were asked if they would participate in a more detailed study.

From the 800 completed telephone interviews, 300 users were selected for detailed interview, keeping the numbers of respondents in each analysis category approximately equal. The interviews were conducted by professional interviewers who were fully briefed in both questionnaire content and interview technique. Interviews were conducted in the last quarter of 1988, approximately one year after the ADVISE system was installed.

User Survey Analysis and Results

The first group of questions deliberately dealt with matters only indirectly concerning the Canterbury Road ADVISE system. From them the following was elicited:

- The response of users was the same in each road use frequency category.
- In terms of kilometres travelled per year by the surveyed drivers, there was a broad representation over a wide range from under 5000 to over 30 000.
- On a list of Canterbury and six other major arterial roads in the vicinity, only Canterbury was believed by a majority to be linked (by 70%), other roads scoring from 27% for Doncaster (fully linked), Blackburn (20%), Middleborough (16%), Warrigal (14%), Elgar (13%), and High St Road, Ashburton (7%) (all partially linked). All the signals on these roads were under the central control of the regional traffic system computers.

- When asked their first preference in terms of four driving objectives, a clear majority were in favour of objectives espoused by the ADVISE system.

Comfortable speed	38%
Saving stops	26%
Saving petrol	13%

As against

Saving time	23%

i.e. 77% of first preferences agreed with the objectives of ADVISE as against the 23% who wished to save time.

- When asked how traffic information could best be delivered to the driver, a majority were in favour of road signs as against radio or specialised in-car means.

Road signs	54%
Radio	35%
In-car	11%

and with respect to road signs two out of three of all respondents preferred overhead signs (as used by ADVISE).

The rest of the questions were directed at features of ADVISE and/or attitudes to driving on Canterbury Road.

- Knowledge of ADVISE was primarily obtained by driving down the road. Media and advertising were relatively ineffective except for articles and stories read in the print media.

Driving	46%
Newspapers/magazines	19%
Television	10%
Advertising (daily and local press)	9%
Radio	8%
Information pamphlet	8%

- Moving to questions that were directed at the system display it was first asked whether they were noticeable and if they were distracting and of the right size. A clear majority was obtained in favour of the designed display for the following three questions.

Noticeable	81%
Not distracting	91%
Right size	74%

- Turning to the accuracy of the traffic intensity information at the top of the sign, the respondents were divided in opinion. (During the course of development, including the period of the survey and beyond, a steady program of improvement has been carried out on the software providing better accuracy.)

Accurate	42%
Borderline	39%
Inaccurate	19%

- In reply to usage, 77% replied that they had used the traffic intensity information, and, a separate question, 77% claiming the information was of value.

- Regarding the speed information, a majority said they had changed their driving in response to ADVISE.

Changed speeds	73%
Driven more carefully	42%

- Asked about the size of the speed information 94% thought that it was slightly too small (as distinct from much too small, about right and too big).

- Some 89% of respondents had tried to follow the speed information at some time with 44% trying on the last occasion they drove along Canterbury Road. A total of 63% of drivers had used the system more than 10 times.

- Drivers used the system slightly more frequently in MEDIUM traffic conditions (as defined by the display) than at other times.

LIGHT	63%
MEDIUM	71%
HEAVY	50%
DELAYS	N.A.

- Asked if ADVISE affected the number of stops, the replies were:

Reduced	69%
No change	25%
Increased	6%

- Questions on the minimum speed display desired did not state the alternative for lower speeds which are either PREPARE TO STOP or 'blank'. ADVISE cannot 'raise' a minimum speed as the advised speed is a property of the time-distance geometry of the traffic control system and only the minimum and maximum (set in this case by the speed limit) can be controlled. However, given this deficiency in the question, the majority of respondents wanted the minimum in both speed zones (60 and 75) raised 10 km/h, i.e. from 30 to 40 and from 40 to 50. This would have the effect of increasing the time PREPARE TO STOP was displayed in many cases to some 60 or 70% of the cycle (but would also improve the overall time the PREPARE TO STOP was accurate). 'Blank' is discounted as an option as it conveys no information and thus lessens credibility. In short, the higher the imposed minimum the less information is conveyed to the driver and the smaller are the number of driving options available.

- A majority of drivers (61%) said they did not speed up from their current speed on seeing a low ADVISE speed, 14% said they did speed up, contrary to the advice.

- Some 90% reported they valued the speed advice.

- With PREPARE TO STOP, 75% said they are aware of the display and 80% thought it was big enough. As to accuracy, 83% believed it to be accurate and 87% slowed down on seeing PREPARE TO STOP. Conversely a similar majority did not go faster. An encouraging 94% valued the PREPARE TO STOP message (48% said, 'great value').

- For the distance information, 70% thought the size was large enough: the information was used by half the respondents and 89% valued the information (29%, 'great value'). A minority had not noticed the distance information or did not know the meaning intended.

- Most respondents had not noticed the range dots or thought them too small or did not know the meaning. It seems obvious that they should be made 50 to 100% larger in size before drivers can make use of the information.

- Regarding the speed limits on Canterbury Road (60 and 75 km/h), drivers were divided between accepting the present limits (63%) and wanting the limit raised a little higher (by 10 km/h?) (29%) leaving only 8% wanting greater variation.

CONCLUSIONS

Speeds, importantly those excessively higher than the speed limit, have shown a small decrease since the advent of ADVISE. Fuel consumption is reduced 3 to 4%, stops are down and travel time is not significantly changed. An increase in the use of the road has been observed.
Free of seasonal effects, and uniformly along Canterbury Road, tow truck calls have been reduced by 25%, comparing the Before Year to the After Year. Calls in the business and evening periods have reduced by almost half.

Accidents, especially those occurring in the business hours and the evenings, are shown to be significantly less on Canterbury Road after ADVISE was introduced compared to two nearby major parallel arterial roads. Personal injury accidents are shown to have risen less on Canterbury Road than on other similar roads. On an accident exposure basis of vehicle-kilometres, Canterbury Road is shown to be a comparatively safe road which has become safer after ADVISE, whereas other similar nearby roads having a higher exposure have become worse or, in one case, only a little better.

Taking three before years of accident category data and comparing the after year, rear-end accidents are shown to have significantly decreased on the Canterbury Road ADVISE section. In contrast, on three other nearby parallel arterial roads, using their combined data, single vehicle accidents and multi-vehicle accidents (other than rear-end and adjacent manoeuvre categories), are shown to have increased significantly.

Community cost savings from ADVISE, taking into account the fuel, maintenance, and accident call figures, show a benefit to cost ratio of over 20:1, yielding savings of $1 to $2 million to date: they point to Melbourne-wide savings of $750 million per year if adopted for the whole metropolis.

It can be concluded from the user survey that a substantial majority of drivers are in favour of ADVISE, in that they use and value the traffic intensity, through speed and PREPARE TO STOP information. Further, they indicate that the driving changes they make in response to the information are in a responsible and positive direction.

These results appear consistent with the usability afforded by the ADVISE system, i.e. good visibility at night and opportunity to use the system in the business and evening hours but not as much in the peak periods.

ACKNOWLEDGMENT

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The opinions expressed in this paper are those of the authors and not necessarily those of the Road Traffic Authority.

The RCV is presently commissioning its own evaluation of the project. This will be undertaken by an independent body not associated with the ADVISE project.

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APPENDIX
ASSUMPTIONS FOR ACCIDENT COSTS USING BTCE DATA

1. The ratio of metropolitan fatalities to accidents where a fatality occurred is in the same proportion as that for the whole of Victoria.

2. Victorian injuries are in the same proportion to Australia as are deaths due to road accidents.

3. Melbourne injuries are in the same proportion to Victoria as are injury accidents

4. Melbourne property damage accidents are in the same proportion to Australia as are injuries.