COMMUTER PLAN STUDY
MAINE TURNPIKE

Prepared For

MAINE TURNPIKE AUTHORITY

By

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COMMUTER PLAN STUDY

MAINE TURNPIKE AUTHORITY

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EXCUTIVE SUMMARY

This Commuter Plan Study Report, for the Maine Turnpike Authority, presents a summary of a wide range of issues regarding the commuter plan. Several of these issues include the development of a detailed profile of the existing commuter program, evaluation of alternative commuter options for liberalization or expansion of the plan and evaluation of various technological alternatives for short-term utilization on the new northend Barrier System and under a long-term scenario for the existing Ticket System.

The existing commuter profile was developed from operating statistics on the Maine Turnpike as well as information collected from the comprehensive travel pattern and characteristic survey conducted in August 1988. Total commuter transactions per year on the Turnpike has grown very rapidly, averaging 20.5 percent per year between 1983 and 1987. Only one-half of those motorists who indicated they traveled five or more times per week currently are members of the commuter program. The existing commuter profile suggests that further increases in program utilization may be expected.

Several alternate commuter plans were evaluated, including:

- Permitting use of all interchanges between and including those shown on the current pass card;
- Permitting use of the commuter pass at the primary interchanges and one adjacent interchange at each trip end;
- Issuing commuter cards valid for trips for an entire county;
- Issuing annual commuter cards, with and without a discounted toll charge per trip; and
- Issuing a commuter pass to allow all movements on the Turnpike, with and without a discounted toll charge per trip.

Evaluation of the anticipated revenue impacts for each of the above alternatives showed that the annual commuter card without a toll charge per trip is the only alternative which will have a positive revenue impact, estimated at $140,000 per year. Each of the other alternative programs appear to have a negative revenue impact on the Turnpike commuter program.

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Chapter 1
INTRODUCTION

The Maine Turnpike extends approximately 100 miles from York to Augusta. It presently employs a closed ticket system of toll collection. In addition to the two mainline toll plazas at the northern and southern ends of the Turnpike, there are 14 intermediate interchanges.

Several years ago, the Maine Turnpike Authority introduced a commuter discount program on the Turnpike. The program provides for discount travel to frequent Turnpike users in the form of a quarterly pass. Passes are sold for each individual interchange to interchange movement, with the amount of the pass prorated to the equivalent of 126 trips at an effective discount rate of 60 percent over cash fares.

Utilization of the commuter program has grown significantly in recent years. However, as congestion levels on alternate routes increase, consideration has been given to possible means of increasing utilization of the Turnpike through modification of commuter plan parameters. In addition, the Authority has announced plans to convert the northern end of the Turnpike to a closed barrier system of toll collection. This may well necessitate a modification in the commuter program in that section of the Turnpike.

Authority and Purpose of Study

The Authority, on July 13, 1988, requested Wilbur Smith Associates (WSA) to undertake this study of the Commuter Plan. The principal objective of the study was to develop possible

options for liberalization or expansion of the existing commuter program. A second objective was to develop technological alternatives for the commuter plan in the new Barrier System section of the Turnpike, extending from Portland to Augusta. This report addresses the existing commuter plan and options for liberalization. Options for a barrier system commuter plan are discussed in a separate technical memorandum.

The Commuter Plan Study was timed to coincide with the collection of extensive travel pattern and characteristics information on the Turnpike, which was performed under a separate agreement. Another important part of the Commuter Plan Study was to analyze the results of a selected traffic survey location off the Turnpike, which was performed by the Maine Department of Transportation in the Biddeford-Saco area. Results of this traffic survey were used to estimate the impact on off-Turnpike traffic of alternate commuter plans.

Scope of Work

Conduct of the work study program was divided into four principal work tasks. These include:

- Task 1 - Evaluation of Existing Commuter Profile;
- Task 2 - Evaluation of Alternate Commuter Plans for Short-Term Implementation;
- Task 3 - Evaluation of Technological Options for the New Northend Barrier System; and
- Task 4 - Evaluation of Technological Options for the Existing Ticket System.

Again, Tasks 3 and 4 are addressed in a separate technical document. Based on results of the comprehensive travel pattern

and characteristics survey, a complete profile of the existing commuter program in use on the Turnpike was developed. As a part of the commuter program profile, trip frequency and purpose characteristics of commuter and non-commuter patrons were identified. The primary objective of Task 1 was to distinguish between commuter and non-commuter characteristics in order to identify potential opprotunities for increased usage of the commuter program through program parameter modifications.

Alternate commuter program options were evaluated during Task 2 of this Commuter Plan Study. Estimated traffic and revenue impacts were developed for each of the five (5) alternative plans which were selected, as compared to the existing system. This detailed analysis included estimates of transfers within existing Turnpike market segments, including shifts from the existing plan to a more liberalized plan, cash paying patrons to the commuter plan, patrons ending membership in the commuter plan and off-Turnpike vehicles being attracted into the commuter program. The impacts were analyzed under the 1988 toll schedule. Secondary impacts were also developed. These included cash flow and investment opportunity impacts, as well as potential impacts on toll plaza operations, safety and the toll audit process.

Alternative technological options for the commuter program in the new Barrier System in the northern end of the Turnpike were evaluated during Task 3. Detailed evaluation was performed to estimate possible drawbacks when integrating the new Barrier section with the existing Ticket System. Consideration was given to the possible characteristics of the toll collection equipment system in the new Barrier section of the Turnpike. Further analysis took place with regard to implementation of unattended ramp plaza operation in the new Barrier System. A

cost effectiveness analysis was performed for each of the scenarios under consideration. Commuter program parameters were carefully analyzed to ensure consistency with the existing commuter plan in the Ticket System.

The primary objective of Task 4 was to evaluate the relative cost-effectiveness of possible alternative technological options to increase the automation of commuter processing which would thereby reduce operating costs and effectively speed the flow of traffic. Also taken into consideration during the evaluation of these several options was toll collection personnel requirements, toll collection equipment needs and toll audit requirements. Consideration was also given to ensure long-term compatability of a Ticket and Barrier System integration.

Barrier System Conversion

In order to optimize the use of the Maine Turnpike north of Interchange 10 (Portland), the Authority intends to convert this northerly section from the present closed Ticket System to a closed Barrier form of toll collection. This conversion, combined with the addition of several new interchanges, would increase the Turnpike's role in meeting local and regional traffic demands, and also serve as a potential catalyst to economic development in this corridor.

There are presently four intermediate interchanges in the northerly section of the Turnpike, located at Gray, Auburn, Lewiston and Gardiner. Traffic volumes are generally lower in the northern Turnpike section as compared to volumes on the southern portion of the Turnpike. Modifications of the toll collection system would allow the new interchanges to be constructed using a less complex design and would not only

provide greater access within the corridor, but also reduce capital construction costs.

Previous Studies

All previous studies relative to the operation of the Maine Turnpike and, in particular, to the analysis of the commuter discount program, were assembled and reviewed. Information of commuter transaction trends was obtained and analyzed. Considerable pertinent data was also utilized for comparable studies of evaluation of commuter plans on similar toll facilities.

Particular studies used as a guide in carrying out this detailed analysis included the WSA Toll Schedule Analysis and Commuter Plan Study conducted in 1981 and it's updated follow-up comparison study in 1983. These two reports were used to evaluate factors considered in the initial development of the existing commuter program on the Maine Turnpike.

Another helpful report used during the analysis of this Commuter Plan Study was the Northerly Corridor Study performed by WSA for the Maine Turnpike in 1988. During the analysis of the northend Barrier System, the Critique and Evaluation of the New Toll Collection Equipment System was beneficial when evaluating the impacts of Ticket/Barrier toll system operations. This study was also conducted by WSA, in 1987.

Chapter 2
EXISTING COMMUTER PROFILE

The Maine Turnpike Authority presently utilizes a commuter plan which offers a sizable toll discount to frequent users on the Turnpike. This payment plan is based on a quarterly, or three-month, time period. Upon application and payment of appropriate fees, a commuter identification card is issued to the patron seeking to join the program. Each commuter identification card is clearly marked as such and also contains pertinent information, including the eligible pair of interchanges for which that patron can travel toll free, the name and address of the program member and a unique serial number.

The rate charged for each discount movement was originally established based on a nominal 50 percent discount of the passenger car rates in effect in 1981. Passenger car toll rates were subsequently increased by 25 percent, with no change in the commuter rate. Hence, the effective rate of discount now in effect is approximately 60 percent, with program participants utilizing the full theoretical number of trips per pass paying only 40 percent of the normal Class 1 fares. Fares are also based on nominal normal trip making patterns for commuters of 42 trips per month, or 126 trips per quarter. As described subsequently, the actual number of trips per pass is less than the nominal amount used in computing the quarterly rates. Hence, the actual revenue per commuter transaction represents more than 40 percent of the cash fare.

Existing Operating Procedures

As a commuter patron enters the Turnpike and approaches the

toll booth, the commuter identification card is shown to the Toll Collector. The Collector visually confirms that one of the two eligible interchanges printed on the commuter card is appropriate for the entering interchange. If the commuter patron presents a legitimate commuter card, then the Toll Collector classifies the vehicle as a Class 16, scans a commuter toll ticket and passes the ticket to the patron. Upon exiting the Turnpike, the commuter patron gives the commuter toll ticket to the Toll Collector and again flashes the commuter card in order to verify that the patron has traveled a valid commuter movement. The Toll Collector, after verification of a legitimate commuter trip, processes the commuter toll ticket and enters that transaction into the toll system.

A commuter identification card is purchased by a commuter patron on a quarterly basis. The particular quarterly charge is directly associated to the commuter movement requested. For example, if a commuter patron wishes to purchase a commuter card that is eligible for use between York and Wells, then the quarterly charge would amount to $18.90. Possession of this commuter card entitles the patron to the discounted fare between these two interchanges for an unlimited number of trips during the three-month validation period.

The commutation discount plan presently in use on the Maine Turnpike is offered as a privilege to its motoring public. Each member of the commuter program is held responsible for the possession of the commuter identification card. If a commuter card is lost or stolen, replacement is only made upon full repayment of the quarterly charge. If a commuter program participant claims to be a member of the plan but does not have the card in hand, then the patron does not have the privilege of being a frequent user and will pay the full cash fare for traveling on the Turnpike.

The existing commuter discount plan used on the Maine Turnpike has several important characteristics. Eligible vehicles that participate in the commuter program are those which would otherwise be classified as Class 1 on the Turnpike; two-axle, four-tire vehicles. The existing commuter plan is not available for commercial vehicles. There is no address or state of registration restriction on commuter program participants. The existing commuter plan is valid on every day of the year and all hours of the day. There is no limitation on the number of commuter trips allowed with each commuter identification card. The quarterly payment time restriction is closely monitored to prevent invalid commuter movements. A commuter identification card is issued to the individual, not the vehicle, which permits use of the card in a carpool or when the card needs to be transferred between family members.

Commuter Transaction Trends

There continues to be strong growth in the number of commuter transactions on the Maine Turnpike. As presented in Table 1, it can be seen that commuter transactions have increased by an average of 20.5 percent per year over the last five years. The percentage of class one vehicles utilizing the commuter program also has increased each year since 1983, reaching 10.1 percent in 1987, which represents over 3 million commuter transactions.

Presented in Table 2 is the commuter transaction trends by entering interchange on the Maine Turnpike over the last five years. The highest volume of commuter transactions processed in 1987 was at Interchange 7 with more than 450,000. Interchange 5

Table 1

COMMUTER TRANSACTION TRENDS

YEAR	TOTAL TRANSACTIONS	TOTAL COMMUTER TRANSACTIONS	COMMUTER TRANSACTIONS AS A PERCENT OF TOTAL
1983	20,848,958	1,546,336	7.4
Percent Change	10.6	23.2	
1984	23,066,361	1,904,709	8.3
Percent Change	9.0	19.0	
1985	25,145,068	2,266,237	9.0
Percent Change	14.6	20.8	
1986	28,807,453	2,738,303	9.5
Percent Change	12.0	19.1	
1987	32,259,306	3,261,463	10.1
AVERAGE ANNUAL PERCENT CHANGE	11.5	20.5	

Table 2

COMMUTER TRANSACTIONS BY ENTERING INTERCHANGE

ENTERING INTERCHANGE	COMMUTER TRANSACTIONS 1983	Percent Change	1984	Percent Change	1985	Percent Change	1986	Percent Change	1987	AVERAGE ANNUAL PERCENT CHANGE 1983-1987	PERCENT OF TOTAL(1)
1	130,243	8.5	141,312	13.5	160,421	17.6	188,712	22.9	231,975	15.5	7.1
2	92,153	22.7	113,116	15.8	130,952	22.1	159,953	18.3	189,280	19.7	5.8
3	87,436	19.1	104,135	13.9	118,625	11.9	132,684	13.3	150,337	14.5	4.6
4	160,843	21.0	194,621	14.6	223,070	9.1	243,456	12.6	274,169	14.3	8.4
5	159,828	37.4	219,563	25.6	275,802	24.0	342,070	17.2	400,824	25.8	12.3
6A	120,362	30.9	157,549	22.9	193,582	20.0	232,267	14.2	265,263	21.8	8.1
7	201,126	28.1	257,698	23.2	317,598	23.7	393,013	15.3	453,319	22.5	13.9
8	147,395	21.1	178,530	18.8	212,176	24.2	263,529	20.7	318,008	21.2	9.7
9	43,466	19.2	51,830	20.2	62,290	34.5	83,759	31.3	110,003	26.1	3.4
10	57,999	27.8	74,099	29.4	95,887	32.3	126,889	30.1	165,102	29.9	5.1
11	51,089	33.2	68,063	17.3	79,807	20.9	96,491	40.8	135,858	27.7	4.2
12	84,193	17.0	98,520	14.5	112,810	24.4	140,307	18.0	165,584	18.4	5.1
13	76,037	18.8	90,325	17.3	105,923	21.6	128,804	16.8	150,502	18.6	4.6
14	66,419	15.0	76,369	13.7	86,859	17.3	101,905	20.8	123,075	16.7	3.8
15	67,747	16.6	78,979	14.5	90,435	15.5	104,464	22.7	128,164	17.3	3.9
TOTAL	1,546,336	23.2	1,904,709	19.0	2,266,237	20.8	2,738,303	19.1	3,261,463	20.5	100.0

(1) Percent of total commuter transactions by entering interchange for 1987.

ranked second in total volume with just over 400,000 commuter transactions during the same year. Commuter transactions have shown strong growth by interchange, as the percent increase from 1983 to 1987 ranged from 14.3 percent to 29.9 percent.

Commuter transaction trends grouped by Maine Turnpike movement is presented in Table 3. The commuter movements are defined as all of those commuter trips between interchange pair, in both directions. As can be seen from this table, the highest individual volume is the commuter movement between Interchanges 5 and 6A, which exceeded 275,000 during 1987. The second highest commuter movement is between Interchanges 14 and 15, which showed a volume of over 220,000 during the same year. Both of these commuter movements were also the two highest in 1983, which shows that the study interchange pairs increase in commuter transactions is spread across the entire Turnpike Corridor.

Commuter Pass Sales and Revenue

A summary of commuter pass sales trends by quarter is presented in Table 4. The number of commuter pass sales on a yearly basis has increased rapidly, ranging from 17.3 percent between 1984 and 1985 to over 21 percent between 1986 and 1987. Judging from the strong increase in commuter program membership, it would appear that many Turnpike travelers are taking advantage of the excellent savings they are entitled to as frequent users of the facility. For the first time since the inception of the commuter program, the number of commuter passes sold has exceeded 9,000 during the fourth quarter of 1987.

Revenue collected from commuter patrons has also shown a strong increase from year to year. Table 5 presents commuter

Table 3
COMMUTER TRANSACTION TRENDS BY TURNPIKE MOVEMENT

COMMUTER MOVEMENT(1)	COMMUTER TRANSACTIONS 1983	Percent Change	1984	Percent Change	1985	Percent Change	1986	Percent Change	1987	AVERAGE ANNUAL PERCENT CHANGE 1983 - 1987	PERCENT OF TOTAL(2)
1 - 2	75,516	18.3	89,368	16.3	103,971	36.0	141,377	29.9	183,709	24.9	5.6
1 - 3	33,640	12.1	37,711	12.8	42,541	22.8	52,242	25.4	65,506	18.1	2.0
1 - 4	61,434	4.6	64,245	6.8	68,590	2.1	70,053	7.5	75,294	5.2	2.3
1 - 5	28,982	11.7	32,387	8.2	35,035	8.4	37,968	33.5	50,692	15.0	1.6
1 - 6A	19,873	7.5	21,363	49.3	31,902	(6.0)	29,999	24.8	37,445	17.2	1.2
1 - 7	28,316	(4.0)	27,180	(8.7)	24,822	16.6	28,937	12.5	32,555	3.5	1.0
1 - 8	7,840	(8.3)	7,188	15.8	8,323	65.1	13,745	6.2	14,596	16.8	0.4
1 - 9	422	142.9	1,025	104.6	2,097	(36.5)	1,331	111.9	2,820	60.8	0.1
1 - 10	1,983	(41.4)	1,162	76.5	2,051	55.8	3,196	11.8	3,572	15.9	0.1
1 - 11	1,045	(20.6)	830	27.0	1,054	50.6	1,587	9.6	1,740	13.6	0.1
1 - 12	1,523	(59.0)	624	95.0	1,217	36.6	1,663	(37.0)	1,047	(9.8)	0.0
2 - 3	2,487	4.5	2,599	87.2	4,865	3.9	5,053	30.9	6,613	27.7	0.2
2 - 4	34,805	38.2	48,109	14.5	55,069	5.0	57,842	0.7	58,254	13.7	1.8
2 - 5	20,369	9.7	22,352	29.1	28,854	9.8	31,672	9.8	34,775	14.3	1.1
2 - 6A	20,608	27.8	26,341	(0.1)	26,320	15.4	30,384	17.5	35,703	14.7	1.1
2 - 7	22,894	15.1	26,349	29.1	34,020	11.4	37,901	6.8	40,494	15.3	1.3
2 - 8	4,128	52.7	6,302	(8.9)	5,743	30.0	7,464	19.4	8,915	21.2	0.3
2 - 10	1,202	(11.2)	1,067	(29.7)	750	(10.8)	669	104.5	1,368	3.3	0.0
3 - 4	25,230	7.6	27,155	(7.8)	25,044	(9.4)	22,688	(11.5)	20,089	(5.9)	0.6
3 - 5	20,685	24.5	25,755	9.2	28,114	23.6	34,741	16.9	40,606	18.4	1.2
3 - 6A	40,703	26.1	51,345	10.5	56,760	14.5	64,986	8.5	70,501	14.7	2.2
3 - 7	38,929	18.5	46,134	18.9	54,855	10.9	60,861	13.7	69,189	15.5	2.1
3 - 8	7,311	33.1	9,731	34.8	13,115	2.7	13,475	6.3	14,319	18.3	0.5
3 - 10	340	(27.6)	246	239.4	835	89.7	1,584	76.6	2,798	69.4	0.1
3 - 11	222	101.4	447	108.5	932	(33.3)	622	(4.7)	593	27.8	0.0
3 - 12	554	63.2	904	(42.8)	517	15.1	595	56.3	930	13.8	0.0
3 - 13	153	168.6	411	(10.9)	366	27.6	467	(15.6)	394	26.7	0.0
4 - 5	26,633	32.8	35,369	9.3	38,675	4.1	40,262	29.4	52,080	18.3	1.6
4 - 6A	72,290	23.9	89,536	17.0	104,713	16.6	122,120	14.1	139,368	17.8	4.3
4 - 7	69,952	19.5	83,604	25.0	104,515	21.7	127,170	9.7	139,475	18.8	4.3
4 - 8	20,536	37.4	28,215	7.1	30,215	(3.7)	29,097	35.2	39,332	17.6	1.2
4 - 9	721	65.3	1,192	(13.8)	1,028	52.2	1,565	114.2	3,353	46.9	0.1
4 - 10	2,030	2.0	2,070	82.1	3,770	55.6	5,868	31.5	7,717	39.6	0.2
4 - 12	2,036	(33.3)	1,359	(25.5)	1,012	126.4	2,291	(3.9)	2,202	2.0	0.1
4 - 13	1,011	(22.0)	789	36.2	1,075	(11.1)	956	(0.4)	952	(1.5)	0.0

Table 3 (Cont'd)
COMMUTER TRANSACTION TRENDS BY TURNPIKE MOVEMENT

COMMUTER MOVEMENT(1)	COMMUTER TRANSACTIONS									AVERAGE ANNUAL PERCENT CHANGE 1983 - 1987	PERCENT OF TOTAL(2)
		Percent 1983	Change	Percent 1984	Change	Percent 1985	Change	Percent 1986	Change		
5 - 6A	99,067	43.8	142,486	23.8	176,386	34.9	237,906	15.6	275,041	29.1	8.5
5 - 7	67,180	66.4	111,789	25.3	140,115	27.3	178,316	8.4	193,340	30.2	5.9
5 - 8	35,824	22.3	43,795	35.7	59,420	20.0	71,311	12.3	80,060	22.3	2.5
5 - 9	459	(9.4)	416	426.2	2,189	202.8	6,629	38.0	9,147	111.3	0.3
5 - 10	5,204	5.0	5,464	3.9	5,678	93.3	10,973	118.7	23,993	46.5	0.7
5 - 11	2,287	(36.2)	1,460	146.7	3,602	50.2	5,409	8.1	5,847	26.4	0.2
5 - 12	1,565	35.7	2,123	(22.7)	1,641	130.5	3,783	11.9	4,235	28.3	0.1
5 - 13	873	82.2	1,591	41.5	2,252	29.1	2,908	(11.2)	2,583	31.2	0.1
7 - 8	98,899	19.2	117,914	11.9	131,994	25.5	165,647	14.8	190,130	17.8	5.8
7 - 9	868	56.6	1,359	134.9	3,192	278.2	12,071	14.5	13,823	99.8	0.4
7 - 10	32,248	27.6	41,092	39.3	57,221	35.3	77,429	27.7	98,900	32.3	3.0
7 - 11	22,862	48.2	33,872	31.2	44,439	32.8	59,008	45.1	85,646	39.1	2.6
7 - 12	16,009	45.0	23,207	22.8	28,507	20.2	34,257	15.6	39,597	25.4	1.2
7 - 13	10,175	36.4	13,883	37.5	19,086	26.6	24,166	18.3	28,588	29.5	0.9
8 - 9	65,331	13.8	74,333	13.4	84,307	30.2	109,733	26.4	138,675	20.7	4.3
8 - 10	16,636	21.5	20,220	31.7	26,639	7.3	28,576	34.1	38,316	23.2	1.2
8 - 11	21,986	36.6	30,042	25.7	37,753	35.5	51,167	30.6	66,845	32.0	2.1
8 - 12	13,852	7.9	14,951	23.6	18,477	39.7	25,818	31.4	33,916	25.1	1.0
8 - 13	9,476	23.5	11,704	45.1	16,978	25.9	21,382	14.2	24,416	26.7	0.8
9 - 10	2,165	73.7	3,760	73.2	6,514	39.9	9,114	33.7	12,188	54.0	0.4
9 - 11	7,081	55.1	10,982	(5.6)	10,371	(14.5)	8,865	88.1	16,677	23.9	0.5
9 - 12	8,258	2.2	8,442	6.8	9,016	20.3	10,847	23.8	13,431	12.9	0.4
9 - 13	1,320	71.1	2,258	6.3	2,400	81.9	4,366	54.4	6,741	50.3	0.2
10 - 11	19,130	13.4	21,687	12.9	24,488	15.5	28,290	50.1	42,464	22.1	1.3
10 - 12	21,210	39.4	29,575	19.8	35,420	35.4	47,949	21.6	58,313	28.8	1.8
10 - 13	13,171	53.3	20,186	25.1	25,262	41.8	35,827	(2.1)	35,089	27.8	1.1
11 - 12	6,203	34.1	8,321	(8.5)	7,614	25.4	9,548	22.7	11,716	17.2	0.4
11 - 13	11,476	17.5	13,486	15.4	15,566	(8.6)	14,234	48.4	21,120	16.5	0.6
11 - 15	3,183	49.0	4,742	(17.8)	3,898	(9.0)	3,548	3.3	3,664	3.6	0.1
12 - 13	88,725	7.8	95,634	12.2	107,285	18.8	127,505	13.8	145,110	13.1	4.5
12 - 14	3,155	45.2	4,581	(5.3)	4,338	15.4	5,007	55.8	7,801	25.4	0.2
12 - 15	5,478	34.3	7,358	17.1	8,617	(17.2)	7,138	68.8	12,046	21.8	0.4
13 - 14	2,917	6.1	3,094	38.7	4,292	37.8	5,915	29.9	7,681	27.4	0.2
13 - 15	9,366	52.5	14,281	20.0	17,133	14.7	19,656	29.9	25,531	28.5	0.8
14 - 15	121,626	13.6	138,117	14.5	158,145	16.7	184,611	20.4	222,274	16.3	6.8
TOTAL(2)	1,541,668		1,898,669		2,243,000		2,731,340		3,253,940		

(1) Only commuter transaction totals by Turnpike movement of more than an average of one per day for each year is presented.

(2) Percent of total commuter transactions by Turnpike movement from 1987.

Table 4

COMMUTER PASS SALES BY QUARTER

COMMUTER QUARTER	1984 PASSES ISSUED	PERCENT CHANGE	1985 PASSES ISSUED	PERCENT CHANGE	1986 PASSES ISSUED	PERCENT CHANGE	1987 PASSES ISSUED	AVERAGE ANNUAL PERCENT CHANGE 1984 - 1987
February	4,681	17.6	5,506	18.8	6,540	23.6	8,082	20.0
May	4,614	19.3	5,503	22.3	6,730	19.3	8,029	20.3
August	4,828	15.8	5,592	23.6	6,914	19.9	8,290	19.7
November	5,338	16.7	6,231	19.6	7,453	22.7	9,143	19.6
TOTAL(1)	19,461	17.3	22,832	21.0	27,637	21.4	33,544	19.9

(1) Yearly commuter pass sales actually represent a yearly total from December 1 to November 30.

Table 5

COMMUTER REVENUE TREND BY QUARTER

COMMUTER QUARTER	1984 COMMUTER REVENUE	PERCENT CHANGE	1985 COMMUTER REVENUE	PERCENT CHANGE	1986 COMMUTER REVENUE	PERCENT CHANGE	1987 COMMUTER REVENUE	AVERAGE ANNUAL PERCENT CHANGE 1984 - 1987
February	$ 108,850	18.3	$128,794	17.8	$151,658	24.2	$188,422	20.1
May	104,478	22.3	127,737	21.8	155,595	19.7	186,230	21.2
August	113,067	14.7	129,706	24.0	160,810	20.7	194,039	19.7
November	124,204	16.3	144,452	20.2	173,577	23.0	213,420	19.8
TOTAL(1)	$ 450,599	17.8	$530,689	20.9	$641,640	21.9	[redacted]	20.2

(1) Yearly commuter revenue totals actually represent a yearly total from December 1 to November 30.

revenue trends by quarter from 1984 to 1987. The commuter revenue is based on the total number of commuter passes sold for each interchange movement. As can be seen from this table, the average increase by quarter ranges from just under 18 percent between 1984 and 1985 to approximately 22 percent between 1986 and 1987. Revenue collected from commuter pass sales between December 1, 1986, and February 28, 1987, totaled over $782,000, as compared to over $450,000 in revenue during the same four quarters in 1984.

Commuter Usage Profile

An analysis was undertaken to determine the actual commuter trip usage on the Maine Turnpike. Presented in Table 6 is the commuter usage profile on the Turnpike, which is based on the fourth quarter of 1987; the period from December 1, 1987 to February 28, 1988. Each individual commuter movement was plotted to determine the actual percentage of commuter trips being utilized per pass.

As can be seen, each commuter movement is broken down and categorized by the number of commuter passes sold for that particular trip and the total number of theoretical commuter trips this covers, based on nominal levels of 126 trips per pass (42 trips/month). In order to define the total commuter revenue for the quarter analyzed, a straight multiplication of the quarterly pass charge and the number of commuter passes sold was performed.

The actual number of commuter trips per pass was calculated by dividing the actual number of commuter trips by the number of commuter passes sold. A percentage of actual commuter trips was then developed by dividing the number of actual commuter trips

Table 6
COMMUTER USAGE PROFILE
December 1987 - February 1988

COMMUTER MOVEMENT	NUMBER OF COMMUTER PASSES SOLD (1)	TOTAL THEORETICAL COMMUTER TRIPS	QUARTERLY PASS CHARGE	TOTAL COMMUTER REVENUE	ACTUAL COMMUTER TRIPS			REVENUE PER ACTUAL COMMUTER TRANSACTION
					Total Trips	Trips Per Pass	Percent of Theoretical Trips	
1 - 2	517	65,142	$18.90	$9,771	51,312	99	78.8	$0.19
1 - 3	187	23,562	25.20	4,712	18,232	97	77.4	0.26
1 - 4	192	24,192	31.50	6,048	19,420	101	80.3	0.31
1 - 5	135	17,010	40.95	5,528	12,818	95	75.4	0.43
1 - 6A	132	16,632	56.70	7,484	10,823	82	65.1	0.69
1 - 7	109	13,734	56.70	6,180	8,899	82	64.8	0.69
1 - 8	41	5,166	63.00	2,583	3,496	85	67.7	0.74
1 - 9	9	1,134	78.75	709	539	60	47.5	1.31
1 - 10	10	1,260	72.45	725	993	99	78.8	0.73
1 - 11	5	630	81.90	410	374	75	59.4	1.09
1 - 12	4	504	94.50	378	271	68	53.8	1.39
2 - 3	19	2,394	9.45	180	1,757	92	73.4	0.10
2 - 4	129	16,254	12.60	1,625	14,060	109	86.5	0.12
2 - 5	105	13,230	22.05	2,315	9,641	92	72.9	0.24
2 - 6A	88	11,088	37.80	3,326	8,213	93	74.1	0.41
2 - 7	110	13,860	37.80	4,158	10,810	98	78.0	0.38
2 - 8	26	3,276	44.10	1,147	2,389	92	72.9	0.48
2 - 9	4	504	59.85	239	406	102	80.6	0.59
2 - 10	9	1,134	53.55	482	606	67	53.4	0.80
2 - 11	2	252	63.00	126	131	66	52.0	0.96
2 - 12	3	378	75.60	227	167	56	44.2	1.36
3 - 4	57	7,182	9.45	539	4,903	86	68.3	0.11
3 - 5	134	16,884	15.75	2,111	12,489	93	74.0	0.17
3 - 6A	204	25,704	31.50	6,426	18,322	90	71.3	0.35
3 - 7	183	23,058	31.50	5,765	18,506	101	80.3	0.31
3 - 8	35	4,410	37.80	1,323	3,079	88	69.8	0.43
3 - 9	2	252	53.55	107	212	106	84.1	0.51
3 - 10	14	1,764	47.25	662	1,116	80	63.3	0.59
3 - 11	2	252	56.70	113	201	101	79.8	0.56
3 - 12	2	252	69.30	139	133	67	52.8	1.04
3 - 13	2	252	78.75	158	172	86	68.3	0.92

Table 6 (Cont'd)
COMMUTER USAGE PROFILE
December 1987 - February 1988

COMMUTER MOVEMENT	NUMBER OF COMMUTER PASSES SOLD (1)	TOTAL THEORETICAL COMMUTER TRIPS	QUARTERLY PASS CHARGE	TOTAL COMMUTER REVENUE	ACTUAL COMMUTER TRIPS			REVENUE PER ACTUAL COMMUTER TRANSACTION
					Total Trips	Trips Per Pass	Percent of Theoretical Trips	
4 - 5	165	20,790	9.45	1,559	13,752	83	66.1	0.11
4 - 6A	370	46,620	25.20	9,324	36,176	98	77.6	0.26
4 - 7	357	44,982	25.20	8,996	36,379	102	80.9	0.25
4 - 8	104	13,104	31.50	3,276	10,605	102	80.9	0.31
4 - 9	13	1,638	47.25	614	899	69	54.9	0.68
4 - 10	21	2,646	40.95	860	1,924	92	72.7	0.45
4 - 11	5	630	50.40	252	452	90	71.7	0.56
4 - 12	8	1,008	63.00	504	601	75	59.6	0.84
4 - 13	2	252	72.45	145	155	78	61.5	0.93
5 - 6A	795	100,170	15.75	12,521	78,419	98	78.1	0.16
5 - 7	518	65,268	15.75	8,159	54,802	106	84.0	0.15
5 - 8	243	30,618	22.05	5,358	22,005	91	71.9	0.24
5 - 9	34	4,284	37.80	1,285	2,603	77	60.8	0.49
5 - 10	81	10,206	31.50	2,552	6,646	82	65.1	0.38
5 - 11	26	3,276	40.95	1,065	1,878	72	57.3	0.57
5 - 12	17	2,142	53.55	910	1,289	76	60.2	0.71
5 - 13	14	1,764	63.00	882	837	60	47.4	1.05
7 - 8	467	58,842	9.45	4,413	47,381	101	80.5	$0.09
7 - 9	62	7,812	18.90	1,172	4,706	76	60.2	0.25
7 - 10	274	34,524	15.75	4,316	25,432	93	73.7	0.17
7 - 11	259	32,634	34.65	8,974	24,637	95	75.5	0.36
7 - 12	127	16,002	47.25	6,001	11,891	94	74.3	0.50
7 - 13	81	10,206	56.70	4,593	8,047	99	78.8	0.57
8 - 9	434	54,684	15.75	6,836	39,839	92	72.9	0.17
8 - 10	108	13,608	9.45	1,021	9,718	90	71.4	0.11
8 - 11	203	25,578	18.90	3,837	19,574	96	76.5	0.20
8 - 12	113	14,238	34.65	3,915	9,819	87	69.0	0.40
8 - 13	86	10,836	40.95	3,522	7,832	91	72.3	0.45
8 - 14	1	126	69.30	69	93	93	73.8	0.75
8 - 15	2	252	78.75	158	105	53	41.7	1.50
9 - 10	46	5,796	9.45	435	3,723	81	64.2	0.12
9 - 11	60	7,560	18.90	1,134	5,291	88	70.0	0.21
9 - 12	36	4,536	34.65	1,247	3,559	99	78.5	0.35
9 - 13	27	3,402	40.95	1,106	2,585	96	76.0	0.43

Table 6 (Cont'd)
COMMUTER USAGE PROFILE
December 1987 - February 1988

COMMUTER MOVEMENT	NUMBER OF COMMUTER PASSES SOLD (1)	TOTAL THEORETICAL COMMUTER TRIPS	QUARTERLY PASS CHARGE	TOTAL COMMUTER REVENUE	ACTUAL COMMUTER TRIPS			REVENUE PER ACTUAL COMMUTER TRANSACTION
					Total Trips	Trips Per Pass	Percent of Theoretical Trips	
10 - 11	127	16,002	12.60	1,600	12,216	96	76.3	0.13
10 - 12	182	22,932	28.35	5,160	17,955	99	78.3	0.29
10 - 13	106	13,356	34.65	3,673	10,336	98	77.4	0.36
10 - 15	2	252	72.45	145	45	23	17.9	3.22
11 - 12	51	6,426	15.75	803	4,187	82	65.2	0.19
11 - 13	68	8,568	22.05	1,499	6,288	92	73.4	0.24
11 - 14	3	378	50.40	151	286	95	75.7	0.53
11 - 15	15	1,890	59.85	898	1,147	76	60.7	0.78
12 - 13	401	50,526	9.45	3,789	37,734	94	74.7	0.10
12 - 14	26	3,276	34.65	901	2,309	89	70.5	0.39
12 - 15	43	5,418	44.10	1,896	3,501	81	64.6	0.54
13 - 14	18	2,268	28.35	510	1,928	107	85.0	0.26
13 - 15	77	9,702	37.80	2,911	6,789	88	70.0	0.43
14 - 15	681	85,806	15.75	10,726	61,738	91	72.0	0.17
TOTAL	9,430	1,188,180		$221,369	894,603	95	75.3	$0.25

(1) Commuter usage profile analysis quarter time period from December 1, 1987 to February 29, 1988.

by the total number of allowable trips. For informational purposes, the average revenue per actual commuter trip was then calculated by dividing the quarterly pass charge for each commuter movement by the actual number of trips per pass.

As shown in Table 6, the total number of commuter passes issued during this quarter was 9,430, which generated $221,359 in commuter revenue. Evaluating the total commuter movements on the Turnpike shows that an average of 95 of the 126 theoretical trips per commuter pass are presently being used, accounting for slightly more than 75 percent of the nominal level used in computing quarterly pass charges. This results in an average actual revenue per commuter transaction of $0.25.

Clearly the utilization rate per pass also affects the effective rate of discount when compared with normal Class 1 cash fares. The weighted equivalent cash toll of vehicles making commuter transactions is estimated at $0.465. When compared with the actual revenue per commuter transaction at $0.248, the effective average rate of discount is 46.8 percent (as compared with the nominal 60 percent).

In essence, the summary shown in Table 6 clearly indicates that while a limited number of commuter patrons may be making more than the nominal 126 trips per quarter, the "unlimited trips" nature of the existing commuter plan is not suffering from widespread abuse, and overall average usage levels are considerably below theoretical values. It also shows, however, that a reasonably high proportion of commuter patrons may not be in the very high frequency commuter category. This is due to the fact that with a nominal 60 percent rate of discount, the break even point is generally in the range of 50 trips per quarter, depending on commuter movement. This is equivalent to

less than 17 trips per month, or about four trips per week.

Valid Trip Profile

A key objective of this Commuter Plan Study is to determine the extent to which program utilization would increase through increased liberalization of plan restrictions. One measure of this is the proportion of valid commuter trips being made; i.e., trips between interchanges listed on the actual commuter card. As noted above, holders of commuter cards are only eligible for toll-free travel if the movement is made between the two authorized interchanges. Motorists must pay the full cash Class 1 fare for any other movements on the Turnpike.

A major travel pattern and characteristic survey was undertaken on the Maine Turnpike by Wilbur Smith Associates in August 1988. During the course of this mailback survey, in addition to other information, motorists were asked if they were currently participating in the Turnpike Authority commuter program, the interchanges for which they were eligible and the actual interchanges of entry and exit during the trip underway at the time of the interview. By relating the actual trip pattern to the indicated eligible interchanges, it was possible to determine the proportion of commuter trips being made which were proper movements.

As shown in Table 7, after factoring survey results, 12,441 average daily movements were made by patrons holding commuter cards. Of these, 9,931, or 79.8 percent, were found to be made for valid interchange pairs. The remaining 2,510, or 20.2 percent, indicated they were using an entering and/or exiting interchange which did not agree with the interchange pair indicated on the commuter card. Had the program been designed

Table 7

COMMUTER VALID TRIP PROFILE

1988 Travel Pattern Surveys

COMMUTER MOVEMENT(1)	TOTAL NUMBER IN PROGRAM	VALID COMMUTER TRIPS(2)		INVALID TRIPS(2)	
		Number	Percent of Total	Number	Percent of Total
1-2	502	454	90.4	48	9.6
1-3	276	233	84.4	43	15.6
1-4	253	217	85.8	36	14.2
1-5	147	113	76.9	34	23.1
1-6A	97	73	75.3	24	24.7
1-7	163	143	87.7	20	12.3
1-8	49	39	79.6	10	20.4
1-9	17	11	64.7	6	35.3
1-10	9	9	100.0	0	0.0
1-11	9	9	100.0	0	0.0
1-12	4	4	100.0	0	0.0
2-3	12	6	50.0	6	50.0
2-4	133	111	83.5	22	16.5
2-5	84	78	92.9	6	7.1
2-6A	94	74	78.7	20	21.3
2-7	128	96	75.0	32	25.0
2-8	9	9	100.0	0	0.0
2-10	22	16	72.7	6	27.3
3-4	77	57	74.0	20	26.0
3-5	149	93	62.4	56	37.6
3-6A	284	203	71.5	81	28.5
3-7	344	286	83.1	58	16.9
3-8	39	30	76.9	9	23.1
3-10	31	22	71.0	9	29.0
3-11	6	4	66.7	2	33.3
3-12	12	9	75.0	3	25.0
3-13	5	5	100.0	0	0.0
4-5	174	131	75.3	43	24.7
4-6A	478	352	73.6	126	26.4
4-7	642	510	79.4	132	20.6
4-8	114	75	65.8	39	34.2
4-9	18	12	66.7	6	33.3
4-10	62	39	62.9	23	37.1
4-12	3	3	100.0	0	0.0
4-13	4	4	100.0	0	0.0
5-6A	889	582	65.5	307	34.5
5-7	924	745	80.6	179	19.4
5-8	191	159	83.2	32	16.8
5-9	43	25	58.1	18	41.9

(continued)

Table 7 (cont'd)

COMMUTER VALID TRIP PROFILE

1988 Travel Pattern Surveys

COMMUTER MOVEMENT(1)	TOTAL NUMBER IN PROGRAM	VALID COMMUTER TRIPS(2) Number	VALID COMMUTER TRIPS(2) Percent of Total	INVALID TRIPS(2) Number	INVALID TRIPS(2) Percent of Total
5-10	131	91	69.5	40	30.5
5-11	17	14	82.4	3	17.6
5-12	18	15	83.3	3	16.7
5-13	7	7	100.0	0	0.0
6-6A	3	3	100.0	0	0.0
6-7	6	6	100.0	0	0.0
6-8	5	5	100.0	0	0.0
7-8	724	646	89.2	78	10.8
7-9	36	34	94.4	2	5.6
7-10	720	605	84.0	115	16.0
7-11	519	381	73.4	138	26.6
7-12	295	246	83.4	49	16.6
7-13	172	143	83.1	29	16.9
7-15	6	6	100.0	0	0.0
8-9	329	298	90.6	31	9.4
8-10	167	130	77.8	37	22.2
8-11	219	191	87.2	28	12.8
8-12	131	92	70.2	39	29.8
8-13	107	86	80.4	21	19.6
9-10	75	54	72.0	21	28.0
9-11	64	53	82.8	11	17.2
9-12	36	30	83.3	6	16.7
9-13	21	14	66.7	7	33.3
10-11	240	158	65.8	82	34.2
10-12	294	253	86.1	41	13.9
10-13	212	159	75.0	53	25.0
11-12	33	17	51.5	16	48.5
11-13	60	57	95.0	3	5.0
11-15	22	17	77.3	5	22.7
12-13	476	396	83.2	80	16.8
12-14	29	25	86.2	4	13.8
12-15	58	45	77.6	13	22.4
13-14	13	13	100.0	0	0.0
13-15	63	53	84.1	10	15.9
14-15	636	547	86.0	89	14.0
TOTAL	12,441	9,931	79.8	2,510	20.2

(1) As denoted on commuter pass.
(2) Trip at time of survey.

to enable motorists to use any interchanges between a given pair, the proportion of trips being "valid" would increase by 5 to 6 percent. Even so, about 10 percent of the total trips would still be made for movements not covered by the interchanges on the commuter pass.

Trip Frequency Distribution

In the same August surveys, motorists were asked the number of times per week each trip was made, in the direction of travel underway at the time of the survey. The responses were correlated to payment type for passenger car transactions. As shown in Table 8, 60.3 percent of those passenger car motorists tendering cash indicated they traveled less than once per week on the Turnpike. Less than 10 percent responded that they travel five or more times per week. By contrast, over 88 percent of those using the commuter plan traveled five or more times per week, as might be expected.

Predictably, the percentage of total passenger car transactions made using commuter passes increases sharply as the trip frequency increases. Less than 1 percent of the motorists indicating a trip frequency of one or less per week were in the commuter plan program. Of those making five trips per week, 53.5 percent were using the commuter cards. Almost 42 percent of those traveling six or more times per week used commuter cards.

It would seem logical that a higher proportion of passenger car motorists in the high trip frequency categories would be in the commuter program, recognizing the 60 percent discount rate. However, based on the survey results, only about half of these frequent users actually participate.

Table 8

TRIP FREQUENCY DISTRIBUTION

Passenger Cars

PAYMENT TYPE	TRIPS PER WEEK: Less Than One	One	Two	Three	Four	Five	Six or More	TOTAL
	(percent of total)							
Cash	60.3	20.0	6.1	3.8	1.7	5.5	2.6	100.0
Commuter	1.8	2.0	1.4	2.5	4.0	69.5	18.8	100.0
TOTAL	53.4	18.1	5.6	3.7	2.0	12.8	4.4	100.0
Percent Commuter	0.3	1.1	2.5	6.5	19.7	53.5	41.6	9.8

NOTE: Based on August 1988 travel pattern and characteristic surveys.

Again, it is important to recognize that surveys were conducted in August, when there are a large number of short-term seasonal visitors in the Turnpike corridor. Many of these visitors do travel with relatively high frequency during concentrated vacation stays while not choosing to participate in the quarterly commuter program. On an annual basis, it is likely that the proportion of high frequency passenger trips made by commuters is slightly higher than that shown in Table 8, although it is not unreasonable to assume that the year round average is 60 percent or less.

Trip Purpose Distribution

Table 9 presents a summary of the relative trip purpose distribution observed during the August surveys for passenger car motorists tendering cash or using commuter cards. Recreation trips represented 33.9 percent of the total of those motorists using cash, clearly influenced by the fact that the surveys were conducted during the peak tourist season. Social trips comprised 17.9 percent of cash passenger car trips, followed by 16.9 percent for personal business, 14.5 percent for company business, and only 9.8 percent for travel to and from work.

By contrast, 90.2 percent of motorists responding to the survey who indicated they were using a commuter card were traveling to or from work. An additional 3.6 percent were traveling for company business and just over 6 percent of commuters were traveling for all other trip purposes combined.

Commuter transactions represented 47.0 percent of trips to and from work and 6.5 percent of school trips. Commuters represented less than 2 percent of all other trip purposes.

Table 9

TRIP PURPOSE DISTRIBUTION

Passenger Cars

PAYMENT TYPE	TRIP PURPOSE							
	To/From Work	Company Business	Personal Business	School	Shopping	Recreation	Social	TOTAL
	(percent of total)							
Cash	9.8	14.5	16.9	1.1	5.9	33.9	17.9	100.0
Commuter	90.2	3.6	2.5	0.7	0.8	1.1	1.1	100.0
TOTAL	18.9	13.4	15.4	1.1	5.4	29.9	15.9	100.0
Percent Commuter	47.0	2.6	1.6	6.5	1.5	0.4	0.7	9.8

NOTE: Based on August 1988 travel pattern and characteristic surveys.

Overall, based on the factored survey response, commuter transactions represented about 9.8 percent of total passenger car transactions. This compares well with the actual experience of about 10.1 percent.

Chapter 3
ALTERNATE COMMUTER PLAN OPTIONS

A number of different commuter plans were identified and evaluated as to their overall effectiveness in liberalizing the existing commuter program on the Turnpike. The current plan is somewhat limited in that two specific interchanges must be selected for use by a motorist who wants to pay the discounted commuter rate. If a movement other than the selected interchange pair is made, the commuter must pay the full fare. Thus, five potential commuter plan options were selected in this study to be analyzed with the ultimate goal of increasing commuter usage on the Turnpike. Each option was evaluated with respect to the following criteria:

Average Daily Traffic Impacts - Liberalization of the existing commuter plan is expected to divert some percentage of traffic currently using competing routes onto the Turnpike. The U.S. Route 1 survey data obtained from the Maine Department of Transportation was important in analyzing this impact, as Route 1 is a primary competing route to the Turnpike. In some instances, some motorists might actually divert off the Turnpike, in cases where the new commuter plan increased toll costs.

Annual Toll Revenue Impacts - For each of the five new commuter options, revenue impacts were analyzed for three market segment shifts. The first of these was a revenue shift from current commuters opting to stay in the new program, but now charged a different amount for their commuter pass. In most instances, a revenue loss was experienced here.

The second revenue shift experienced was from those

motorists anticipated to switch from cash payment to the new commuter program. Again, a revenue loss was experienced in this case. In some instances, a small percentage of motorists were assumed to switch from the commuter program to the cash system, and in those situations, an incremental revenue gain was experienced.

The third revenue impact would come from motorists currently traveling on an alternate route who are expected to divert to the Turnpike with the implementation of a more liberalized commuter program. In these cases, a revenue gain is, of course, recognized. The overall revenue impact resulting from these various shifts was than quantified on a systemwide basis.

Cash Flow Impact - One revenue advantage to the Authority of the commuter program is that commuter payments are made in advance and the Authority receives this revenue earlier than had the money been deposited on a transaction by transaction basis. As such, the greater the participation in the commuter program, the greater opportunity for increases in reinvestment income.

Accountability of Commuter Programs - Under any toll scheme or commuter plan, there exists some opportunity for evasion or dishonesty, either on the part of the motorist or the toll attendant. The actual degree to which this may occur is the important factor; each of the five options was evaluated with respect to this component.

Public Acceptance and Patron Convenience - It is important that the new commuter program meet the public's acceptance. Among other things, the program should be unambiguous, with commuters easily being able to understand the various options they have available. Patron convenience is another important

factor. Most motorists using the commuter program are traveling to or from work and have neither the time nor patience to be inconvenienced by any flaws the program may have.

Operational Considerations - As a final criterion, any operational problems anticipated with the new commuter options were highlighted and analyzed as to their seriousness and potential impacts on the program.

Alternative Commuter Plan Options Studied

As discussed above, five general alternative commuter plan modifications were evaluated as part of the study. Each of these options were developed assuming the toll collection system on a majority of the Turnpike remains a closed ticket system. Each of the programs would also work within existing technological limitations on the toll collection equipment, utilizing a commuter card program.

This study evaluated variations in commuter program parameters such as increasing the number of eligible plazas, increasing the validity time period for the commuter plan, and possibly moving toward a combination card/discounted cash fare program. Two of the alternatives included a pair of sub-options, making a total of 7 overall possible modified plans.

The alternative commuter plan concepts to be studied were identified following discussions with Authority staff and review of study objectives. Plans analyzed include:

1. Alternative A - Inclusive Interchange Plan - Under this program modification, commuters would be permitted toll-free travel between the two interchanges indicated on the commuter card, as with the current plan, plus any intermediate interchanges between the interchanges shown on the card. For example, a commuter pass valid between Interchanges 3 and 8 would also be valid at Interchanges 4, 5, 6A and 7.

2. Alternative B - Adjacent Interchange Plan - This concept would be similar to Alternative A except that the number of eligible interchanges would be increased only to include those interchanges immediately adjacent to the interchanges shown on the card. For purposes of analysis, the newly eligible interchanges were assumed to include only those interchanges within the interchange pair. That is, motorists would not be able to make trips longer than that provided by the commuter movement, but would be able to use the adjacent interchanges falling within the pair of interchanges indicated on the card. For example, a card valid between Interchanges 3 and 8 would also be acceptable at Interchanges 4 and 7.

3. Alternative C - Countywide Commuter Card Plan - Under this program, commuters would purchase commuter cards which would be valid for all interchanges within a particular county. If there are four commuter movements which crossed county lines, a double cash county pass would be provided. The two cash county pass would, of course, have a higher cost although this study assumed the cost increment would be less than the cost of two individual countywide passes.

4. Alternative D - Annual Commuter Card Plan - Under this alternative, commuter cards would be issued annually. This would act to reduce Authority operating costs and minimize patron inconvenience. This plan was analyzed under two sub-options:

   - Without a toll charge per trip; and
   - With a discounted toll charge per trip.

   Without a toll charge per trip, the cost of an annual card would be significant as compared to the present cost. The purpose of considering a discounted trip program would be to permit use of the existing card rate supplemented by a per-transaction discounted toll to arrive at total annual revenue equivalent to that now being generated.

5. Alternative E - Turnpike-Wide Commuter Plan - Under this program a single commuter pass would be issued and would be valid at all interchanges on the Maine Turnpike. This program would have maximum flexibility of all those studied. It was evaluated under two options, with and without a discounted toll per transaction.

   After preliminary analysis, the option of a Turnpike-wide card without a toll charge per trip was dropped from further consideration. Annual toll revenue impacts would be prohibitive, with the majority of residents anywhere in the vicinity of the Turnpike probably electing to purchase an annual commuter card for free usage of the entire Turnpike.

Under the modified Alternate E, a more reasonable annual card cost would be assessed, coupled with a discounted per-transaction charge. This would allow much of the same increase in flexibility for Turnpike commuters while minimizing a potentially severe negative revenue impact.

The basic assumption in evaluating each of the alternative commuter plans was that the present level of discount, or that in effect during the base year of analysis 1988, would be essentially retained. Prior to the January 1, 1989 toll change for cash tolls, the effective rate of discount was 60 percent. Further, the existing nominal trip frequency parameters were assumed to be generally retained. Essentially equivalent to 42 one-way trips per month or 504 trips per year. The current commuter rate structure is based on 126 trips per quarter.

Alternative A Inclusive Interchange Plan

As noted above, the current commuter plan is restricted to the two interchanges shown on the commuter pass. As noted in Chapter 2, based on travel pattern and characteristics study conducted during 1988 it is estimated that about 85 percent of trips being made by patrons holding commuter cards are for valid interchange movements. The other 15 percent is composed of interchange-to-interchange movements for which the commuter is not eligible for toll free travel.

Under this plan, all interchanges between the two indicated on the pass would become eligible. This would act to instantly increase the number of valid commuter trips made by existing commuters. It would also increase the attractiveness of the commuter plan to existing cash patrons and current non-Turnpike

users by introducing a measure of flexibility not currently provided.

Estimated Traffic and Revenue Impacts - Implementation of modified commuter program Alternative A would be expected to have several traffic and revenue impacts. Estimated impacts at 1988 calendar year levels are shown in Table 10. Potential shifts between market segments are shown for both traffic and annual revenues. Net revised estimated transactions and revenues under the modified program are then compared with 1988 actual transactions and revenue to determine net annual impacts of the modified plan.

The format of the table was established to show the market shifts. For example, in the case of Alternative A, a significant number of transactions currently in the passenger car-cash category would shift to the commuter program. This would, of course, have a negative revenue impact on passenger car cash revenue and an increase in commuter revenue.

The liberalization of the program under Alternative A would not be expected to result in a decrease in any existing commuter patrons. However, there would likely be an increase in the number of "valid" trips made by those commuters. In this case, a reduction of cash transactions would be experienced with an increase in commuter transactions. However, for this segment of the market shift, there would be no increase in commuter revenue since the commuters in question would already have paid for their commuter cards and there would simply be an increase in the number of valid commuter trips per card. Estimated shifts in valid trips for existing commuters were made based on a review of travel pattern survey information collected at each of the Turnpike interchanges during 1988.

A second type of shift from the cash to commuter markets would also be expected. A review of certain information suggest that there is still a fairly substantial number of relatively high frequency motorists who are not now in the commuter program. Those motorists now tendering cash who indicated a trip frequency of 3, 4 or 5 trips per week were assumed to be partially divertable to the commuter program as it became more liberalized. This estimated shift is included in the 603,000 additional annual commuter transactions shown in Table 10 made by motorists currently in the cash category. It would result in an increase in commuter revenue of about $109,000 but a more sizeable decrease in passenger car cash revenue.

Another important impact would be the attraction of motorists not now using the Turnpike to the Turnpike by virtue of a more flexible commuter program. This is estimated at slightly more than 300,000 annual transactions systemwide, producing an increase in commuter revenue of $73,000 at 1988 levels. Estimated diversion of off-Turnpike trips was made utilizing travel pattern and characteristic data along U.S. Route 1 furnished by the Maine Department of Transportation (MDOT). MDOT operated several of the survey stations along Route 1 in the Biddeford-Saco region. The first information to become available for use in this study was at a survey station located north of this urban region, immediately south of the Cumberland/York County line. This was a convenient location for a direct comparison between Route 1 and Turnpike trips to estimate the proportion of high-frequency work trips now using the Turnpike and, in particular, the commuter program.

The MDOT surveys used a slightly different coding system for trip purposes and did not record trip frequency information. However, work-related trips accounted for 2,200 vehicles per day

Table 10

ESTIMATED ANNUAL TRAFFIC AND REVENUE IMPACTS
Alternative A

POTENTIAL MARKET SEGMENT	EXISTING MARKET SEGMENT				1988 ACTUAL	NET IMPACT
	Commuter	Passenger Car Cash	Off Turnpike	TOTAL		
	(thousands)					
ANNUAL TRANSACTIONS:						
o Passenger car cash	--	26,987	--	26,987	27,590	(603)
o Commuters	3,802	603	304	4,709	3,802	907
TOTAL PASSENGER CARS	3,802	27,590	304	31,696	31,392	304
ANNUAL REVENUE:						
o Passenger car cash	--	$20,889	--	$20,889	$21,225	$(336)
o Commuters	$916	109	$73	1,098	916	182
TOTAL PASSENGER CARS	$916	$20,998	$73	$21,987	$22,141	$(154)

on U.S. Route 1 near the Cumberland/York County line. The adjacent Turnpike link, between Interchanges 5 and 6, carries an average of about 4,300 work trips with origins or destinations in the greater Biddeford-Saco region. Of these, an estimated 2,800 were using the commuter program.

In total, therefore, the Turnpike currently is carrying about two-thirds of total work trips between Biddeford-Saco and points north. Of those, about 65 percent use the commuter program. Under Alternative A, about 10-15 percent of the work trips now using Route 1 would be assumed to transfer to the Turnpike. This results in an estimated increase in Turnpike commuter trips on this mainline segment of about 8 percent.

No other off-Turnpike travel pattern or characteristic information was available for use in the study. It was generally assumed that the relationship between the Turnpike and Route 1 in the Biddeford-Saco area was representative of conditions elsewhere in the Turnpike corridor. Hence, the diversion analysis at this representative screen line was used in estimating off-Turnpike traffic impacts throughout the Turnpike corridor for each alternative.

In total, the number of cash transactions on the Maine Turnpike made by passenger cars (without trailers) in 1988 would have been reduced by 603,000 annually in 1988 had the modified Alternative A commuter program been in effect. At the same time, the number of commuter transactions would have been increased by about 907,000, resulting in a total increase in Turnpike transactions estimated at 304,000. A negative revenue impact estimated at $154,000 would likely have been experienced. This is due to the fact that the increase in commuter revenue would be more than offset by the decrease in

cash revenue from passenger cars which were transitioned from the cash to commuter category.

Operational and Other Considerations - Implementation of Alternative A would have relatively few operational impacts. The same type of commuter cards could be used and no modification to the in-lane transaction processing at exit or entry lanes would be required. Collectors would simply be instructed to accept cards with intermediate interchanges included.

It would, of course, be a definite perceived increase in program flexibility by the motoring public. As noted above, this will likely increase utilization of the commuter program, but would act to decrease revenues. There would not appear to be a problem with public acceptability or understanding of the program.

Traffic impacts on alternative routes would be relatively small, probably amounting to about 10-15 percent of work trips, or, as in the case of the Route 1 test section, about 2-5 percent overall.

Alternative B - Adjacent Interchange Plan - As noted above, Alternative B would be similar to Alternative A, except that only the "inside" adjacent interchanges would be added to those eligible for commuter usage. For example, a commuter pass with coded interchanges of 4 and 7 would also be valid at Interchanges 5 and 6A. It would not be valid at Interchanges 3, 8 or others.

The primary objective of this proposed plan would be to accommodate motorists which may typically have one common fixed

trip end, but occasionally travel to alternative interchanges for work or shopping. For example, some motorists may normally use Interchange 7 when traveling to or from work in Portland. However, on occasion, the motorists may use Interchange 8. By purchasing a card validated at Interchange 8, the motorists would now be able to use the card at either 7 or 8 and significantly increase the number of valid commuter trips.

Estimated Traffic and Revenue Impacts - Table 11 provides a summary of estimated annual traffic and revenue impacts of Alternative B. Again, this more liberalized plan would be expected to eliminate or shift any existing commuter transactions. Some transactions which are currently invalid based on the current program would be transferred from the cash to commuter program. As noted above, this should have no positive impact on commuter revenues since the trips would be toll-free at the time they are made. Shifts would also be expected from existing cash categories into the commuter plan, although at a lower rate than under Plan A. Smaller off-Turnpike travel impacts are also anticipated. In total, annual transactions in the cash category would be expected to be reduced by about 320,000, while commuter transactions would likely increase by about 472,000.

As with Alternative A, Alternative B would result in a negative toll revenue impact. The increase of about $91,000 in annual commuter revenue would be more than offset by the estimated decrease of about $170,000 in cash revenue by virtue of both shifts into the commuter plan of non-commuters as well as an increase in the number of valid trips being made by existing commuters.

Table 11

ESTIMATED ANNUAL TRAFFIC AND REVENUE IMPACTS
Alternative B

POTENTIAL MARKET SEGMENT	EXISTING MARKET SEGMENT				1988 ACTUAL	NET IMPACT
	Commuter	Passenger Car Cash	Off Turnpike	TOTAL		
	(thousands)					
ANNUAL TRANSACTIONS:						
o Passenger car cash	--	27,270	--	27,270	27,590	(320)
o Commuters	3,802	320	152	4,274	3,802	472
TOTAL PASSENGER CARS	3,802	27,590	152	31,544	31,392	152
ANNUAL REVENUE:						
o Passenger car cash	--	$21,055	--	$21,055	$21,225	$(170)
o Commuters	$916	55	$36	1,007	916	91
TOTAL PASSENGER CARS	$916	$21,110	$36	$22,062	$22,141	$ (79)

Other Considerations - As with Alternative A, there would be relatively little impact on toll plaza operations, accountability or transaction processing. In essence, the number of potential movements would increase slightly and this would, of course, be favorably received by the motoring public. The same type of commuter card could also be used. The program would, however, have relatively small impact and would offer the least amount of opportunity for increased program utilization of any of the Alternatives studied.

Alternative C - Countywide Commuter Card Plan

Another plan suggested for evaluation was a countywide commuter program in which for the purchase of a single commuter card motorists could enjoy toll-free travel between any interchanges on the Turnpike within a particular county. This program would have the advantage of a significant increase in flexibility. However, since many commuter movements cross from one county into another, such as Biddeford to Portland, the program would have some problems with equity of commuter rate charges. Another potential drawback would be the number of interchanges located within each county. Certain counties would have increased opportunities for commuter movements, such as York as compared with Androscoggin County.

Program Parameters

A series of new program parameters had to be established for Alternative C. It represents a significant departure from the existing program. The same quarterly card was assumed to be issued. Quarterly rate was based on the weighted average card cost for all cards issued within a particular county. In this way, for some commuters on relatively short trips the revised

rate would exceed current levels, while a sizeable savings would be realized by other patrons.

In the case of commuters who wish to have commuter privileges in more than one county, a dual-county card was proposed. In this case, it was assumed that the cost for the dual-county card would not be equal to the sum of the two individual counties. Rather, prices were established as equal to the cost of the more expensive of the two counties plus 50 percent of the cost of the adjacent county. It was further assumed that a maximum of two counties could be procured with a single commuter card. The limited number of motorists who would have commuter patterns which might cross into three or more counties would simply accomplish this by purchasing more than one commuter card. It was also assumed that no cash fare would be required at the time of each commuter transaction.

Estimated Traffic and Revenue Impacts - Table 12 shows the summary of estimated annual traffic and revenue impacts for Alternative C. Impacts were estimated for each of the above referenced market segments. The proposed modified rate which would be in effect for each individual commuter movement was compared with the current rate charged for commuter cards. A sliding scale of anticipated diversions into or away from the commuter program was established based on the relationship between the existing and modified quarterly charge for each individual movement. In some cases, where rates under the modified program would be significantly more than currently charged, a certain proportion of commuters were anticipated to leave the program. Of these, it was assumed that 75 percent would transfer into the cash category and remain on the Turnpike, while the remaining 25 percent would be diverted off the Turnpike.

Table 12

ESTIMATED ANNUAL TRAFFIC AND REVENUE IMPACTS
Alternative C

POTENTIAL MARKET SEGMENT	EXISTING MARKET SEGMENT				1988 ACTUAL	NET IMPACT
	Commuter	Passenger Car Cash	Off Turnpike	TOTAL		
	(thousands)					
ANNUAL TRANSACTIONS:						
o Passenger car cash	262	26,673	--	26,935	27,590	(655)
o Commuters	3,453	917	215	4,585	3,802	783
TOTAL PASSENGER CARS	3,715	27,590	215	31,520	31,392	128
Off Turnpike	87					
ANNUAL REVENUE:						
o Passenger car cash	$ 71	$21,318	--	$20,389	$21,225	$(836)
o Commuters	766	207	$50	1,023	916	107
TOTAL PASSENGER CARS	$837	$20,525	$50	$21,412	$22,141	$(729)

It would be, however, a sizeable shift from the cash to the commuter category of existing Turnpike patrons. This relates to the fact that there were a greater number of movements for which the effective rate per quarterly commuter card would decrease as compared with the current program. An estimated 917,000 additional transactions would likely be diverted from the existing cash category. After factoring the additional estimated 215,000 annual commuter transactions from vehicles not now using the Turnpike, a total of 4,585,000 annual commuter transactions is estimated, or about 783,000 more than actually experienced in 1988.

A sizeable negative revenue impact would be anticipated. The large shift from cash into the commuter program would result in a significant decrease in cash revenue from passenger cars estimated at about $836,000 at 1988 levels. A further decrease in commuter revenues would also be experienced, since the nominal rates charged under the program would be somewhat less than those presently assessed. This results in a total negative impact of more than $700,000.

Operational and Other Considerations - Implementation of Alternative C would require significant changes in the overall administration of the commuter program and probably some difficulty in transitioning from the existing program. There would be some increase in patron confusion since exact county lines may not be readily perceived by motorists. There could also be some potential confusion on the part of toll attendants, particularly during the early stages of operation, but this should not be a significant factor. There would still be no individual charge per transaction, hence there would not be negligible impacts on transaction times in the toll lanes after the initial stage of confusion.

From a public acceptance standpoint, several motorists would appreciate this particular change in the program while others would not. Obviously, there would be some existing commuter patrons who would suffer an increase in their cost for commuter cards simply because the trip crosses from one county into another. It would be difficult to develop more equitable rates under a county-wide program since individual motorists would have different predominant travel patterns which are typically used.

Alternative D - Annual Card Plans

Two annual card plans were evaluated, with and without a discounted toll payment at the time of each transaction. Under plan D-1, the quarterly card would simply be issued on an annual basis and the cost of the card would be multiplied by four. For example, a typical movement between Interchange 5 and 6A presently has a quarterly charge of $15.75. This would be increased to $63.00 annually, although there would be no additional fare for unlimited trips between these two interchanges during the course of an entire calendar year.

Estimated Traffic and Revenue Impacts - A summary of estimated traffic and revenue impacts under Alternative D-1 is shown in Table 13. This particular Alternative program would not be expected to result in any significant increase in the number of commuter transactions either from existing Turnpike patrons using cash or off-Turnpike patrons. In fact, the program is considered to be somewhat less convenient than the current plan. Even though payment for the card would be made less frequently and would increase patron convenience regarding renewals, it would require a much more significant initial capital outlay and it is likely to divert many patrons from the

Table 13

ESTIMATED ANNUAL TRAFFIC AND REVENUE IMPACTS
Alternative D-1

POTENTIAL MARKET SEGMENT	EXISTING MARKET SEGMENT: Commuter	Passenger Cars: Cash	Off Turnpike	TOTAL	1988 ACTUAL	NET IMPACT
	(thousands)					
ANNUAL TRANSACTIONS:						
o Passenger car cash	670	27,590	--	26,260	27,590	670
o Commuters	2,909	--	--	2,909	3,802	(893)
TOTAL PASSENGER CARS	3,579	27,590	--	31,169	31,392	(223)
Off Turnpike	223					
ANNUAL REVENUE:						
o Passenger car cash	$ 429	$21,225	--	$21,654	$21,225	$429
o Commuters	627	--	$--	627	916	(289)
TOTAL PASSENGER CARS	$1,056	$21,225	$--	$22,281	$22,141	$140

commuter plan to the cash program or off the Turnpike entirely. Again, a sliding scale was used to estimate this impact, with the highest impacts assumed to occur under those commuter movements with the highest existing rates. For example, a movement from Interchange 7 to 13 has a quarterly commuter card cost of $56.70. If this were switched to an annual card, commuter patrons would be required to forward $226.80 for a year's worth of passage. The increase in capital outlay from $56.70 to $226.80 would likely have a significant negative impact on utilization of the commuter program.

In total, an estimated 223,000 patrons would likely be diverted off the Turnpike. An additional 670,000 would shift to cash resulting in a net reduction of almost 900,000 in annual commuter transactions. This would result in a positive revenue impact, since motorists being transitioned from commuters to cash would pay an increased fare per trip. In total, a positive revenue impact of $140,000 would be expected had the program been in effect in 1988.

Alternative D-2 would also involve extending the program to an annual card basis. However, rather than simply multiplying the card costs times four, the existing card costs would be maintained and the card validity period extended to one year. To maintain the nominal 60 percent rate of discount on an annual basis, motorists would be required to pay a discounted toll on each transaction. The rate per transaction would be established such that the total fare paid on a transaction basis over the course of a year, plus the initial capital outlay, would equal 40 percent of the full cash fare for the equivalent number of trips.

For example, consider the movement between Interchange 1 and

3. The current quarterly card charge is $25.20. In this case, a commuter patron who remains in the plan for a full year would be paying $100.80 for travel between Interchanges 1 and 3. This is based on an assumed total of 504 trips per year. If the quarterly pass charge of $25.20 were deducted from the annual amount, a total of $75.60 would be targeted for collection on a transaction basis. Again, assuming 504 trips per year, this would result in a discounted cash fare at the time of each transaction of $0.15. This would represent a very sizeable savings over the 1988 cash fare for that same movement of $0.50, while still producing an overall effective annual discount of 60 percent.

Again, this program modification would be expected to attract few additional patrons from existing Turnpike cash motorists or non-Turnpike travelers. It would have relatively little impact on the number of commuter transactions. However, a potentially significant revenue impact would result since the current average commuter uses only about 75 percent of the nominal transactions assumed in establishing the commuter fare.

An analysis was performed relative to each of the major commuter movements on the Turnpike to recognize reduced revenue impacts due to less than the maximum theoretical number of commuter trips. Actual use profiles were discussed earlier in Table 6 of Chapter 2. A total negative impact on commuter toll revenue of $174,000 is estimated, due to less than maximum utilization rates.

Operation and Other Considerations - This proposed program would have potentially significant negative operational impacts. Most notable among these would be the requirement for a cash payment at the time of the exit transaction. This would

reduce transaction time and increase delays at exit toll plazas, largely inconsistent with objectives of upgrading the commuter program on the Turnpike. Further, it would produce relatively little, if any, impact on attracting new patrons to the Turnpike and could actually divert motorists away from the Turnpike if congestion at toll plazas became a serious problem. The negative revenue impact associated with the option D-2 would be increased by expected increases in operating costs associated with additional toll collection personnel for processing cash transactions of commuter patrons.

In terms of motorist acceptance, option D-1 with a straight quadrupling of existing rates to arrive at an annual card would likely be opposed by many motorists. The discounted fare program would also provide little advantages for existing patrons.

Alternative E - Turnpike-Wide Plan - Initially, two possible Turnpike-wide programs were conceptualized. One with and one without the need for a per-transaction discounted fare. The option of such a program without a per-transaction fare was considered infeasible. It would be difficult or impossible to establish an appropriate annual fee for a systemwide program which would not require cash at the time of the transaction and which was eligible for any interchanges on the entire Turnpike. Clearly, there would be a significant increase in utilization of the commuter program, with a very significant negative revenue impact.

Alternative E-2 was considered a more reasonable option in which an annual card would be sold at a nominal cost of $25.00. The card would be valuable at all interchanges and motorists holding the card would be entitled to a discounted fare at the

time of each transaction regardless of points of entry or exit. The discount fare would be computed in a similar fashion to that described above for Alternative D-2. In essence, for each particular interchange-to-interchange movement, the discount fare would be based on an equivalent 504 trips per year, less the $25.00 initial capital outlay.

Estimated Traffic and Revenue Impacts - Estimated traffic and revenue impacts under this program would be the most significant of any of the options studied. As shown in Table 14, essentially all commuters now in the plan were assumed to remain in the program. In addition, all invalid commuter movements now being made by patrons holding commuter cards would become valid. There would also be a very significant shift from existing cash patrons into the commuter category based on a review of existing trip frequency patterns among cash patrons and the substantial increase in commuter program eligibility and flexibility. In total, over 2.0 million cash transactions would likely be converted to the commuter program. In addition, an estimated 380,000 annual transactions would be attracted to the Turnpike from off-Turnpike routes.

A significant negative annual revenue impact would be expected. Passenger car cash revenue would be reduced by an estimated $1,204,000 at 1988 levels. Although commuter revenue would be increased by over $660,000, a net reduction in total Turnpike revenue of $540,000 would likely be experienced.

Operational and Other Considerations - Alternative E-2 would again require a payment of a cash fare at the time of each transaction. This would have the same operational impacts described above for Alternative D-2.

Table 14

ESTIMATED ANNUAL TRAFFIC AND REVENUE IMPACTS
Alternative E-2

POTENTIAL MARKET SEGMENT	EXISTING MARKET SEGMENT: Commuter	Passenger Car Cash	Off Turnpike	TOTAL	1988 ACTUAL	NET IMPACT
	(thousands)					
ANNUAL TRANSACTIONS:						
o Passenger car cash	--	25,547	--	25,547	27,590	(2,043)
o Commuters	3,800	2,043	380	6,225	3,802	2,423
TOTAL PASSENGER CARS	3,800	27,590	380	31,772	31,392	380
ANNUAL REVENUE:						
o Passenger car cash	--	$20,021	--	$20,021	$21,225	$(1,204)
o Commuters	$ 847	600	$133	1,580	916	664
TOTAL PASSENGER CARS	$ 847	$20,621	$133	$21,601	$22,141	$(540)

The program would likely have more widespread public acceptance, however, since it would permit maximum increase in flexibility and utilization of the Turnpike and would encourage increased participation in the commuter plan. The significant negative revenue impact would be compounded by potentially significant increases in operating costs, particularly recognizing the large scale shifts from cash to the commuter categories.

Cash Flow Considerations

The alternative programs evaluated would be expected to have some impact on cash flow. As noted above, the more participants in the commuter program, the greater the amount of cash which is received in advance of the time of actual travel. These funds can be reinvested. Based on discussions with Turnpike Authority staff, WSA was advised to assume a nominal reinvestment rate of 8.0 percent interest per year.

Those programs which would remain on a quarterly basis would result in an increase in investment income equivalent to about 1.0 percent times the estimated increase in quarterly pre-payments. The annual programs would have a more significant impact. In this case, the funds would be assumed to be available 50 percent sooner than on a "pay as you go" basis. Hence, an additional 4.0 percent interest would be received for all additional funds transferred into the pre-payment program from cash. In addition, there would be an increase in the duration for reinvestment for pre-payments from motorists already in the commuter program.

Comparative Summary of Findings

Table 15 presents a comparative summary of estimated revenue and cash flow impacts associated with each of the proposed alternative commuter programs. Annual revenue impacts would range from an increase of $140,000 under Alternative D-2 to a maximum negative impact of more than $700,000 under Alternative C. After recognizing anticipated cash flow benefits ranging from $(7,000) to $16,000, the total revenue impacts of the programs would range from $(728,000) to $ 156,000.

As noted, in some cases the annual revenue impact would understate the true financial impact to the Authority. In the case of those programs which would require a cash payment at the time of each discount transaction, a long-term impact in operating costs should be assumed. This would be added to the negative revenue impact shown in Table 15.

In summary, none of the Alternatives studied appear to be clearly superior to the existing program. Alternative E-2 would probably have the most significant impact in increasing commuter program utilization although it would have a serious negative revenue impact. Alternative C would have a significant negative revenue impact and would have unclear impacts on patron perceptions of program flexibility and restrictiveness. Alternatives D-1 and D-2 would provide little incentive for increasing program utilization, in fact Alternative D-1 would likely act to reduce participation in the commuter plan.

Impact of Recent Rate Increases

The Maine Turnpike Authority increased toll rates for passenger car and other vehicles (except commuters) by 15.0

percent on January 1, 1989. By not adjusting the commuter rates at the same time, this resulted in an effective increase in the percent discounts for commuter movements. The program effectively now provides a 65 percent rate of discount. This should act to increase participation in the commuter plan, the continue shift from the passenger car cash to commuter category. However, this should not have a significant impact on the relative findings discussed previously in this chapter.

Table 15

TOLL REVENUE IMPACT ESTIMATES

COMMUTER ALTERNATIVES	1988 TOLL REVENUE IMPACTS (--000--)	CASH FLOW IMPACTS	TOTAL REVENUE IMPACTS
A	$(154,000)	2	$(152,000)
B	(79,000)	1	(78,000)
C	(729,000)	1	(728,000)
D1	140,000	16	156,000
D2	(183,000)	(7)	(156,000)
E2	(540,000)	(5)	(545,000)