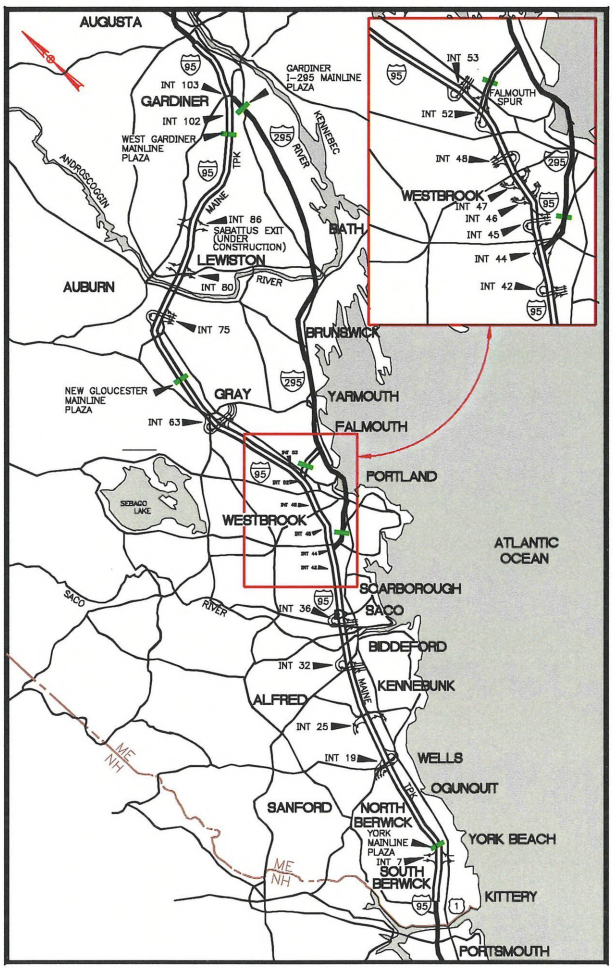
2004 Origin-Destination Survey

Summary Report



Prepared for

Maine Turnpike Authority

E-ZPass℠

HNTB

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Section 1. Executive Summary

In May 2004, HNTB conducted an origin and destination (O&D) study of Maine Turnpike patrons. The purpose of the study, performed as a mailback survey, was to acquire updated information on travel patterns, to better understand key patron characteristics, and to get feedback on the quality of service provided by the Maine Turnpike. The highlights of the study are summarized below.

Response Rate A total of 4,816 surveys were returned out of 38,800, yielding a response rate of **12.4%**.

Trip Frequency The average patron makes about **6** trips per week on the Turnpike. Patrons who pay cash average **4.5** trips per week, while ETC patrons average close to **9** trips per week.

Trip Types The Maine Turnpike serves a diverse array of trip purposes, as summarized in Table 1.1.

Table 1.1 – Trip Purpose Summary

Trip Type	Examples	Wkday%	Wkend%
Home-based work	Trips between home and work	34.8%	20.5%
Work-based	Trips between work and any destination other than home	19.6%	9.0%
Home-based shopping	Trips between home and any shopping location	7.1%	9.5%
Home-based recreational	Trips between home and recreational areas, hotels, or seasonal home	8.4%	17.2%
Home-based other	Trips between home and schools, medical facilities, etc.	24.5%	36.8%
Other	Any trip not captured in preceding five categories	5.5%	7.0%

Origin-Destination Patterns The survey highlighted the following trends in Turnpike travel patterns:

- As expected, numerous northbound patrons destined for the Portland area (and points north) are bypassing the exit toll at Exit 44 and using Exit 45 instead.
- The opening of two new interchanges in Greater Portland (Exits 46 and 47) has created many new, shorter trips in the "Central" zone of the Turnpike (between the Mall and West Falmouth).

In-State vs. Out-of-State Travel

- Approximately **one-third** of Maine Turnpike revenue comes from out-of-state patrons.
- Nearly **one in four** trips either begins or ends in Massachusetts or New Hampshire.
- In 2004, Maine residents accounted for **82%** of all Turnpike trips, up from **78%** in 1994.

Usage of Electronic Toll Collection (ETC) About **32%** of all Turnpike trips used *Transpass*, the former method of electronic toll collection. This should increase to nearly **40%** after the conversion to *E-ZPass*.

Use of I-95 and I-295 by Traffic Driving Through Portland

- Roughly 16,000 vehicles per day travel between Scarborough and Falmouth using I-95 & I-295. About 25% of these vehicles use I-95; the remaining 75% drive through Portland on I-295.
- This equates to approximately **12,000** through vehicles per day on I-295. This volume represents **15-20%** of I-295 traffic in Portland.

Section 2. Purpose and Need

HNTB Corporation, consulting engineering firm to the Maine Turnpike Authority (MTA), conducted a mailback survey of Maine Turnpike patrons in May 2004. The purpose of the survey was threefold:

1. To acquire updated information on the **travel patterns** exhibited by Turnpike patrons. This involved looking at how origin-to-destination trips translated into interchange-to-interchange movements on the Turnpike.
2. To better understand key **patron characteristics** such as (a) the percentage of in-state vs. out-of-state patrons; (b) the average number of people in each vehicle; (c) the frequency with which patrons typically travel on the Turnpike; (d) the types of trips that are served by the Turnpike, such as home-to-work or home-to-vacation trips; and (e) the extent to which patrons use the Turnpike to connect to alternative modes of travel such as carpool, bus, or rail.
3. To get feedback on the **quality of service** provided by the Turnpike. This primarily involved acquiring information on delays experienced by Turnpike patrons.

As the survey collects information on travel patterns, patron characteristics, and quality of service, it can shed important light on several other transportation planning efforts. To illustrate:

- The travel patterns identified by the survey can help forecast the impact of major possible changes to the Turnpike's infrastructure, such as the addition of a new interchange, or the potential conversion to a regional toll system.
- The survey can support MaineDOT's I-295 Corridor Study by identifying the extent to which existing traffic on I-295 could shift to the Turnpike in its journey through Greater Portland.
- The survey can help the Authority understand how its toll structure distributes the toll collection burden between in-state and out-of-state users.
- The trends highlighted by the survey can help document the effectiveness of various programs. For example, a comparison of delay statistics with previous years can help highlight the effectiveness of the Widening. A comparison of vehicle occupancy statistics with previous years can help highlight the effectiveness of various carpooling programs.
- The origin-destination data can support the modeling efforts of the region's Metropolitan Planning Organizations (MPO's), such as PACTS, ATRC, and KACTS.

There are at least two important reasons for collecting specific origin-destination data from patrons of the Maine Turnpike. First, it provides information that cannot otherwise be collected from cash-paying patrons. And second, it enables the Authority to track recent changes in travel patterns. These reasons are elaborated below.

(i) Reason #1 – To provide information that cannot otherwise be collected

For the first 50 years of its existence, the Maine Turnpike employed a ticket-based toll collection system. Patrons received a ticket upon entering the Turnpike, and they would travel uninterrupted until they reached their exiting interchange. At that point, they surrendered their ticket and paid the corresponding fare.

The tickets were not just a means of determining each patron's fare; they were also a means of tracking all interchange-to-interchange movements on the Turnpike. The ticket system thus provided an effective way of tracking the travel patterns of Turnpike patrons. It also provided a quick means of calculating key statistics such as vehicle-miles traveled (VMT) and total trips.

In the 1990's, the MTA converted from a ticket system to a closed barrier system. The northern end was converted in September 1991[1], while the southern end was converted in September 1997. These conversions, while introducing some operational benefits, eliminated the ability to track the interchange-to-interchange movements of cash-paying patrons.[2] The origin-destination survey helps fill this data-collection void by providing insight on the movements of cash-paying patrons.

(ii) Reason #2 – To track changes in travel patterns

The Maine Turnpike has undergone many changes since the last survey, which was conducted in the summer of 1998. The changes include:

- The implementation of a toll increase in February 1999. This toll increase involved the introduction of exit tolls at Exits 44 and 52. One effect of the exit tolls was to encourage northbound travelers connecting to I-295 to bypass Exit 44 and use Exit 45, which has no exit toll. The 2004 origin-destination survey sheds some light on the extent to which this diversion was taking place.

- The addition of two new interchanges. Since the last survey, two new interchanges have been added—Exit 46 (October 1999), and Exit 47 (December 2002). The 2004 origin-destination survey provides insight on how these plazas are being used.

- The near-completion of the Widening. During the last survey, the entire Turnpike (with the exception of the first six miles) was a 4-lane roadway. However, during this survey, all but one segment south of Portland had been widened. It is possible that this widening has attracted new users to the Turnpike—users that had been previously deterred by Turnpike congestion. Therefore, the 2004 origin-destination survey can help capture the impact of the Widening on Turnpike travel patterns.

- The designation of the Turnpike as I-95. In January 2004, the Turnpike and its parallel interstate counterpart to the east underwent a route redesignation. This redesignation had three components. First, the Turnpike was designated as I-95 for its entire length. Second, the untolled route to the east, running between Scarborough and Gardiner, was designated as I-295 for its entire length. And third, the Falmouth spur (the connector road between the Turnpike and the interstate) had its designation as "I-95" removed.

  Initial evidence from analysis of Turnpike traffic data indicates that this redesignation has affected travel patterns, with through traffic between Portland and Augusta tending to stay on the Turnpike (as the newly-designated I-95) instead of using the parallel I-295. The 2004 origin-destination survey can help verify whether this is indeed the case.

In short, the origin-destination survey helps the Authority understand how its patrons are using the Turnpike, and it illustrates the extent to which travel patterns have changed in response to recent systemwide changes. This information can assist the Authority as it plans for the future.

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[1] The north end was converted to a *closed* barrier system in September 1991. It was subsequently converted to an *open* barrier system in November 1999, with the removal of the Auburn ramp tolls. All travel between the New Gloucester and West Gardiner barriers are now toll-free.

[2] The movements of ETC patrons continued to be tallied by the *Transpass* system, which assessed fares based on interchange-to-interchange movements.

Section 3. Conducting the Survey

This section summarizes the manner in which the survey was conducted. A more detailed description of the decisions which supported this approach can be found in Appendix A.

3.1. SURVEY CARD

At the onset of the survey, an Advisory Committee was formed in order to develop the survey instrument. The Maine Turnpike Authority's most recent origin-destination (O&D) surveys—in 1988, 1994, and 1998—had all used similar questions with similar wording. The Authority felt that it was appropriate to review the survey's content in order to ensure that the questions were clear, concise, and relevant.

The Advisory Committee was comprised of twelve individuals. They represented a variety of institutions (such as the MTA, MaineDOT, PACTS, and the University of Southern Maine), and they possessed a broad range of expertise (such as transportation modeling, statistics, public relations, and commercial vehicle operations). After two meetings, the committee approved a slate of 19 questions, to be distributed to patrons on the back of a postpaid card. Patrons were asked to respond to the questions and put the postpaid card in the mail, addressed to the Maine Turnpike Authority. The MTA subsequently forwarded all survey cards to HNTB.

Prior to conducting the survey, HNTB developed a database to receive the data. HNTB also handled all survey-related data entry.

Figure 3.1 illustrates the card that served as the foundation of the origin-destination survey. Figure 3.2 illustrates the instructional card that accompanied the survey in order to assist patrons.

Mail Back Questionnaire

1. How many trips did you make on the Maine Turnpike in the last 7 days?
   _____ trips
   (Example - If you traveled back and forth to work three times, that would make 6 trips.)

For questions 2 thru 15, please tell us more about one trip, *in one direction only*, that you took on the Turnpike in the last week.

2. On what date did this trip occur?
   _____ / _____
   month date

3. What type of place did this trip start from?
   - ☐ Your primary residence
   - ☐ Your seasonal residence
   - ☐ Workplace
   - ☐ Customer call
   - ☐ Store / Shopping
   - ☐ Recreation area
   - ☐ Hotel / Motel
   - ☐ Other _____

4. Where did this trip start?
   Street Address or Place: _____
   City / State: _____

5. At approximately what time did you start this trip?
   _____ am _____ pm

6. At what interchange (or town) did you **enter** the Turnpike on this trip? _____

7. At what interchange (or town) did you **exit** the Turnpike on this trip? _____

8. After exiting the Turnpike, where did this trip end?
   Street Address or Place: _____
   City / State: _____

9. What type of place is this ending point?
   - ☐ Your primary residence
   - ☐ Your seasonal residence
   - ☐ Workplace
   - ☐ Customer call
   - ☐ Store / Shopping
   - ☐ Recreation area
   - ☐ Hotel / Motel
   - ☐ Other _____

10. What is your **home** ZIP code or postal code?
    _____

11. What type of vehicle were you driving?
    - ☐ Motorcycle
    - ☐ Car / SUV / pickup
    - ☐ Recreational Vehicle
    - ☐ Bus
    - ☐ 3 or 4 axle truck
    - ☐ 5 or more axle truck
    - ☐ Passenger vehicle towing a trailer

12. How many people (driver plus passengers) were in your vehicle?
    _____ people

13. Did you encounter any delays on the turnpike during this trip? (circle one) YES NO

14. If yes, approximately how long were you delayed?
    _____ minutes

15. Did this trip include the use of a Park & Ride lot?
    (circle one) YES NO

16. Do you have an active Transpass transponder?
    (circle one) YES NO

17. *E-ZPass* is a method of electronic toll collection used in other states. Do you currently have an *E-ZPass* transponder? (circle one)
    YES NO

Commercial Vehicles Only

18. How frequently do you travel outside of Maine?
    - ☐ Less than once a month
    - ☐ Once a month
    - ☐ Once a week
    - ☐ Daily

19. Comments
    _____
    _____
    _____

Thank you very much for your time and assistance!

Figure 3.1 – Survey Card

Dear Maine Turnpike Traveler:

The Maine Turnpike Authority is conducting a survey of our customers to help us plan for the future. Please take a few minutes to fill out the survey and mail it back to us (postage paid) at your earliest convenience.

Please read the following before answering the questions.

Question 1: For our purposes a "trip" is a one way outing on the Turnpike. *So if you go back and forth to work in one day, you have taken two "trips".*

Question 2-15: Please tell us about your most recent trip on the Turnpike within the last seven days. If the trip on which you received this survey was the ONLY trip you made on the Turnpike in the last seven days, please tell us about that trip.

If you aren't sure of some of the information, such as the address of the beginning or ending of your trip, then write in the place and town, such as: *Maine Mall, South Portland.*

If you aren't sure of the exit number where you started or ended your trip, please write down the town's name, such as *Saco.*

Question 18 is for commercial vehicles only.

If you would like more detailed instructions, please go to *www.maineturnpike.com* and click on the origin destination study icon.

Thank you very much for your input!

The Maine Turnpike Authority

Thinking Ahead

Figure 3.2 – Survey Instruction Sheet

3.2. SURVEY TIMING

In order to capture traffic conditions on an "average day", the survey was conducted in the month of May. Historically, May traffic levels have been nearly equal to average traffic levels over the course of an entire year. Moreover, May traffic includes a broad cross-section of patrons, with routine users (such as commuters and commercial vehicles) sharing the road with shoppers, tourists, and other recreational users.

Table 3.1 summarizes the dates during which survey cards were distributed. The weekday surveys were distributed during the evening rush hour (4-6pm). The weekend surveys were distributed during the midday hours (10am-3pm).

Table 3.1 – Survey Dates, by Location

<table>
<tr><th>Location</th><th>Weekday Survey</th><th>Weekend Survey</th></tr>
<tr><td>York - NB</td><td rowspan="5">May 18, 2004 (Tue)</td><td rowspan="5">May 15, 2004 (Sat)</td></tr>
<tr><td>Wells (Exit 19)</td></tr>
<tr><td>Kennebunk (Exit 25)</td></tr>
<tr><td>Biddeford (Exit 32)</td></tr>
<tr><td>Saco (Exit 36)</td></tr>
<tr><td>Scarborough (Exit 42)</td><td rowspan="8">May 19, 2004 (Wed)</td><td rowspan="8">May 22, 2004 (Sat)</td></tr>
<tr><td>I-295 (Exit 44 - SB)</td></tr>
<tr><td>So. Portland (Exit 45)</td></tr>
<tr><td>Jetport (Exit 46)</td></tr>
<tr><td>Rand Rd. (Exit 47)</td></tr>
<tr><td>Riverside St. (Exit 48)</td></tr>
<tr><td>Falmouth Spur (Exit 52)</td></tr>
<tr><td>W. Falmouth (Exit 53)</td></tr>
<tr><td>Gray (Exit 63)</td><td rowspan="5">May 20, 2004 (Thu)</td><td rowspan="5"></td></tr>
<tr><td>Auburn (Exit 75)</td></tr>
<tr><td>Lewiston (Exit 80)</td></tr>
<tr><td>W. Gardiner / I-95 - SB</td></tr>
<tr><td>Gardiner / I-295 (NB & SB)</td></tr>
</table>

3.3. SURVEY DISTRIBUTION PLAN

In order to ensure that all patrons received one (and only one) survey, cards were distributed at all *entry* points to the Turnpike. There were only 3 exceptions to this:

1. **Augusta SB** Southbound patrons entering the Turnpike in Augusta do not pass through a toll barrier until they reach Gardiner. Therefore, in order to provide cards to these patrons, cards were handed out at the Gardiner / I-295 and the W. Gardiner / I-95 plazas, in the SB direction.
2. **Lewiston NB** Vehicles entering the Turnpike via the Lewiston NB-on ramp received their survey cards at the W. Gardiner / I-95 toll barrier.
3. **Auburn SB** Vehicles entering the Turnpike via the Auburn SB-on ramp received their survey cards at the New Gloucester toll barrier.

Table 3.2 indicates the locations at which surveys were distributed, and it summarizes the number of surveys that were to be distributed at each location. In most instances, cards were to be handed to vehicles as

they passed through the toll plaza. However, at some locations (e.g. Auburn NB-on, Lewiston SB-On), no toll plaza existed. Therefore, patrons were asked to stop on the ramp and receive a card handed to them by a roadside attendant. State Police officers provided traffic control for these roadside stops.

Table 3.2 – Number of Surveys to be Distributed, by Location and Day

Location	# of Surveys	
	Weekday	Weekend
York Plaza - NB	1,000	900
Wells (plaza) - *Exit 19*	600	450
Wells (SB on-ramp) - *Exit 19*	400	300
Kennebunk (NB plaza) - *Exit 25*	700	500
Kennebunk (SB plaza) - *Exit 25*	350	250
Biddeford - *Exit 32*	1,150	700
Saco - *Exit 36*	1,150	750
Scarborough - *Exit 42*	1,050	700
I-295 Plaza (SB only) - *Exit 44*	1,050	800
So. Portland - *Exit 45*	1,150	750
Jetport (NB plaza) - *Exit 46*	1,050	150
Jetport (SB plaza) - *Exit 46*	550	100
Rand Rd. - *Exit 47*	1,350	400
Riverside St. - *Exit 48*	1,150	700
Falmouth Spur - *Exit 52*	1,100	750
W. Falmouth - *Exit 53*	1,150	650
Gray (plaza) - *Exit 63*	850	550
Gray (NB on-ramp) - *Exit 63*	250	150
New Gloucester Plaza (SB only)	1,300	800
Auburn (NB on-ramp) - *Exit 75*	450	300
Lewiston (SB on-ramp) - *Exit 80*	950	550
W. Gardiner / I-95 Plaza (NB)	900	500
W. Gardiner / I-95 Plaza (SB)	1,000	750
Gardiner / I-295 Plaza (NB)	550	400
Gardiner / I-295 Plaza (SB)	550	400

As Table 3.2 indicates, a total of 35,000 surveys were scheduled for distribution to vehicles entering the Turnpike. An additional 3,800 surveys were distributed through the mail. These surveys were targeted to *Transpass* patrons that might not otherwise receive a survey, since they are not required to stop at toll plazas when they enter the Turnpike.

3.4. RESPONSE RATE

A total of 4,816 cards were received out of the 38,800 that were to be distributed—a response rate of **12.4%**. Table 3.3 summarizes the response rates, breaking them out by method of distribution.

Table 3.3 – Response Rate Summary

Distribution Method	Surveys Distributed	Surveys Returned	Response Rate
Toll Plaza	35,000	3,838	11.0%
Mail	3,800	978	25.7%
Overall	**38,800**	**4,816**	**12.4%**

Here is how the response rate for the 2004 O&D study compares to other studies performed over the past decade:[3]

- 1994 O&D Study – 15.9%[4]
- 1998 O&D Study – 4.5%[5]
- 2003 Park & Ride Study – 20.7%[6]

In short, the response rate for the 2004 O&D study is consistent with response rates from other recent surveys. It represented a significant improvement over the 1998 survey, though it still fell short of the response rate achieved by the 1994 O&D study.

HNTB's goal was to receive enough responses such that the survey was statistically valid at each entry point. Based on the 4,816 responses noted above, the survey achieved a 90% confidence level at entry point, with the results lying well within a 10% confidence interval. In fact, at five locations (York NB, Gray, Auburn, Lewiston, and W. Gardiner SB), the survey achieved the much more precise standard of a 95% confidence level with a 5% confidence interval.

[3] All of the studies used a mailback survey instrument.
[4] The 1994 survey was conducted when MTA operated with a ticket system. Toll collectors distributed the survey cards together with the tickets at all points of entry to the Turnpike.
[5] The 1998 survey was conducted after the MTA's conversion to a barrier system. Survey cards were distributed at all toll barriers (to cash-paying patrons), and by mail (to selected Transpass patrons).
[6] In the 2003 study, survey cards were enclosed in weathertight bags and placed on the windshields of all vehicles in the various Park & Ride lots.

Section 4. Travel Patterns

The first nine questions of the survey dealt with the travel patterns of Turnpike patrons. This section will focus on the key characteristics of these travel patterns.

4.1. Question 1: Number of Trips in Last Seven Days

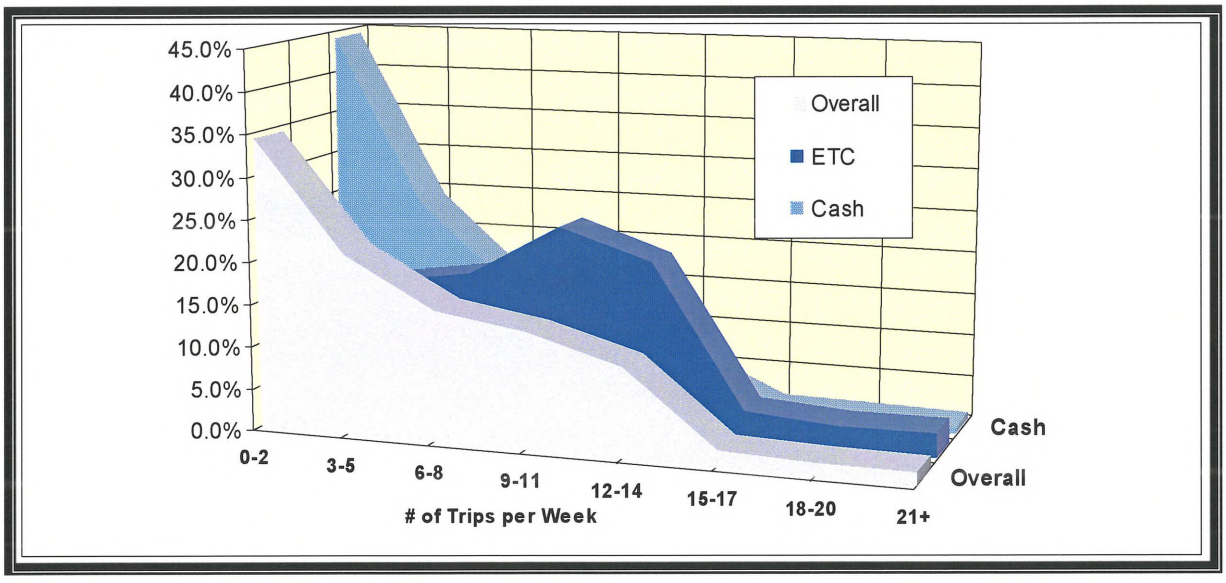
The first question on the survey is shown below.

> 1. How many trips did you make on the Maine Turnpike in the last 7 days?
> _____ trips
> (Example – If you traveled back and forth to work three times, that would make 6 trips.)

Figure 4.1 summarizes the response to Question 1, distinguishing between cash-paying patrons and ETC patrons. It breaks the responses down into eight general categories:

- 0 to 2 trips per week
- 3 to 5 trips per week
- 6 to 8 trips per week
- 9 to 11 trips per week
- 12 to 14 trips per week
- 15 to 17 trips per week
- 18 to 20 trips per week
- More than 20 trips per week

Figure 4.1 – Frequency of Turnpike Travel, Cash vs. ETC



The following observations may be drawn from Figure 4.1:

- The most common response for cash-paying patrons was 0 to 2 trips per week (44%), while the most common response for ETC patrons was 9 to 11 trips per week (25%). This confirms that ETC patrons tend to be more frequent users of the Turnpike.
- It is interesting to note that **over half** of cash-paying patrons use the Turnpike 3 or more times per week. In the summer of 1998, only about **25%** of cash-paying patrons reported using the Turnpike more than once a week.
- A closer look at the raw data indicates that **61%** of all patrons are "daily" users—that is, they use the Turnpike 5 or more times per week. In the May 1994 survey, by contrast, only **42%** of patrons described themselves as "daily" users.

Table 4.1 summarizes the median number of trips per week made by Turnpike patrons, broken out by payment type:[7]

Table 4.1 – Average Trips per Week on Maine Turnpike

Payment Type	Average # of Trips per Week
Cash	4.58
ETC	8.67
Overall	5.88

Table 4.1 illustrates that the typical ETC patron travels on the Turnpike about twice as frequently as the typical cash-paying patron. Overall, the typical Maine Turnpike patron makes about six trips per week. This indicates that the Maine Turnpike is serving an increasing number of frequent travelers; it is no longer primarily a recreational road dominated by a summer influx of tourist traffic.

4.2. QUESTION 2: DATE OF TRIP

Question 2, replicated below, asked respondents to identify the date of their trip.

> 2. On what date did this trip occur?
> _____ / _____
> month date

It is important to note that this trip may *not* correspond to the date in which the survey was actually distributed. The survey asked patrons to provide information on any one trip taken in the past week.

[7] The median represents the "typical" driver. By definition, half of all patrons travel more frequently than the median, while half travel less frequently.

The responses to Question 2 are summarized in Table 4.2:

Table 4.2 – Date of Trip

Month	Weekday	Weekend	Total
April	0.5%	0.3%	0.8%
May	54.1%	37.0%	91.1%
June	3.3%	4.7%	7.9%
July	0.2%	0.0%	0.2%
Total	58.0%	42.0%	100.0%

The responses to this question indicate that the survey met its goal of capturing May travel patterns, since over 90% of the responses described trips that took place in May. Moreover, the survey met its goal of achieving a blend of weekday and weekend trips. About 58% of the surveys described weekday trips; similarly, a separate analysis has indicated that about 55-60% of all Turnpike trips occur on weekdays.[8]

4.3. QUESTIONS 3 & 9: TRIP TYPES

Questions 3 and 9, illustrated below, were designed to help identify the types of trips that are occurring on the Turnpike.

3. What type of place did this trip start from?

□ Your primary residence	□ Store / Shopping
□ Your seasonal residence	□ Recreation area
□ Workplace	□ Hotel / Motel
□ Customer call	□ Other _____

9. What type of place is this ending point?

□ Your primary residence	□ Store / Shopping
□ Your seasonal residence	□ Recreation area
□ Workplace	□ Hotel / Motel
□ Customer call	□ Other _____

The responses from these two questions may be broken down into six basic categories:

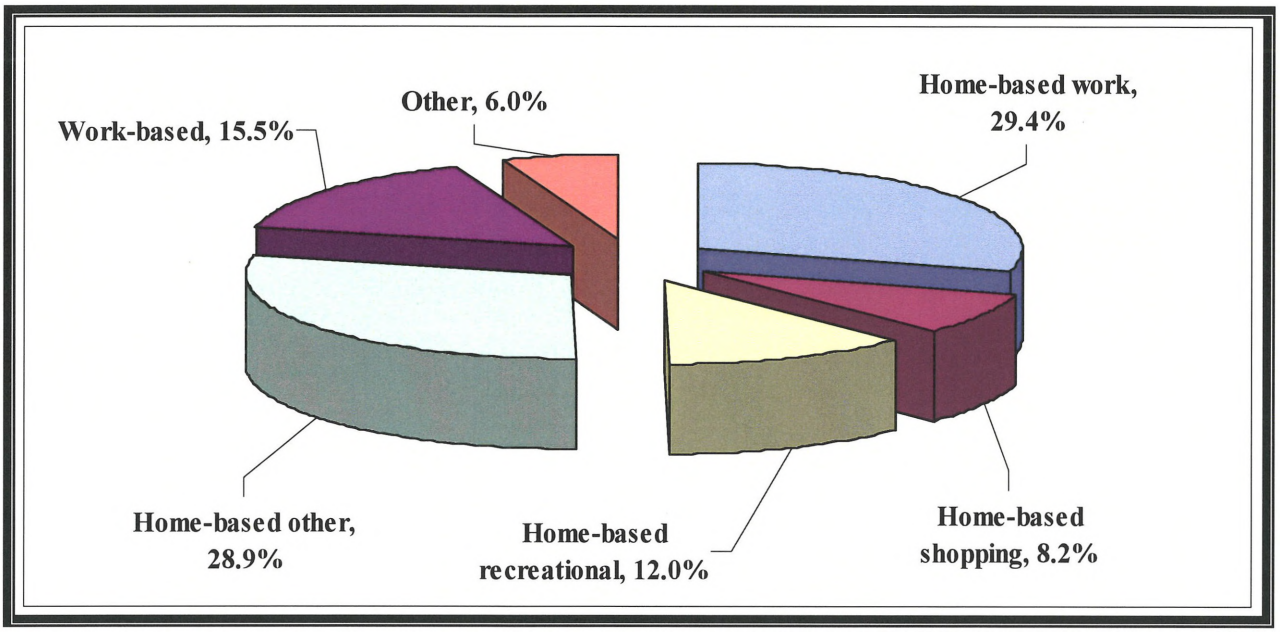
- **Home-based work** These represent direct trips between home and work. They could also be classified as "commuting" trips.
- **Home-based shopping** These represent trips between home and any shopping location.
- **Home-based recreational** These represent trips between home and a recreational area (e.g. campground, state park), a hotel, or a seasonal residence. Trips to amusement parks and concerts would also be included here.
- **Home-based other** These represent trips between home and other miscellaneous destinations, such as a school or a medical facility.
- **Work-based** These represent trips between work and any destination other than home. Typical work-based trips would include customer calls and lunch-hour trips.

[8] For purposes of this survey, a "weekday" was considered Monday through Thursday. It is interesting to note that these four days comprise 57% of a week (4/7=0.57). This also closely approximates the percentage of weekday survey responses.

- **Other** These represent any trip not captured in the preceding five categories. An example could be a trip between two recreational areas, or between a doctor's office and a shopping plaza.

Figure 4.2 summarizes the various trip types exhibited by Maine Turnpike patrons.

Figure 4.2 – Trip Types on Maine Turnpike



Several observations may be drawn from Figure 4.2.

- The single largest category of trips is home-based work. Nearly 30% of all trips on the Turnpike represent people traveling to or from their place of work.
- The second-largest category is "home-based other", comprising 29% of all Turnpike trips. This indicates that the Turnpike supports many miscellaneous trips that are not easily categorized, such as trips to visit friends, to attend a church, to go to school, or to receive medical care.
- Work-related trips (home-based work plus work-based) make up nearly half of all Turnpike trips.
- "Miscellaneous" trips (i.e. "home-based other" (29.0%) plus "other" (6.0%)) make up over one-third of all Turnpike trips.
- Trips between home and shopping comprise about 8% of all Turnpike trips. This is identical to the percentage of shopping trips identified in the 1998 survey.
- Trips between home and recreational areas represent a modest 12% (or one out of eight) of all Turnpike trips. In other words, on a typical day on the Maine Turnpike, commuting trips (that is, "home-based work" trips) outnumber recreational trips by more than 2 to 1.

It is interesting to compare these statistics with averages from other parts of the country. For example, in most metropolitan regions, home-based work trips comprise 15-25% of all trips (both highway and non-highway)[9]. The percentage on the Maine Turnpike is slightly higher at 30%.

The survey data also indicates that nearly 80% of all trips on the Turnpike are home-based trips. By comparison, for most regions, about 65-75% of all trips are home-based.[10] Thus, the Maine Turnpike appears

[9] See *Phoenix External Travel Survey – Executive Summary*, Parsons Transportation Group, 5 March 2001, pg. 7. The report is available online at www.mag.maricopa.gov.

to serve a higher-than-average proportion of home-based trips. This may indicate that non-home based trips, such as trips between work and shopping centers, are more likely to be served by local roads. However, without more data, it is difficult to draw definitive conclusions.

In short, the Maine Turnpike serves a wide variety of trip types. The vast majority (nearly 80%) of these trips either begin or end at home. About half of the trips on the Turnpike are work-related. Recreational trips are common, but they are by no means dominant. Miscellaneous trips that are not easily categorized make up about one-third of the trips. In other words, as traffic on the Turnpike has grown over the years, so has the diversity among Turnpike users.

Figure 4.3 provides an alternative view of the trip purpose data, comparing weekday trip purposes with weekend trip purposes. In this report, a "weekday" trip is any trip taken Monday through Thursday, whereas a "weekend" trip is any trip taken Friday through Sunday.

Figure 4.3 – Trip Purpose Comparison, Weekday vs. Weekend

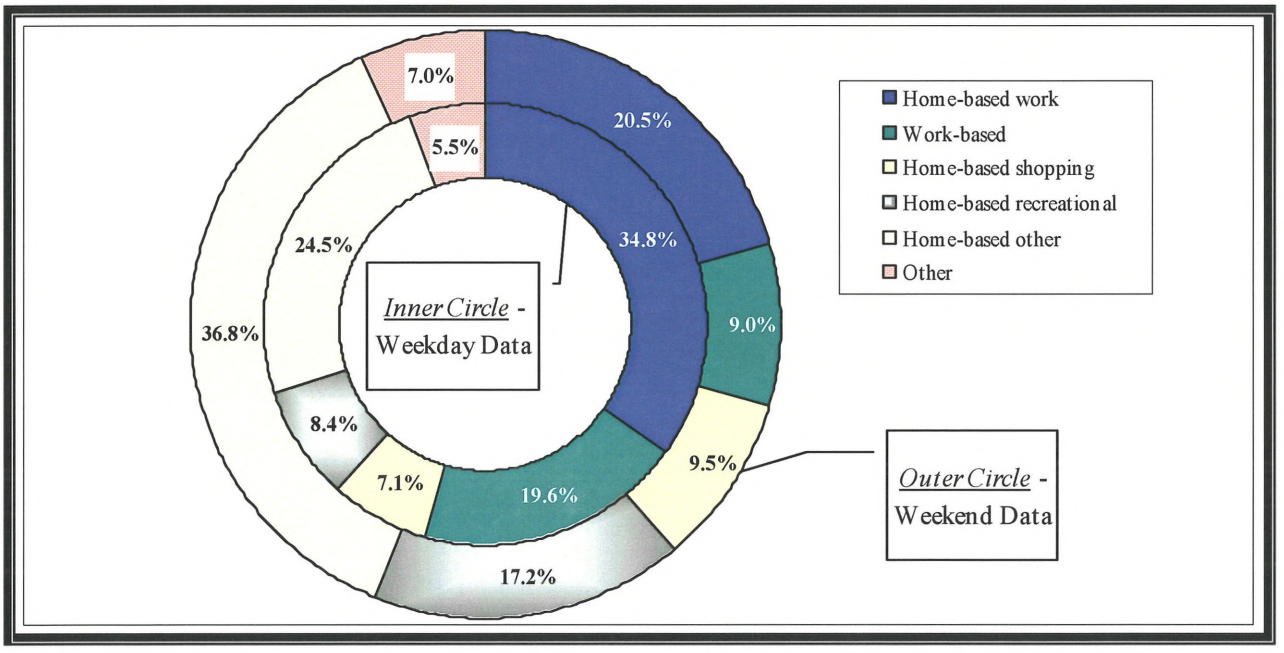


Figure 4.3 highlights some interesting distinctions between weekday and weekend traffic.

- On weekdays, over half of all Turnpike trips are work-related (that is, home-based work or work-based). This share is cut nearly in half on weekends.[11]
- On weekends, only 1 in 12 Turnpike trips is classified as "home-based recreational". This share jumps to 1 in 6 on weekends.
- "Miscellaneous" trips (i.e. trips classified as "other" or "home-based other") comprise only 30% of all trips on weekdays. This percentage rises to 45% on weekends.
- On weekdays, commuting (i.e. home-based work) trips outnumber home-based recreational trips by 4:1. The ratio is nearly 1:1 on weekends.

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[10] Ibid. See also the *2000 Travel Behavior Inventory*, a comprehensive transportation survey of Minnesota's Twin Cities region, available at www.metrocouncil.org/planning.

[11] One might expect the work-related share on weekends to be lower than the 30% suggested by Figure 4.3. However, Friday—a day with a significant number of work-related trips—is considered a "weekend" day by this study.

In sum, the "average" conditions depicted in Figure 4.2 actually mask dramatic differences between weekday and weekend traffic. Weekday traffic tends to be more work-oriented, with a very small share of recreational usage. Yet even on weekends, home-based recreational trips comprise less than 20% of all Turnpike traffic. Clearly, the Turnpike is not primarily a "recreational" road, as previous reports have depicted.[12]

4.4. QUESTIONS 6 & 7: INTERCHANGE ENTERED AND EXITED

Questions 6 and 7 asked patrons to identify the interchanges by which they entered and exited the Turnpike. The questions are depicted below.

6. At what interchange (or town) did you **enter** the Turnpike on this trip? _____
7. At what interchange (or town) did you **exit** the Turnpike on this trip? _____

Table 4.3 summarizes some of the interchange-to-interchange data revealed by the survey. The table, which reflects the responses of both cash and ETC patrons, breaks the Turnpike down into 5 general areas:

- South of Turnpike (i.e. south of York toll plaza)
- Southern section (the 6-lane section between the York toll plaza and Exit 44)
- Central section (Exits 45 through 53)
- Northern section (Exits 63 through 102/3)
- North of Turnpike (I-95 Exit 109 and points north)

The table summarizes the manner in which traffic entering the Turnpike is dispersed among these five sections. The data is broken out by entering location. For each entering location, the most common destination is highlighted.

Table 4.3 – Origin-Destination Patterns, by Originating Plaza

[12] The 1998 edition of the MTA's 10 Year Planning Report makes reference to "the recreational nature of Turnpike traffic" (pg. 12). The 2004 O&D study illustrates that this characterization is not as relevant today. It fails to appreciate the diverse array of trip types that are served by the Maine Turnpike of the 21st century.

Origin		Destination				
Section	Plaza	South of Turnpike[1]	Southern Section[2]	Central Section[3]	Northern Section[4]	North of Tpke[5]
S. of Tpke.	York		55%	26%	11%	7%
Southern Section	19 (Wells)	44%	33%	18%	4%	1%
	25 (Kennebunk)	30%	44%	22%	3%	1%
	32 (Biddeford)	14%	45%	36%	4%	1%
	36 (Saco)	14%	38%	43%	5%	1%
	42 (Scarborough)	21%	42%	28%	8%	1%
	44 (I-295 Connector)	44%	56%			
Central	45 (Maine Mall)	21%	27%	33%	16%	2%
	46 (Jetport)	7%	21%	47%	23%	2%
	47 (Rand Rd.)	14%	38%	36%	10%	2%
	48 (Riverside St.)	12%	28%	42%	15%	3%
	52 (Falmouth)	16%	12%	56%	15%	1%
	53 (W. Falmouth)	8%	15%	46%	29%	3%
Northern	63 (Gray)	9%	10%	60%	14%	7%
	75 (Auburn)	11%	7%	39%	33%	10%
	80 (Lewiston)	5%	7%	26%	47%	15%
	102 (Gardiner, SB Ramp)	6%	2%	10%	83%	
	103 (I-295 Plaza, NB)					100%
N. of Tpke.	Augusta & N.	8%	4%	7%	81%	

[1]**South of Tpke** = south of York toll (I-95 Exit 7 and south)

[2]**Southern section** = Exits 19 (Wells / Sanford) through 44 (South Portland / Downtown Portland)

[3]**Central section** = Exit 45 (Maine Mall Rd. / Payne Rd.) through 53 (W. Falmouth / Cumberland)

[4]**Northern section** = Exits 63 (Gray / New Gloucester) through 102/3 (Gardiner / Litchfield)

[5]**North of Turnpike** = I-95 Exit 109 and points North

Though more detailed data is available, this table reveals some of the predominant characteristics of Turnpike usage. Some observations that follow from Table 4.3 are listed below:

- About 80% of the vehicles entering at the York toll plaza are destined for either the Southern or Central sections. Only 1 in 14 vehicles entering at York actually travel the full length of the Turnpike.
- Wells is the only interchange whose most common destination is south of the Turnpike. Similarly, the Gardiner / I-295 barrier is the only interchange oriented primarily to points north of the Turnpike.
- For almost all plazas in the Central section (Exits 45 though 53), the most common destination was also in the Central section. In other words, the Central section serves a lot of short trips. This is likely a consequence of adding two closely-spaced interchanges (Exits 46 and 47) in a 3-year span, which has provided access to areas that had previously only been served by local roads.
- The Central section was also the most common destination for trips originating in Gray and Auburn. This could indicate a significant amount of commuting and commercial activity between these two regions and Greater Portland.
- For traffic originating in Lewiston, the most common destinations lay in the northern end. However, nearly one out of every four trips originating in Lewiston are destined for the Central section, about 35 miles to the South. Again, this suggests that the economic reach of Greater Portland extends northward to Lewiston.

Table 4.4 compares the 2004 results with the results from 1996, the last full year in which the ticket system operated. Once again, the most common destination associated with each point of origin is highlighted. The data for 2004 is identical to the information in Table 4.3; it is repeated in this table for purposes of comparison.

Table 4.4 – Comparison of Origin & Destination Data, 1994 – 2004

Origin		Destination									
		1996					2004				
		Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
York & Points South			**59%**	25%	8%	8%		**55%**	26%	11%	7%
Southern	**19 (Wells)**	**46%**	37%	13%	3%	2%	**44%**	33%	18%	4%	1%
Southern	**25 (Kennebunk)**	31%	**49%**	17%	2%	1%	30%	**44%**	22%	3%	1%
Southern	**32 (Biddeford)**	14%	**57%**	24%	3%	1%	14%	**45%**	36%	4%	1%
Southern	**36 (Saco)**	14%	**54%**	27%	4%	1%	14%	38%	**43%**	5%	1%
Southern	**42 (Scarborough)**	18%	**52%**	21%	8%	0%	21%	**42%**	28%	8%	1%
Southern	**44 (I-295 Connector)**	47%	**53%**				44%	**56%**			
Central	**45 (Maine Mall)**	17%	**31%**	31%	18%	3%	21%	27%	**33%**	16%	2%
Central	**46 (Jetport)**						7%	21%	**47%**	23%	2%
Central	**47 (Rand Rd.)**						14%	**38%**	36%	10%	2%
Central	**48 (Riverside St.)**	13%	21%	**50%**	14%	3%	12%	28%	**42%**	15%	3%
Central	**52 (Falmouth)**	33%	11%	**43%**	12%	1%	16%	12%	**56%**	15%	1%
Central	**53 (W. Falmouth)**	5%	11%	**42%**	37%	5%	8%	15%	**46%**	29%	3%
Northern	**63 (Gray)**	14%	9%	**52%**	14%	10%	9%	10%	**60%**	14%	7%
Northern	**75 (Auburn)**	12%	8%	**38%**	36%	6%	11%	7%	**39%**	33%	10%
Northern	**80 (Lewiston)**	6%	5%	25%	**52%**	12%	5%	7%	26%	**47%**	15%
Northern	**102 (Gardiner)**	4%	2%	4%	**90%**		6%	2%	10%	**83%**	
Northern	**103 (I-295 Plaza, NB)**					**100%**					**100%**
Augusta & Points North		11%	3%	7%	**79%**		8%	4%	7%	**81%**	

Notes:

- Region #1 = S. of York toll plaza
- Region #2 = Southern section (Exits 19 through 44)
- Region #3 = Central section (Exits 45 through 53)
- Region #4 = Northern section (Exits 63 through 102/3)
- Region #5 = Augusta and points north

A key point illustrated by Table 4.4 is that travel patterns have *not* changed significantly over the past 8 years. For almost all interchanges, the most common destinations have remained the same.

Nevertheless, some trends can be discerned from Table 4.4.

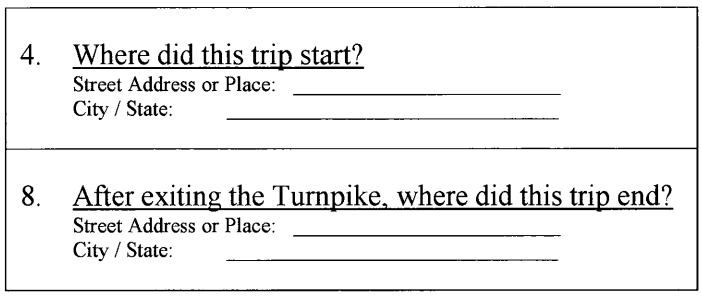
- Only two interchanges experienced changes in their most common destinations.
  - Exit 36 (Saco), whose most common destination shifted from the Southern section in 1996 to the Central section in 2004.
  - Exit 45 (Maine Mall Rd.), whose most common destination also shifted from the Southern section in 1996 to the Central section in 2004.

- Exits 46 and 47 were new interchanges, added to the system since 1996. About 70% of the vehicles entering at these interchanges are destined for interchanges in the Central and Southern sections. Fewer than one in six of the vehicles entering at these interchanges is destined for some point beyond the Turnpike (i.e. York and points south, or Augusta and points north).
- The Falmouth interchange has undergone significant change. In 1996, 43% of its entering traffic was destined for the Central section; by 2004, the share had grown to 56%. Meantime, the percentage of Falmouth traffic destined for York and points south shrunk from 33% in 1996 to 16% in 2004. What accounts for the shift? It is likely the result of adding two new interchanges in the Central section. By improving access to Brighton Ave. and Congress St., these new interchanges have likely attracted new users to the Falmouth interchange.
- There does *not* seem to be a trend toward a greater percentage of through trips. The percentage of trips going from Region 1 (York and points south) to Region 5 (Augusta and points north) stayed relatively constant, at 7-8%. In the opposite direction, the percentage of trips going from Region 5 to Region 1 fell from 11% in 1996 to 8% in 2004.

In short, it appears that most changes in travel patterns have been shaped by the introduction of new interchanges in the Central section. The share of traffic destined for the Central section is growing because these new interchanges have improved access to some highly-developed areas of Portland and Westbrook. These results suggest that, over the past decade, Maine Turnpike travel patterns have been shaped more by the addition of new interchanges than by changes in the tolling structure.

4.5. QUESTIONS 4 & 8: WHERE TRIP STARTED AND ENDED

In order to obtain information for the portion of a trip not on the Turnpike, the survey included Questions 4 and 8. These questions asked patrons where their trip started and ended. The questions are depicted below:



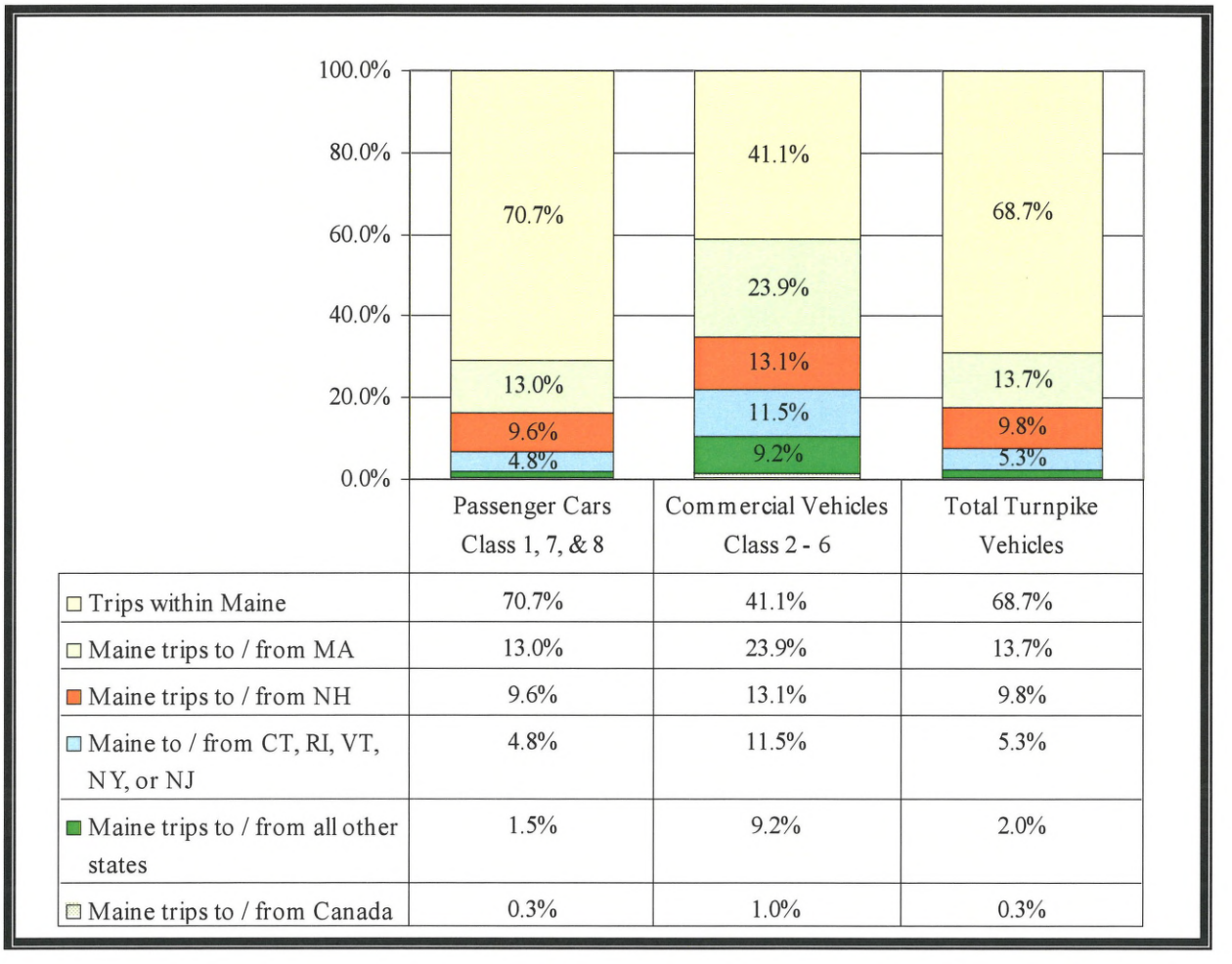
The purpose of these questions was to understand what kinds of door-to-door movements are supported by the interchange-to-interchange movements discussed in the previous section. Information gleaned from these questions can address such questions as:

- From how broad of a geographical area does each interchange draw?
- How many patrons entering at York began their trip from out-of-state?
- To what extent are people traveling between Scarborough and Falmouth using the Turnpike as opposed to I-295?

In short, these questions help provide a context for better understanding the interchange-to-interchange movements exhibited in Section 4.5. They can also help shed light on how patterns might change if tolling strategies were to change (e.g. through the conversion to a regional toll system).

A complete summary of door-to-door movements is beyond the scope of this report. However, it is interesting to review the extent of out-of-state trips on the Turnpike. This information is summarized in Figure 4.4.

Figure 4.4 – Origin and Destination Summary, by State



	Passenger Cars Class 1, 7, & 8	Commercial Vehicles Class 2 - 6	Total Turnpike Vehicles
Trips within Maine	70.7%	41.1%	68.7%
Maine trips to / from MA	13.0%	23.9%	13.7%
Maine trips to / from NH	9.6%	13.1%	9.8%
Maine to / from CT, RI, VT, NY, or NJ	4.8%	11.5%	5.3%
Maine trips to / from all other states	1.5%	9.2%	2.0%
Maine trips to / from Canada	0.3%	1.0%	0.3%

Four important observations may be drawn from Figure 4.4:

- About 70% of all passenger car trips on the Maine Turnpike are intra-state trips. For the commercial traffic, this number is much lower at 41%. In other words, a passenger vehicle on the Turnpike is more apt to be traveling within Maine than a commercial vehicle.
- About one-fourth of all Turnpike trips are between Maine and either Massachusetts and New Hampshire. For commercial vehicles only, this percentage is considerably higher (37%).
- Even though New Hampshire is Maine's closest neighbor, the most common out-of-state destination for Maine Turnpike patrons is actually Massachusetts. About 13% of the Turnpike's passenger cars and 24% of the Turnpike's commercial vehicles travel to and from Massachusetts.
- The percentage of trips *through* Maine on the Turnpike (i.e. trips between Canada and a state other than Maine) is negligible. This indicates that Maine is almost exclusively a destination state. This is a marked contrast to New Hampshire, which likely serves a significant proportion of through trips (e.g. Massachusetts to Maine).[13]

This latter point is of economic consequence. States such as New Hampshire can reap economic benefit from two types of tourists—those who visit the state, and those who simply pass through the state. Maine's economy, on the other hand, only benefits from tourists who are expressly visiting the state.

[13] It is also likely that this survey understates the actual percentage of Canadian trips. The survey narrowly defined a trip as a one-way outing on the Turnpike. Therefore, long-haul trips to and from Canada may have been reported as a shorter trip ending within the state. For example, a two-day trip from Massachusetts to Nova Scotia may have been reported as a Massachusetts to Bangor trip, with the remaining portion of the trip being unreported.

Section 5. Patron Characteristics

As the introduction to this report noted, one purpose of the survey was to better understand selected patron characteristics. Seven questions on the survey were designed to highlight some of these characteristics. The questions are summarized and discussed below.

5.1. Question 10: Home Zip Code or Postal Code

Question 10 is shown below.

> 10. What is you **home** ZIP code or postal code?
> _____

This aimed to answer one basic question: on a typical day, what portion of the Turnpike's patrons are from out of state? The answers to this question are summarized in Table 5.1.

Table 5.1 – Home Location

	Percent of Patrons		
Region / *State*	Passenger Vehicles	Commercial Vehicles	Total Turnpike Vehicles
West	0.2%	0.3%	0.2%
Midwest	0.4%	3.4%	0.7%
South	1.0%	4.6%	1.3%
Northeast	98.1%	90.3%	97.5%
Connecticut	*1.2%*	*2.9%*	*1.3%*
Delaware	*0.1%*	*0.0%*	*0.1%*
Maine	***83.3%***	***61.1%***	***81.6%***
Massachusetts	*6.5%*	*12.0%*	*6.9%*
New Hampshire	*4.3%*	*8.9%*	*4.6%*
New Jersey	*0.6%*	*0.3%*	*0.6%*
New York	*0.8%*	*2.0%*	*0.9%*
Pennsylvania	*0.4%*	*2.0%*	*0.5%*
Rhode Island	*0.5%*	*1.1%*	*0.6%*
Vermont	*0.5%*	*0.0%*	*0.5%*
Canada	0.3%	1.4%	0.4%

The following observations may be drawn from Table 5.1:

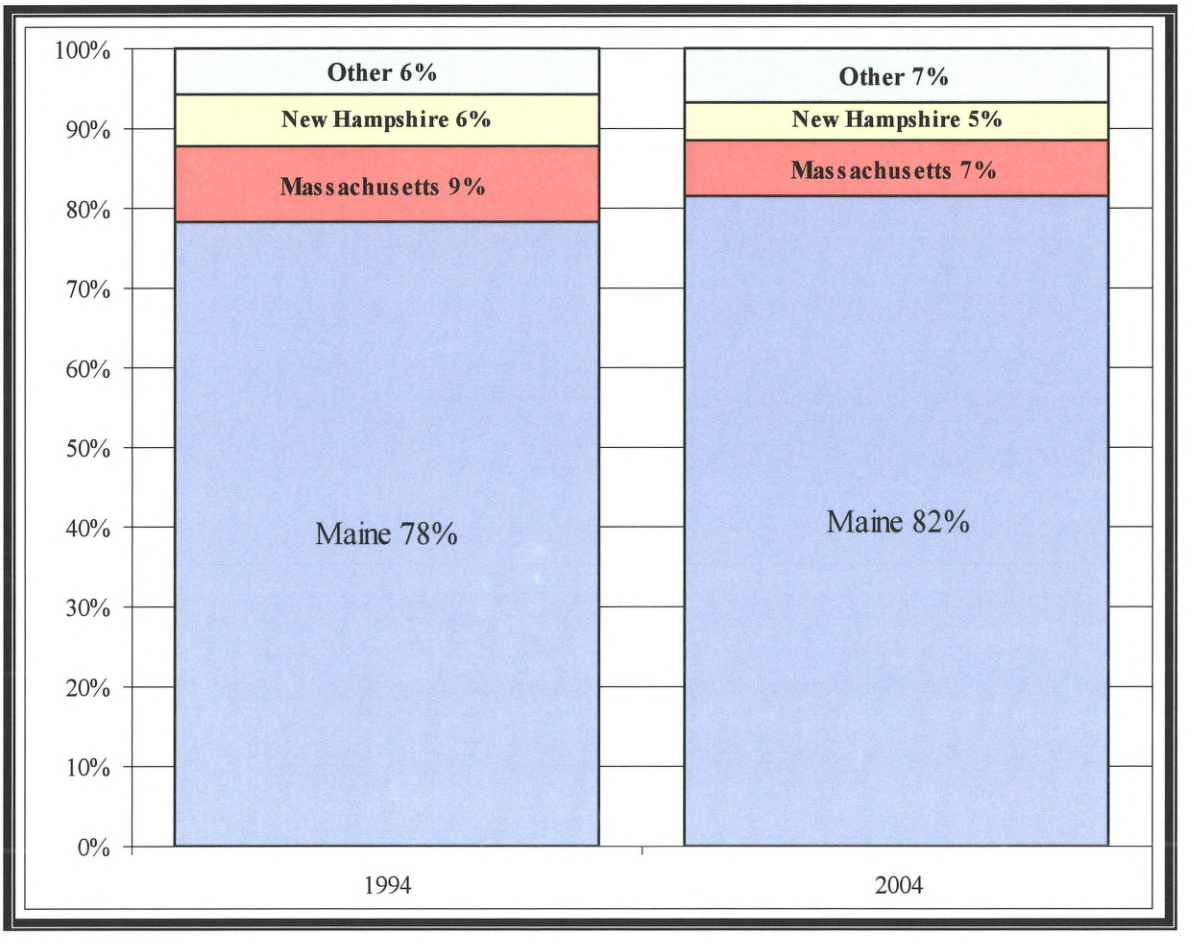
- About four out of five Turnpike travelers reside in the state of Maine. Although the Turnpike is the primary gateway to Maine for out-of-state travelers, the primary users of the roadway are Maine citizens.
- About 40% of all commercial vehicles are from out-of-state, compared to only 17% of passenger vehicles.
- The data in Table 5.1 is consistent with the data in Figure 4.3. For example:

- In Figure 4.3, the most common out-of-state *destination* is Massachusetts; in Table 5.1 the most common out-of-state *patrons* are from Massachusetts.
- In Figure 4.3, a total of 7.3% of all Turnpike *trips* had origins or destinations beyond Massachusetts; similarly, in Table 5.1, a total of 6.4% of all *patrons* reside beyond Massachusetts.

- Despite the fact that Maine and Canada share a border, relatively few Turnpike patrons actually reside in Canada. In fact, the number of Turnpike patrons from Canada is comparable to the number of patrons from the Midwest.[14]

Figure 5.1 compares the data from the 2004 survey with data reported in the 1994 O&D survey.

Figure 5.1 – In-State vs. Out-of-State Patrons, 1994 – 2004



In general, the percentages have only changed at the margins. The share of in-state vehicles has increased modestly, while the share of Massachusetts and New Hampshire users has decreased modestly. In short, in-state users make up a greater share of today's Turnpike travelers, but the increase over the past decade has not been dramatic.

[14] The percentage of Turnpike traffic going to and from Canada is highly seasonal. Thus, this bullet point may *not* be true in the summer, when the Turnpike experiences a relative surge in Canadian patrons.

5.2. QUESTION 11: TYPE OF VEHICLE

Question 11, depicted below, was designed to identify the mix of vehicle types that exist on the Maine Turnpike.

11. What type of vehicle were you driving?

□ Motorcycle	□ 3 or 4 axle truck
□ Car / SUV / pickup	□ 5 or more axle truck
□ Recreational Vehicle	□ Passenger vehicle towing a trailer
□ Bus	

Table 5.2 summarizes the responses to this question. The table contains two columns of data—one representing responses to the survey, and one representing data drawn from HNTB's 2002 revenue study.

Table 5.2 – Vehicle Type Summary

Turnpike Class	Vehicle Type	Percent of Patrons	
		2004 O&D Survey	2002 Revenue Study
Classes 1 & 2	Motorcycle	0.1%	91.6%
	Car/SUV/pickup	91.2%	
Classes 3 thru 6	Recreational Vehicle	0.8%	2.0%
	Bus	0.4%	
	3 or 4 axle truck	2.2%	
	5 or more axle truck	4.2%	5.4%
Classes 7 & 8	Passenger vehicle towing a trailer	1.0%	0.9%

Three important observations may be drawn from Table 5.2:

- Clearly the passenger vehicle (defined in the above table as "Car/SUV/pickup", plus motorcycles) is the dominant mode of travel on the Maine Turnpike. These vehicles account for over 90% of all vehicles.
- The results from the survey are consistent with the results from the revenue study.
  - For class 1 vehicles, the survey indicated 91.3%; the revenue study, 91.6%
  - For class 2-6 vehicles, the survey indicated 7.6%; the revenue study, 7.4%
  - For class 7 & 8 vehicles, the survey indicated 1.0%; the revenue study, 0.9%.
  - BOTTOM LINE – The O&D study captured a representative sample of Turnpike patrons.
- Trucks (defined as class 3-6 vehicles) comprise between 7 and 8 percent of all Turnpike trips. This is a fairly modest truck percentage compared to other turnpikes such as Pennsylvania (13%), New Jersey (15%), and Ohio (20%). One reason for the difference: these other turnpikes serve a high percentage of through truck traffic. Maine, by comparison, serves almost no through truck traffic.[15]

[15] According to a report in the Akron Beacon Journal, about 90% of commercial vehicle revenue collected by the Ohio Turnpike comes from trucks with an origin and/or a destination outside Ohio. Only 10% of the commercial vehicle revenue comes from intra-state trips.

5.3. QUESTION 12: VEHICLE OCCUPANCY

The purpose of Question 12 was to find out how many people, on average, are traveling in each vehicle on the Turnpike. The wording of the question is depicted as follows:

> 12. How many people (driver plus passengers) were in your vehicle?
> _____ people

The response to Question 12 is summarized in Table 5.3. For comparison purposes, the response to the 2004 survey is compared to the 1994 survey.

Table 5.3 – Occupancy Summary

# of Occupants in Vehicle	Percent of Vehicles	
	1994	2004
1	64.9%	58.9%
2	25.4%	29.8%
3	5.4%	6.3%
4	2.6%	3.2%
5 or more	1.7%	1.8%

Table 5.3 suggests that there has been a slight upward trend in vehicle occupancy over the past 10 years. The percentage of single-occupant vehicles (SOV's) declined by 6%, while the percentage of all categories of multiple-occupant vehicles increased. This upward trend in occupancy is also reflected in Table 5.4.

Table 5.4 – Average Occupancy Statistics

Average Number of Occupants / Vehicle	
Maine Turnpike - 2004	1.70
Maine Turnpike - 1994	1.52
National Average (2001)	1.63

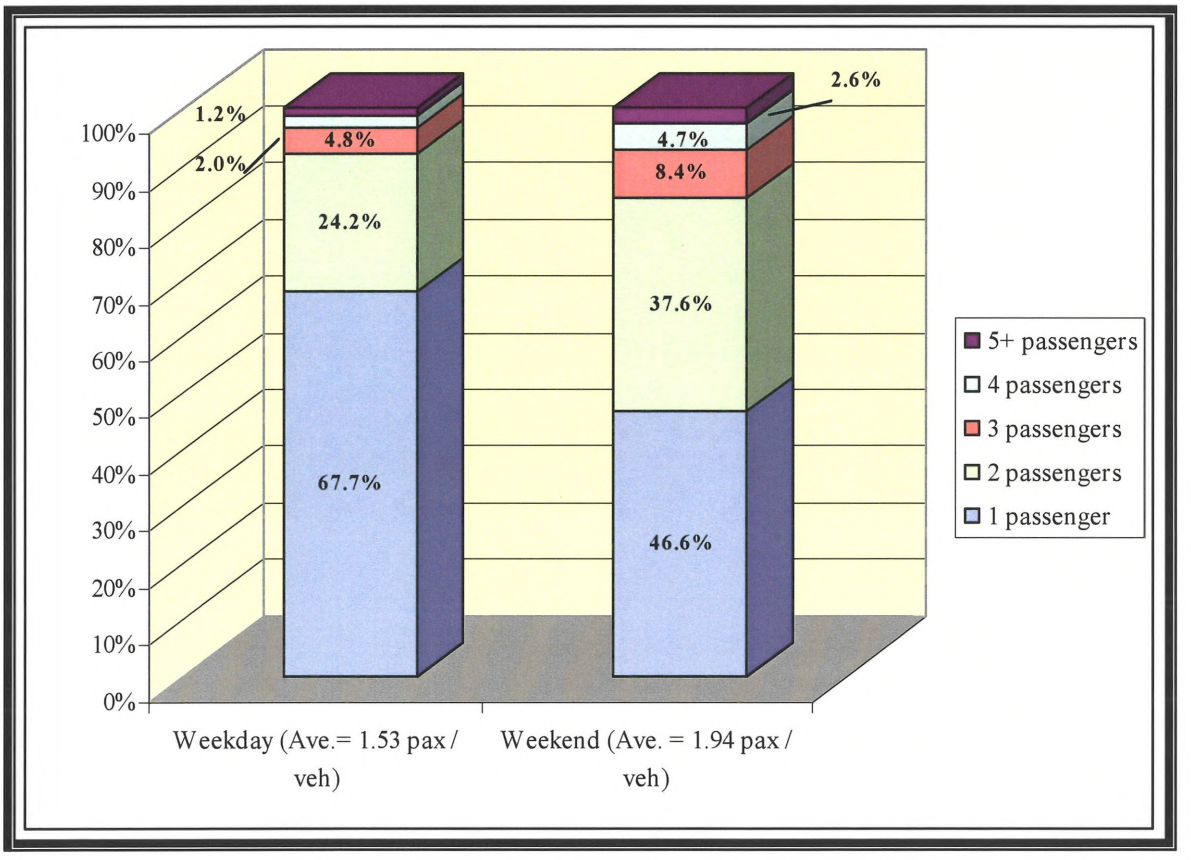
The decrease in SOV usage from 1994 to 2004 is reflected in the growth in average occupancy. The increase from 1.52 persons per vehicle to 1.70 represents an increase of 12%. This is a positive trend. The people-carrying capacity of a highway grows as the average occupancy grows. If the average occupancy of a highway grows 12%, it means that a highway can carry 12% more people with the same number of cars. Alternatively, it means that a highway can carry the same number of people with 11% fewer cars.[16]

[16] To illustrate, consider a highway that carries 1000 vehicles, each with 1 person in it. The highway can therefore carry 1000 people. If the average occupancy increases 12% to 1.12 persons per vehicle, then it would only take 893 cars to carry the same 1000 people. This represents an 11% decrease in the number of vehicles on the roadway.

Table 5.4 also reveals that the Maine Turnpike average is higher than the national average.[17] This is significant. Since highways tend to serve a disproportionate number of commuters, they tend to have lower occupancy rates than local roads.[18] But the Maine Turnpike, even with its high usage by commuters, still has a higher occupancy rate than the national average, which includes all roads. This may reflect an increased awareness of the benefits of carpooling and vanpooling in Maine. Or it could be a by-product of rising gas prices that have encouraged more economical means of travel.

Just as trip purposes vary by type of day (i.e. weekday vs. weekend), so does vehicle occupancy. This variation is evident in Figure 5.2.

Figure 5.2 – Vehicle Occupancy Comparison, Weekday vs. Weekend



As Figure 5.2 illustrates, on weekends, over half of the vehicles on the Turnpike are carrying two or more people. This share shrinks to one-third on weekdays. Overall, weekend occupancy is about 25% higher than weekday occupancy.

An alternative view of this phenomenon can be seen by comparing Saturday traffic with weekday traffic. Saturday traffic levels on the Maine Turnpike are typically about 15% lower than weekday traffic levels. However, after accounting for higher weekend occupancy, the volume of *passengers* is actually about 7% higher on Saturdays. In other words, the Maine Turnpike sees fewer *vehicles* but more *patrons* on a Saturday as compared to a weekday.

[17] National occupancy data was only available for 2001.
[18] Nationwide, the average commuting vehicle carries 1.11 people.

5.4. QUESTION 15: USE OF PARK & RIDE LOT

Question 15, depicted below, was designed to gauge usage of the Park & Ride lot system. There are 15 Park & Ride lots located adjacent to various Turnpike interchanges.

> 15. Did this trip include the use of a Park & Ride lot? (circle one) YES NO

Table 5.5 summarizes the responses to this Question 15, comparing the results to the 1994 survey.

Table 5.5 – Park & Ride Lot Usage

Year	Park & Ride Usage
1994	1.7%
2004	1.9%

As Table 5.5 indicates, the percentage of Park & Ride usage in 2004 is only slightly higher than 1994. In fact, the difference of 0.2% is within the survey's margin of error (± 0.39%). This perhaps explains the relatively flat growth in Park & Ride lot usage in recent years.[19]

Section 5.3 noted that average occupancy has increased over the past decade. Based on the information above, it would appear that this increase is *not* due to a significant increase in Park & Ride usage.

5.5. QUESTIONS 16 & 17: ACTIVE *TRANSPASS* AND *E-ZPASS* ACCOUNTS

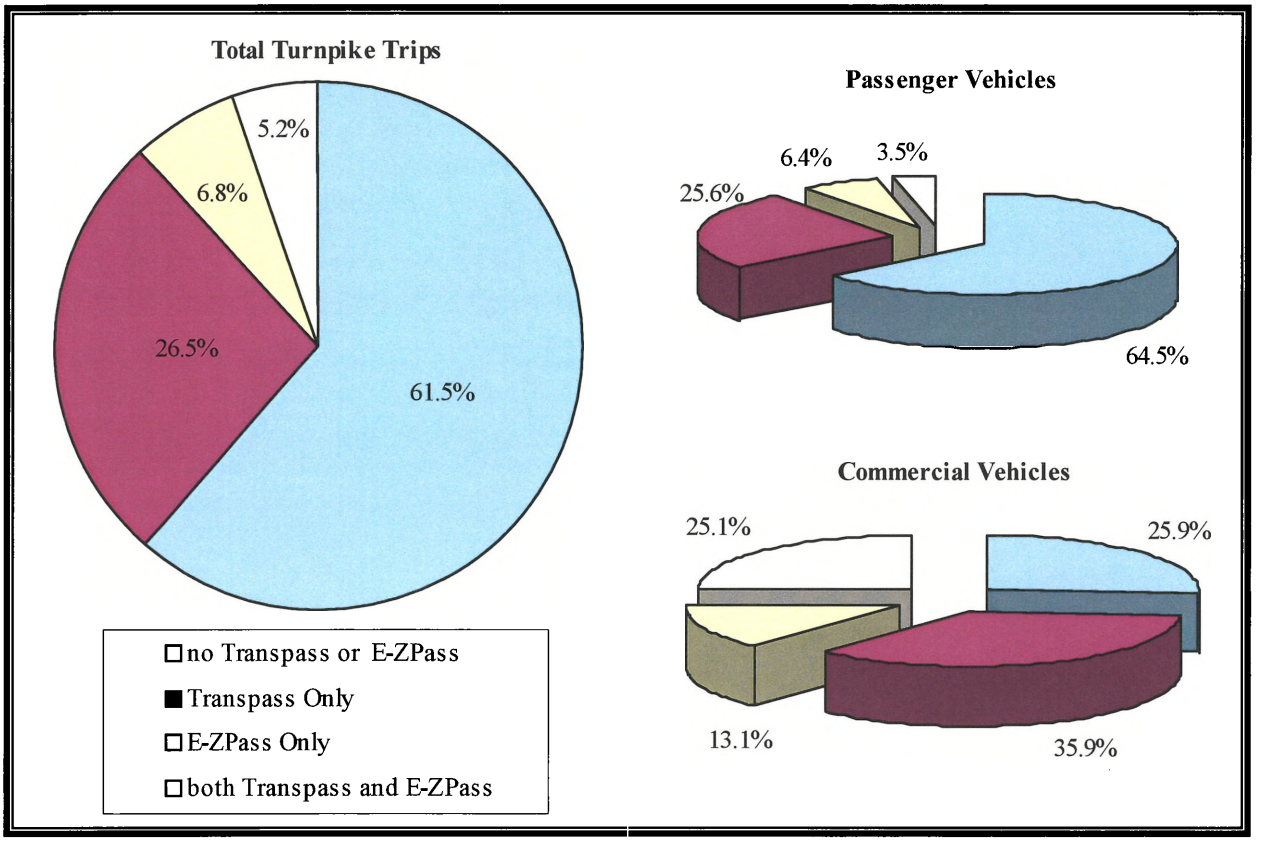
Questions 16 and 17, depicted below, both dealt with the issue of electronic toll collection (ETC). Question 16 asked patrons is they used *Transpass*, the form of ETC used on the Maine Turnpike during the survey. Question 17 asked patrons if they have *E-ZPass*, a form of ETC used on several toll roads in the northeast. The Maine Turnpike will converted from *Transpass* to *E-ZPass* in February 2005.

> 16. Do you have an active Transpass transponder? (circle one) YES NO
>
> 17 *E-ZPass* is a method of electronic toll collection used in other states. Do you currently have an *E-ZPass* transponder? (circle one) YES NO

Figure 5.3 combines the responses to these two questions. It breaks patrons down into four categories: (a) those without *E-ZPass* or *Transpass*; (b) those with *Transpass* only; (c) those with *E-ZPass* only; and (d) those with both *Transpass* and *E-ZPass*.

[19] HNTB has monitored Park & Ride lot usage since 1997. In that year, 464 parking spots were filled. In 2004, a total of 612 spots were filled, representing an annualized increase of 4% per year. To put this rate of growth in context, consider that (a) total traffic has increased about 5% per year during the same time period, and (b) two Park & Ride lots have been added and two others have been expanded since 1997.

Figure 5.3 – *Transpass* and *E-ZPass* Usage Characteristics of Maine Turnpike Patrons



Three observations may be drawn from Figure 5.3:

- Roughly one-third (26.5% + 5.2% = 31.7%) of all Turnpike trips used *Transpass*. In this respect, the survey results are consistent with previous revenue studies. (The 2002 revenue study indicated that 32.2% of Turnpike trips used *Transpass*.)
- About 12% of all Turnpike patrons (in the months preceding the Maine Turnpike's conversion) had *E-ZPass*. This is consistent with data collected near the York toll plaza in 2003 and 2004, which indicated an *E-ZPass* rate of 11.7%.
- Over half of *E-ZPass* tag holders on the Maine Turnpike (again, prior to the conversion) did **not** have a *Transpass*.

Additionally, Figure 5.3 highlights that electronic toll collection is much more popular among commercial vehicles than among passenger vehicles. Nearly three-fourths of all commercial vehicles have some form of electronic toll collection (*Transpass*, *E-ZPass*, or both); by contrast, only about one-third of passenger vehicles did. Moreover, fully 25% of commercial vehicles had both a *Transpass* and an *E-ZPass*, compared to only 4% of passenger vehicles.

This information can help predict the potential impact of the conversion to *E-ZPass*. If all patrons that currently have a *Transpass* switch to *E-ZPass*, then the total percentage could grow to near 40% (i.e., the sum of the "*Transpass* Only", "*E-ZPass* Only", and "both *Transpass* and *E-ZPass*" categories). This will likely have operational benefits for the York toll plaza, where the demand exceeds the capacity during portions of summer weekends. Since ETC patrons are processed about 3-4 times as fast as manual patrons, the York toll plaza should benefit by an increasing share of ETC traffic.

As a side note, it is interesting to compare the actual ETC usage rate on the Maine Turnpike with an "expressed preference" survey conducted a decade ago. The 1994 origin-destination survey posed the following question:

> *Electronic Toll Collection is an automatic, vehicle scanning system where motorists would not have to stop to pay the toll. Would you use this system for a pre-paid reduced toll rate?*

Of the nearly 6700 patrons that responded to the question, **over 80%** said that they would use ETC. This contrasts greatly with the actual usage of about **32%**. This illustrates the limits of expressed preference surveys—what people *say* they will do does not always match what they actually do.

5.6. QUESTION 18: FREQUENCY OF TRAVEL OUTSIDE OF MAINE

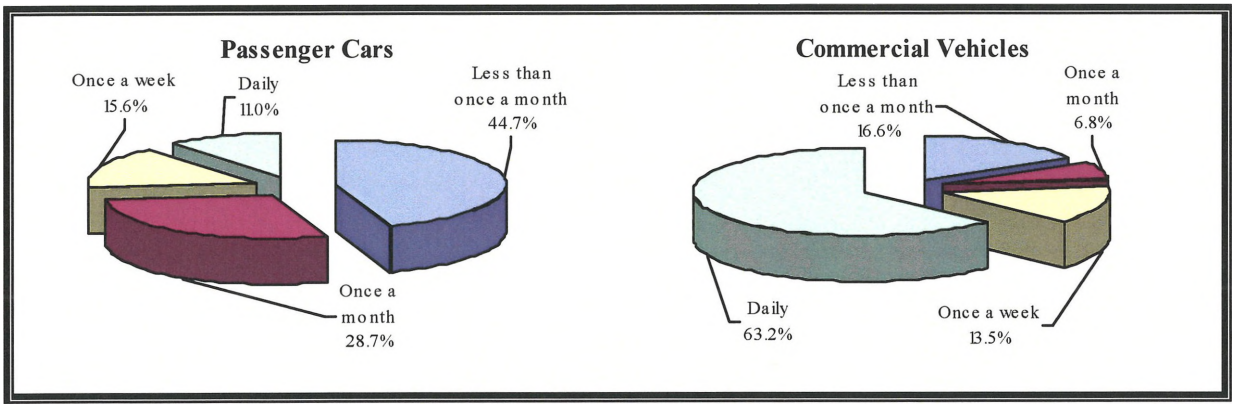
Question 18 was the final question dealing with the general category of "patrons characteristics" . Its intent was to help the Authority understand the extent to which its patrons travel out-of-state. The wording is depicted below.

18. How frequently do you travel outside of Maine?

□ Less than once a month	□ Once a week
□ Once a month	□ Daily

The responses to Question 18 are summarized in Figure 5.4.

Figure 5.4 – Frequency of Out-of-State Travel



The most outstanding characteristic of Figure 5.4 is the contrast between passenger cars and commercial vehicles.

- The most common response for passenger cars was "less than once a month", the *least* frequent option. By contrast, the most common response for commercial vehicles was "daily", the *most* frequent option.
- Roughly 75% of passenger cars travel out-of-state either "once a month" or "less than once a month". By contrast, roughly 75% of commercial vehicles travel out of state either "daily" or "once a week".

Clearly, the travel patterns for commercial vehicles are distinctly different from those of passenger cars. While intra-state trips are the norm for passenger cars, inter-state trips are the norm for commercial vehicles. This likely means that the average trip length for a commercial vehicle on the Turnpike is longer than the average trip length for a passenger car.

Section 6. Quality of Service

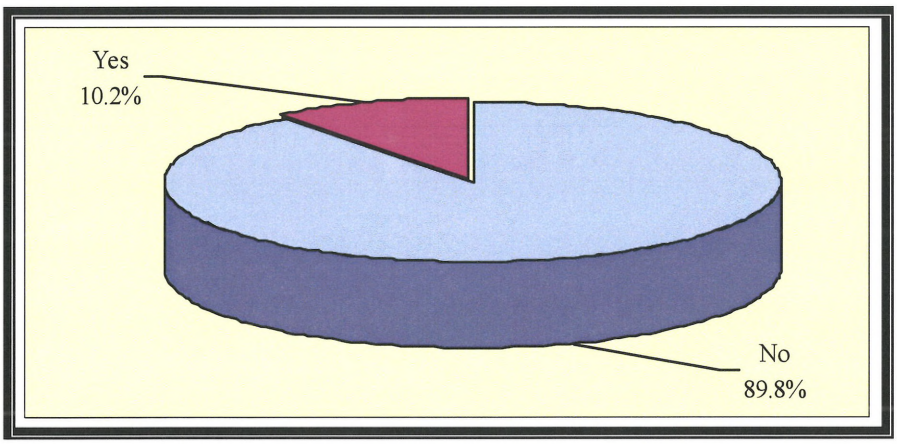
As Section 2 noted, the third purpose of the origin and destination survey was to acquire feedback on the quality of service provided by the Maine Turnpike. In order to do this, the survey asked patrons (a) if they encountered any delays; and (b) how long the delays lasted. These questions, having been asked of patrons in previous surveys as well, thus provide a means for tracking the performance of the Turnpike over time.

Questions 13 and 14, which addressed the issues of quality of service, are depicted below.

13. Did you encounter any delays on the turnpike during this trip? (circle one) YES NO
14. If yes, approximately how long were you delayed? _____ minutes

The response to Question 13 is summarized in Figure 6.1.

Figure 6.1 – Percentage of Patrons Encountering Delays



Clearly, the vast majority of Turnpike travelers experience a smooth ride, at least on the Turnpike portion of their journey. Only one out of every ten Turnpike patrons reported experiencing delays of some sort.

Figure 6.2 adds some detail to Figure 6.1. It illustrates the extent of the delays experienced by the patrons who reported having delays.

Figure 6.2 – Delays Experienced by Turnpike Patrons

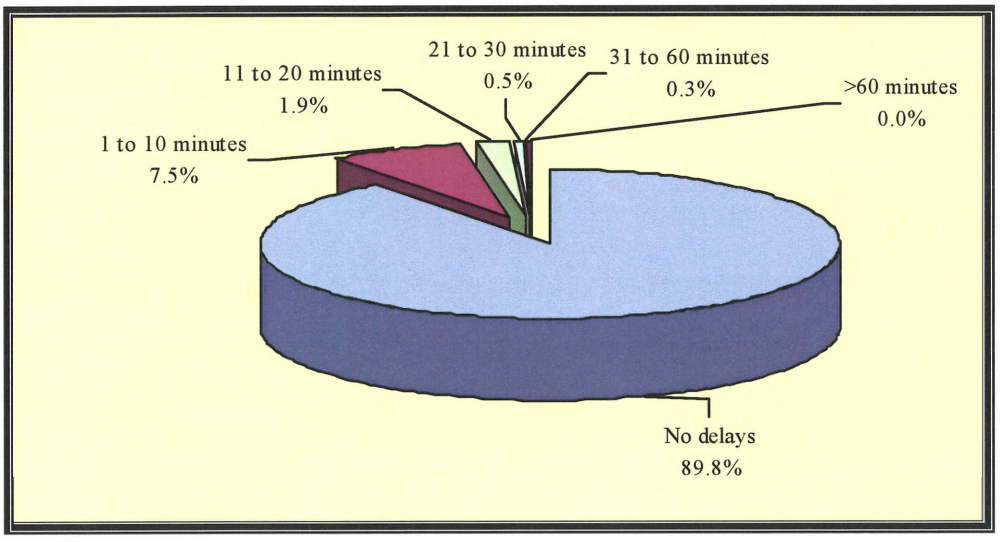
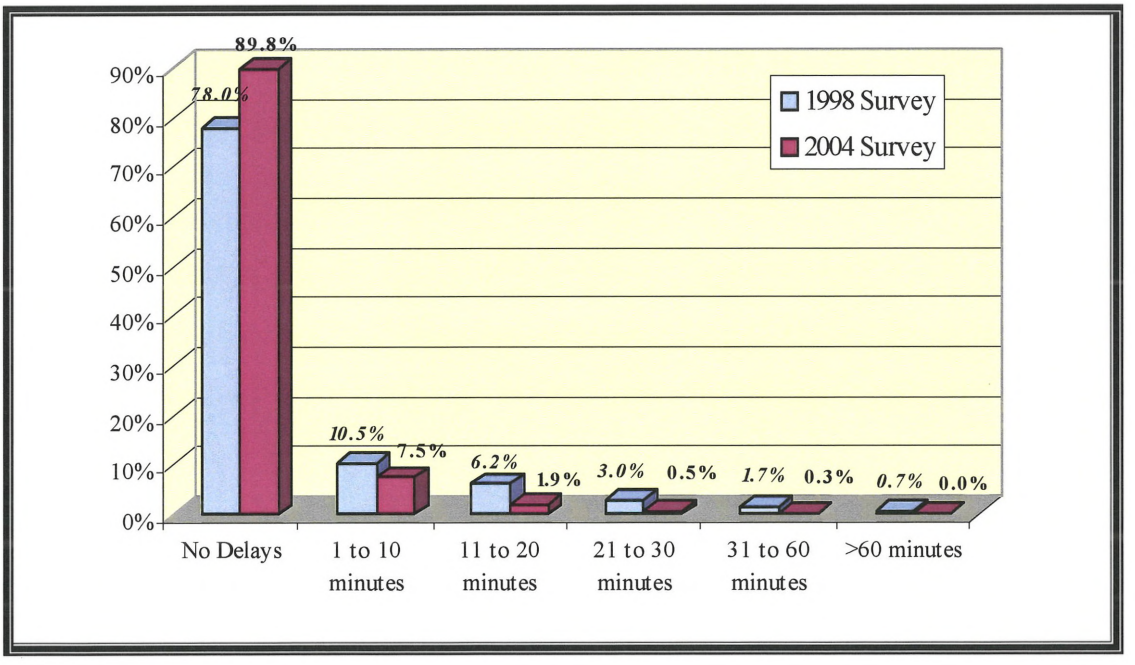


Figure 6.2 illustrates that *less than 1%* of Turnpike patrons experience delays of 20 minutes or more. Moreover, about 97% of all Turnpike patrons experience delays of 10 minutes or less. This indicates that the Turnpike is providing patrons with a relatively congestion-free travel alternative to local roads.

It is interesting to compare the results of the 1998 survey with the 2004 survey. The former was conducted prior to the Widening; the latter was conducted when the Widening was nearly complete. Figure 6.3 compares the two surveys:

Figure 6.3 – Comparison of Delays, 1998 vs. 2004



Two major observations may be drawn from Figure 6.3:

- In 1998, about 2 out of every 9 patrons reported delays. By 2004, only 1 out of 10 reported delays.
- For every category of delay, from "1 to 10 minutes" up to ">60 minutes", the percentage of patrons experiencing delays in 2004 was lower than in 1998.

Clearly, the delays revealed by the 1998 survey were much more prevalent than those reported in the 2004 survey. Part of the reduction in delays in 2004 may be attributed to the Widening. The busiest portions of the Turnpike now operate with three lanes in each direction, thus relieving both recurring delays (i.e. periodic delays caused by heavy traffic volume) and non-recurring delays (i.e. delays caused by accidents and other unanticipated interruptions).

Two final notes can help put these delay results in perspective:

- The 1998 survey was conducted in the midst of the summer tourist season (July), whereas the 2004 survey was conducted in the spring (May). In order to truly evaluate the impact of the Widening, one would need to pose the same questions during the summer season.
- The 2004 survey was conducted in the midst of two major construction projects. The first was the final segment of the Widening, taking place between Exit 25 (Kennebunk / Kennebunkport) and Exit 32 (Biddeford). The second was a repaving project in the vicinity of Gardiner and Augusta. These projects may have accounted for some of the delays reported.

Section 7. Applications of O&D Data

The previous three sections summarized the responses to the 18 questions posed in the survey. This section will examine three additional topics related to the survey. Though not directly related to the three major purposes of the survey (as outlined in Section 2), they nevertheless provide information that can contribute to effective transportation planning in the future.

- Section 7.1 will summarize the major themes that emerged from the comment section of the survey card.
- Section 7.2 will summarize information related to usage of I-95 and I-295 in the Greater Portland area. This information is pertinent to the ongoing I-295 Corridor Study, which is analyzing (in part) the potential benefits of shifting through traffic on I-295 over to the Turnpike.
- Section 7.3 will examine how the overall toll burden is distributed between in-state and out-of-state patrons.

7.1. Question 19: Comments

The final portion of the survey, depicted below, was an open-ended solicitation of comments from patrons.

19. Comments
_____
_____
_____

A wide variety of comments were received. Most of them dealt with one or more of the following topics:

- Transpass (113 comments)
- *E-ZPass* (83 comments)
- The Widening (55 comments)
- Restriction of trucks from the 3rd lane (39 comments)
- New exit numbers (27 comments)
- Toll collectors (15 comments)

These topics will be discussed in order.

(i) Transpass (113 comments)

Transpass-related comments were the most common. About 30 patrons expressed strong support for Transpass. In fact, the single most common comment on the survey card was "I love my Transpass!" Many patrons appreciated the discounts associated with Transpass usage, while others noted that it saved them time at congested toll plazas.

However, support for Transpass was not universal. Many comments also pointed out some problems associated with the system. The most common problems noted were:

- **Lack of paper trail.** No receipts can be generated from the Transpass system, making it difficult for business travelers to be reimbursed for their toll-related expenses.
- **Difficult to obtain.** Many patrons noted that they wanted a Transpass, but had been unable to obtain one from the Authority.
- **Malfunctions.** Many patrons expressed frustration that their Transpass does not always function properly, even when the batteries are fresh.

- **Violators.** Many Transpass users were irritated that non-Transpass patrons were using the Transpass Only lanes, thus getting a free ride.
- **Lack of interoperability.** Some patrons wished that the Transpass could be used on other toll roads as well.
- **Location of dedicated lanes.** These comments generally fell into one of three categories. The first category dealt with the fact that some Transpass lanes are difficult to reach (e.g. Exits 45 and 48). The second category dealt with the fact that some dedicated lanes are not always open (e.g. Exits 32, 36, and 52). The third category dealt with the fact that the locations of the dedicated lanes are not uniform at all plazas.

(ii) *E-ZPass* (83 comments)

The comments related to *E-ZPass* were almost universally positive. There were three primary reasons why patrons were excited about the upcoming transition:

- They wanted electronic toll collection, and they had been unable to acquire a Transpass. So the quicker the new system goes on-line, the sooner they can reap the benefits.
- They will be able to use the device on virtually all toll roads in the northeast.
- They already have the device from another state, and look forward to being able to use it in Maine.

(iii) The Widening (55 comments)

The Widening comments, like the *E-ZPass* comments, were nearly all supportive (48 pro, 2 con). The supportive comments generally fell into one of two categories. The first category expressed appreciation for the improved travel conditions wrought by the additional lane. The second category expressed thanks for the Authority's efforts to keep traffic moving during construction.

(iv) Restriction of trucks from the third lane (39 comments)

This was a hot-button issue with some patrons, with opponents outnumbering supporters by a ratio of 4-to-1. The most common complaint about the policy was that it was not well-understood by passenger vehicles. Many cars tend to stay in the middle lane, not realizing that it essentially functions as the passing lane for trucks. This forces trucks to pass cars on the right, which can be a dangerous maneuver.

Another common complaint (typically made by truckers themselves) was that trucks are entitled to use the entire roadway, since their tolls helped pay for the roadway. Many also expressed skepticism that the policy actually reduces emissions and improves air quality.

(v) New interchange numbers (27 comments)

Negative comments concerning the recently-revised interchange numbering system outnumbered positive comments by a ratio of 6-to-1. Some patrons felt that the project was a waste of money, presumably because the existing numbering system was already well-understood. Other patrons were confused by the fact that existing maps (and mapping software) did not match the new numbers. And some patrons simply didn't understand the rationale for the change.

(vi) Toll collectors (15 comments)

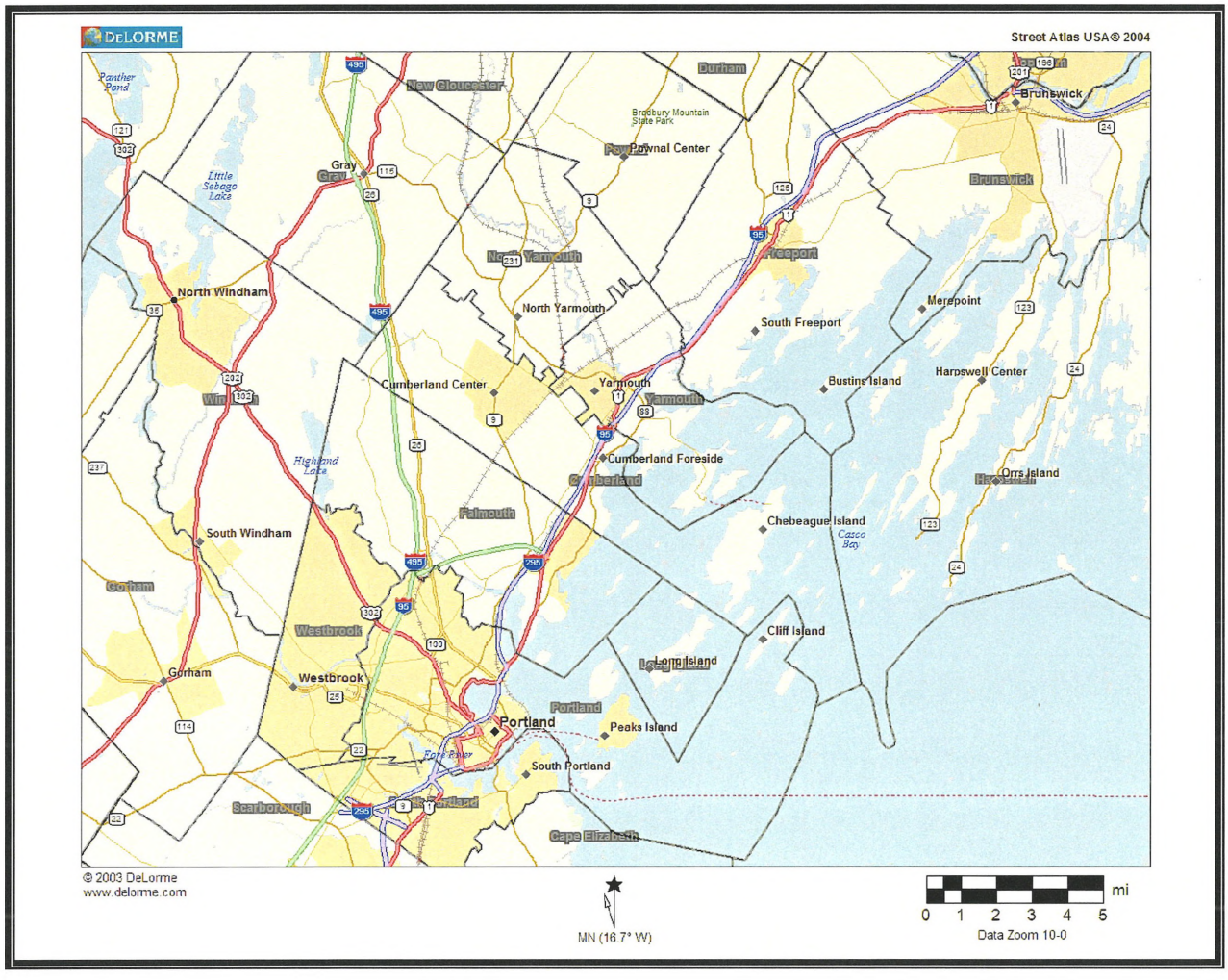
Some patrons used the comment section to express appreciation for the courtesy of the Turnpike toll collection staff. Only two comments were negative; the rest were positive, with most respondents describing the attendants as "very friendly".

7.2. USE OF I-95 AND I-295 BY THROUGH TRAFFIC

The MTA's O&D study gathered door-to-door movement data throughout the Turnpike corridor, from York to Augusta and beyond. One report cannot contain all of the information gathered by such a study. However, this information may be used to support other traffic studies throughout southern Maine.

MaineDOT's I-295 Corridor Study represents an opportunity to support an ongoing study with updated origin and destination data. A primary goal of this study is to improve the flow of traffic on the southern 28 miles of I-295, between Scarborough to Brunswick. The study area is depicted in Figure 7.1.

Figure 7.1 – I-295 Corridor Study Area



The study has noted that portions of I-295 already experience recurring peak-hour congestion, and the problem will likely only get worse over time. The study hopes to identify ways to improve travel conditions in the corridor without having to widen the roadway.

One potential means of reducing congestion is to shift through traffic from I-295 to the Turnpike (depicted in green on Figure 7.1). However, this raises a question: how much of the traffic on I-295 is through traffic? In other words, what portion of traffic on I-295 is traveling between Scarborough (and points south) and Falmouth (and points north)? This portion could conceivably be shifted to the Turnpike, where there is more available capacity to handle peak-hour traffic.

The O&D survey, which contains a wealth of data on highway travel patterns in Greater Portland, can help clarify this issue. A review of survey data collected at MTA Exits 44, 45, and 52 revealed the following[20]:

(i) Exit 44 (I-295 Connector – South Portland / Downtown Portland)

About **48%** of all entering and exiting traffic at this interchange is through traffic. In other words, 48% of the exiting traffic is destined for Falmouth and points north, and 48% of the entering traffic originated from Falmouth and points north. These vehicles have made the decision to go directly through Portland via I-295, as opposed to diverting around downtown Portland via the Turnpike (I-95).

(ii) Exit 45 (Maine Mall Rd. / Payne Rd.)

Approximately **18%** of all *northbound exiting* traffic at this interchange is through traffic. In other words, 18% of the northbound exiting traffic connects to I-295 via the loop ramp and ultimately heads to Falmouth and points north. Conversely, only **6%** of the southbound entering traffic at this interchange originated from Falmouth and points north, connecting to Exit 45 via State Route 703.[21] As with the previous group, these vehicles have made the decision to go through Portland via I-295 instead of using the Turnpike.

(iii) Exit 52 (Falmouth / Freeport)

About **33%** of all *northbound exiting* traffic at this interchange is through traffic. In other words, about one-third of the northbound traffic leaving the Turnpike at Exit 52 actually originated south of Exit 44. Similarly, **35%** of all southbound vehicles entering the Turnpike at Exit 52 are destined for locations south of Exit 44. Unlike the first two groups, these vehicles have chosen to travel around downtown Portland via the Turnpike, rather than driving through the Portland peninsula on I-295.

Based on these percentages, it is possible to estimate the actual volume of through traffic running between Falmouth and Scarborough. This information is summarized in Table 7.1.

[20] All percentages are rounded to the nearest 5%.

[21] This result still raises a question: Why are *any* southbound travelers on I-295 choosing to connect to the Turnpike via Exit 45, given that there is no toll or time advantage to doing so? There are several possible explanations for this phenomenon. First, some travelers on I-295 SB may see the sign for I-95 NB, and mistakenly think that *all* Turnpike access is through the SR-703 connector. Second, some travelers may see the "Last Exit Before Toll" sign and think they can avoid the toll by going to Exit 45. Third, some travelers may mistakenly assume that, since northbound travel is cheaper using Exit 45, then southbound travel may be cheaper as well.

Table 7.1 –Thru Traffic in I-95 / I-295 Corridor of Greater Portland

	NB (Exiting Traffic)			SB (Entering Traffic)		
Location	2004 AADT (est.)	% Thru (from O&D)	Thru Traffic (AADT)	2004 AADT (est.)	% Thru (from O&D)	Thru Traffic (AADT)
Exit 44	8,943	48%	4,300	11,801	48%	5,670
Exit 45	8,712	18%	1,540	5,564	6%	330
Exit 52	5,710	33%	1,870	6,224	35%	2,200
		NB Thru Traffic:	*7,710*		*SB Thru Traffic:*	*8,200*

Table 7.1 suggests that, on an average day, approximately 16,000 vehicles per day travel between Scarborough (and points south) and Falmouth (and points north). These vehicles are of critical interest to the I-295 corridor study, since they can use either I-95 or I-295 in making their journey.

Table 7.2 builds on Table 7.1, comparing the 2004 data with data collected in the May 1994 survey.

Table 7.2 – Thru Traffic Comparison, 1994 and 2004

Route	NB Thru Traffic		SB Thru Traffic	
	1994	2004	1994	2004
I-295 (via Turnpike Exit 44)	4,380	4,300	4,120	5,670
I-295 (via Turnpike Exit 45)	0	1,540	660	330
I-95 (via Turnpike Exit 52)	1,930	1,870	2,270	2,200
Total Thru Traffic:	6,310	*7,710*	7,050	*8,200*
% Using Turnpike:	31%	*24%*	32%	*27%*

One key observation drawn from Table 7.2 is that *the percentage of through traffic using the Turnpike decreased* from 1994 to 2004. In 1994, about 1 in 3 vehicles traveling through Greater Portland used the Turnpike; by 2004, this share had declined to 1 in 4.

This result is somewhat contrary to the expectations of the Authority. Prior to September 1997, there was a cost associated with using the Turnpike to drive through Greater Portland. For example, a cash-paying patron traveling from Falmouth to York would pay $2.05 if he accessed the Turnpike in Falmouth, but only $1.55 if he accessed the Turnpike at Exit 44. However, after the September 1997 conversion to a closed barrier system, this cost disparity disappeared. The same Falmouth-to-York trip would cost $1.75, regardless of whether the patron accessed the Turnpike at Exit 52, Exit 45, or Exit 44.

Therefore, since (a) the cost to travel between Scarborough and Falmouth was the same, regardless of whether one used I-95 or I-295, and (b) the Turnpike provided a less congested route through Greater Portland, the Authority expected that more patrons would use the Turnpike for through travel. This expectation appeared to be confirmed over time, as average daily traffic at Exit 44 (South Portland / Downtown Portland) stagnated while average daily traffic at Exit 52 (Falmouth / Freeport) grew rapidly.

However, Table 7.2 indicates that this expectation has gone unfulfilled. The growth at Exit 52 can be attributed to *new* traffic associated with Exit 46 (Jetport / Congress St.) and Exit 47 (Rand Rd. / Westbrook

Arterial)—interchanges that did not exist during the 1994 survey. (See Section 4 for a more in-depth discussion.) Moreover, the February 1999 introduction of exit tolls at Exits 44 and 52 actually provided a cost incentive for northbound patrons to use I-295. Now, northbound Turnpike patrons destined for Falmouth and points north can connect to I-295 via Exit 45, thus avoiding an exit toll.

A second important observation from Table 7.2 is that the volume of through traffic on I-295 currently stands at roughly **12,000** vehicles per day. This equates to about 15-20% of the existing traffic on I-295. Shifting a significant portion of this traffic to the Turnpike could provided some needed congestion relief to I-295 in the peninsula. However, the fact that so many travelers choose to stay on I-295 (despite its congestion and lack of pricing advantage) suggests that it may not be easy to effect such a shift.

7.3. IN-STATE VS. OUT-OF-STATE REVENUE

A common question posed to the Turnpike is: How much of the MTA's revenue comes from out-of-state travelers? HNTB combined survey data with information from previous revenue studies to help answer this question.

The results of HNTB's analysis are summarized in Table 7.3.

Table 7.3 – Revenue Distribution, In-State vs. Out-of-State Patrons

Plaza Type	Location	In-State	Out-of-State
Mainline Barrier	York	48.0%	52.0%
	New Gloucester	72.9%	27.1%
	W. Gardiner / I-95	67.1%	32.9%
	Gardiner / I-295	69.1%	30.9%
Side Toll Plaza	Wells (Exit 19)	55.7%	44.3%
	Kennebunk (Exit 25)	88.4%	11.6%
	Biddeford (Exit 32)	84.1%	15.9%
	Saco (Exit 36)	95.9%	4.1%
	Scarborough (Exit 42)	87.8%	12.2%
	I-295 (Exit 44)	80.3%	19.7%
	So. Portland (Exit 45)	92.0%	8.0%
	Jetport (Exit 46)	95.5%	4.5%
	Rand Rd. (Exit 47)	90.8%	9.2%
	Riverside St. (Exit 48)	94.3%	5.7%
	Falmouth Spur (Exit 52)	94.3%	5.7%
	W. Falmouth (Exit 53)	93.8%	6.2%
	Gray (Exit 63)	95.2%	4.8%
Total Turnpike	***Total Turnpike***	***66.8%***	***33.2%***

It is important to note that these figures are based on the tolls that were in place in 2004; the percentages will change somewhat in response to the February 2005 toll increase, Nevertheless, at least three observations may be drawn from Table 7.3:

- Roughly one-third of the MTA's revenue comes from out-of-state travelers. This reflects a downward trend in dependence upon out-of-state revenue. It is interesting to note that, in May 1972, the MTA reported that **56%** of its revenue came from out-of-state.
- For the most part, the barriers (York, New Gloucester, W. Gardiner, and Gardiner) have higher percentages of out-of-state vehicles than the side tolls.
- York is the only location where out-of-state patrons pay a greater share than in-state patrons.

These observations have at least three implications for future toll increases.

1. Any increases that are applied to the barriers will increase the share of revenue generated by out-of-state patrons.
2. Similarly, any increases that are applied to the side tolls will increase the share of revenue generated by in-state patrons.
3. The most direct way to draw more revenue from out-of-state patrons is to increase the toll at York.

Section 8. Summary and Conclusions

The 2004 O&D survey represented a comprehensive assessment of Turnpike patrons and their travel habits. The survey had three primary goals: (1) to acquire updated information on **travel patterns**; (2) to better understand key **patron characteristics**; and (3) to get feedback on the **quality of service** provided by the Turnpike. It was hoped that this survey could provide the Authority (as well as other regional entities) with timely information as it plans for the future.

The following bullets highlight some of the key findings of the Maine Turnpike Authority's 2004 O&D survey:

1. The 2004 O&D survey was successful in two important ways:
    a. First, it succeeded in reaching a *representative sample* of patrons. For example, the percentage of responses from ETC patrons (31.7%) was nearly identical to the actual percentage of ETC patrons (32.2%, in 2002). Similarly, the percentage of responses from Class 3 through 6 vehicles (7.6%) was nearly identical to the actual percentage (7.4%).
    b. Second, it succeeded in being statistically valid. The survey achieved a 90% confidence level and 10% confidence interval at every Turnpike entry point. Moreover, at five entry points (York, Gray, Auburn, Lewiston, and West Gardiner), the responses were sufficient to satisfy the much more stringent "95/5" standard (95% confidence level / 5% confidence interval).

2. The survey unveiled considerable evidence that the Maine Turnpike is becoming less of a summer recreational road supporting out-of-state traffic, and more of a commuter-oriented road serving the traveling needs of Maine citizens. Some of this evidence includes:
    a. In May 1994, only 10% of survey respondents reported using the Turnpike on a daily basis. By contrast, in May 2004, an estimated **29%** of patrons use the Turnpike every day.[22]
    b. The survey indicated that **45%** of all Turnpike trips are work-related. This figure rises to about **55%** on weekdays. Only **12%** of Turnpike trips are between home and recreational areas.
    c. Over **two-thirds** of all travelers on the Turnpike both start and end their journey in the state. In other words, the vast majority of Turnpike trips are *intra-state* trips.
    d. Maine residents comprise an increasing share of Turnpike patrons. In 1994, Maine citizens made up 78% of Turnpike patrons; in 2004, they make up **82%**.
    e. The share of revenue coming from out-of-state patrons has fallen from over **50%** in the 1970's to about **33%** today.

3. Another Turnpike trend over the past 10 years has been the growth in average occupancy. In 1994, the average vehicle carried 1.52 passengers. Today, the average vehicle carries **1.70** passengers—an increase of **12%**. This is a positive trend. One alternative to adding lanes is to increase the number of patrons in each existing lane. Increasing the average occupancy achieves this alternative.

4. The survey suggests that the conversion to *E-ZPass* should push ETC usage up to nearly **40%**.[23] This is important from the perspective of toll plaza operations. Some plazas that operate at capacity during

[22] In the 1994 survey, patrons were asked how frequently they traveled on the Turnpike; "daily" was one of the possible responses. In the 2004 survey, patrons were asked how may trips they had taken in the past week. If respondents indicated 10 or more trips (i.e. 5 or more round trips) in the past 7 days, their frequency was considered "daily".

peak periods (such as York, Biddeford, and Saco) could experience relief, as some vehicles that currently pay cash (passing through the plazas at a rate of 300-400 vehicles per hour) shift to ETC (passing through the plaza at a rate of 1000+ vehicles per hour).

5. Only 10% of Turnpike patrons reported experiencing delays on the Turnpike; less than 3% experienced delays of 10 minutes or more. This result is remarkable considering that (a) May 2004 was the busiest May in Turnpike history; (b) the Widening project was still ongoing between Kennebunk and Biddeford; and (c) major paving activity was ongoing in the vicinity of Gardiner and Augusta.

6. Currently, about 16,000 vehicles per day travel between Falmouth and Scarborough. These patrons have essentially two options—take I-95 around downtown Portland, or take I-295 directly through downtown Portland. According to the O&D survey, about **25%** of these patrons take the former route. A decade ago, this percentage was about **33%**.

   On average, therefore, I-295 serves **12,000** through vehicles per day. Based on current traffic levels, this means that **15-20%** of the traffic on I-295 is through traffic. If congestion grows on I-295, these vehicles could conceivably shift to the Turnpike. This raises a new question: Given that Turnpike in Greater Portland is a 4-lane highway serving 45-to-50 thousand vehicles per day, how much capacity does the Turnpike have to absorb traffic from I-295 without being widened?

The 2004 O&D study has been a comprehensive assessment of Turnpike patrons and the manner in which they use the roadway. This study has provided but a small window into the vast array of information that can be drawn from the data. Further inquiries concerning the 2004 O&D study and the information contained in its database may be directed to the Maine Turnpike Authority.

[23] The growth in ETC usage in the months preceding the conversion to *E-ZPass* was stagnant, due in part to the lack of transponder availability. As transponders become available again with the advent of *E-ZPass,* the share of ETC usage could grow even higher.

Appendix A

This appendix provides the supporting documentation for the information presented in Section 3.

A.1. SURVEY TIMING

HNTB and the MTA considered several factors in determining the timing of the survey. These factors are summarized below:

- First, the MTA sought to better understand traffic conditions on an "average day". To that end, the survey was conducted during May 2004. Historically, May has represented average traffic conditions on the Maine Turnpike. The volumes represent a mid-point between the peaks of summer tourist traffic and the troughs of winter traffic.

  Table A.1 summarizes the average daily traffic volumes (ADT's) on the Maine Turnpike in 2003. As the table illustrates, the ADT in May is most nearly identical to the average annual daily traffic (AADT) for the entire year (167,969 vs. 166,221).

Table A.1 – Average Daily Traffic, Maine Turnpike, 2003

Month	Average Daily Traffic
January	138,999
February	139,817
March	145,622
April	154,570
May	**167,698**
June	178,969
July	199,815
August	206,881
September	175,449
October	173,679
November	158,881
December	151,814
Overall	**166,221**

- Second, the MTA wanted to capture both weekday and weekend traffic. Therefore, surveys were distributed twice at each location—once on a weekday (Tuesday, Wednesday, or Thursday), and once on a weekend (Saturday).

- Third, the MTA wanted to avoid the influence of Memorial Day traffic, given that it is typically characterized by a substantial influx of tourist traffic. Therefore, surveys were distributed during the second and third weeks of May.

Table A.2 summarizes the dates and locations at which the surveys were distributed.

Table A.2 – Survey Dates, by Location

Location	Weekday Survey	Weekend Survey
York - NB	May 18, 2004 (Tue)	May 15, 2004 (Sat)
Wells (Exit 19)	May 18, 2004 (Tue)	May 15, 2004 (Sat)
Kennebunk (Exit 25)	May 18, 2004 (Tue)	May 15, 2004 (Sat)
Biddeford (Exit 32)	May 18, 2004 (Tue)	May 15, 2004 (Sat)
Saco (Exit 36)	May 18, 2004 (Tue)	May 15, 2004 (Sat)
Scarborough (Exit 42)	May 19, 2004 (Wed)	May 15, 2004 (Sat)
I-295 (Exit 44 - SB)	May 19, 2004 (Wed)	May 15, 2004 (Sat)
So. Portland (Exit 45)	May 19, 2004 (Wed)	May 15, 2004 (Sat)
Jetport (Exit 46)	May 19, 2004 (Wed)	May 22, 2004 (Sat)
Rand Rd. (Exit 47)	May 19, 2004 (Wed)	May 22, 2004 (Sat)
Riverside St. (Exit 48)	May 19, 2004 (Wed)	May 22, 2004 (Sat)
Falmouth Spur (Exit 52)	May 19, 2004 (Wed)	May 22, 2004 (Sat)
W. Falmouth (Exit 53)	May 19, 2004 (Wed)	May 22, 2004 (Sat)
Gray (Exit 63)	May 20, 2004 (Thu)	May 22, 2004 (Sat)
Auburn (Exit 75)	May 20, 2004 (Thu)	May 22, 2004 (Sat)
Lewiston (Exit 80)	May 20, 2004 (Thu)	May 22, 2004 (Sat)
W. Gardiner / I-95 - SB	May 20, 2004 (Thu)	May 22, 2004 (Sat)
Gardiner / I-295 (NB & SB)	May 20, 2004 (Thu)	May 22, 2004 (Sat)

- Fourth, the MTA identified the PM peak hour as the critical time period to understand from a decision-making perspective. Therefore, the weekday surveys were timed such that they were distributed, at a minimum, during the evening rush hour (4-6pm).

A.2. SURVEY DISTRIBUTION PLAN

Once the *days* for distributing the surveys were identified, it was necessary to specify a *method* for distributing the surveys. This method had to achieve seven goals.

- **Goal #1 – Encompass both cash-paying patrons and electronic toll collection (ETC) patrons**. In the past, surveys were distributed by toll collectors as vehicles passed through the toll plazas. However, with the advent of Transpass in 1997, patrons with transponders were not required to stop at toll plazas. Therefore, in order to capture the patterns and characteristics of these ETC patrons, an alternative approach to distributing surveys had to be developed.

- **Goal #2 – Capture Lewiston-Auburn patrons.** In November 1999, all tolls were removed from Auburn. Therefore, patrons traveling between Lewiston and Auburn were not required to stop at any point. The proposed distribution plan needed to include a strategy for capturing information from patrons traveling between these two interchanges.

- **Goal #3 – Provide only one survey to each patron.** The last time that the MTA conducted an origin-destination survey, cards were distributed at all toll collection locations. This meant that some patrons were offered multiple surveys. For example, a cash-paying patron traveling between Saco and York would have been offered a survey at both the Saco plaza and the York

plaza. Patrons traveling the full length of the Turnpike would have been offered surveys at three locations—York, New Gloucester, and West Gardiner.

Patrons typically responded to this distribution plan in one of two ways. Some took multiple cards but replied to only one; others refused to take some of the cards that were offered. The result of the former was that many cards were discarded, thus driving down the response rate. The result of the latter was that, at some plazas, toll collectors found it difficult to distribute cards. This ultimately drove down the total number of responses.

In response, the distribution plan for the 2004 survey was designed to offer cards to all patrons one time.

- **Goal #4 – Provide greater oversight of survey distribution.** The previous survey in 1998 was conducted on two days—one weekday (Wednesday), and one weekend (Sunday). However, it was extremely difficult to supervise an operation taking place at multiple locations simultaneously over a distance of about 100 miles. Therefore, the 2004 survey was designed to take place over multiple days, with each day covering a smaller, more manageable segment of the Turnpike.

- **Goal #5 – Ensure the survey is statistically valid**. The MTA wanted to ensure that the survey results gave an accurate depiction of the Turnpike's patrons and performance. To this end, HNTB sought to design a distribution plan that would generate enough responses to be statistically valid.

- **Goal #6 – Capture commercial traffic.** The MTA noted that previous surveys had failed to capture a representative portion of commercial vehicle traffic. Thus, one priority of the 2004 distribution plan was to capture a greater share of commercial vehicles.

- **Goal #7 – Ensure that all surveys get distributed.** Another shortcoming of the 1998 survey was that, at some plazas, insufficient time was allocated to distribute the surveys. At some side toll plazas, a thousand cards were presented to the toll attendants, and the time window for distribution did not begin until after the peak hour. As a result, some surveys were never handed out, simply because an insufficient number of vehicles passed through the plaza.

  The goal of this distribution plan was to allocate sufficient time at each plaza for all surveys to be handed out.

In order to achieve these goals, HNTB—in coordination with the MTA—developed a comprehensive five-step distribution plan. These steps are outlined below.

(a) Step 1 – Identify locations for survey distribution.

The process of designing a distribution plan began by identifying the locations at which surveys would be distributed. HNTB made the decision that surveys should be distributed at *all entry locations* to the Turnpike. This approach would ensure that all patrons received a card, and that no patron would receive more than one card.

In order to capture all Turnpike patrons, surveys would need to be distributed at the following locations:

- York toll – NB Only
- All side toll plazas (Wells, Kennebunk NB, Kennebunk SB, Biddeford, Saco, Scarborough, South Portland, Jetport, Rand Rd., Westbrook, West Falmouth, Gray)
- Exit 44 (formerly Exit 6A) – Entry only
- Exit 52 (formerly Exit 9) – Entry only

- West Gardiner / I-95 – SB Only
- Gardiner / I-295 – NB and SB
- Selected on-ramps not served by toll plazas (Wells SB, Gray NB, Auburn NB & SB, and Lewiston NB & SB)

This approach represented a departure from previous surveys in two important ways. First, previous surveys distributed cards at **all** toll plazas. By contrast, this survey did not call for any cards to be distributed at York SB, Exit 44 (exit), Exit 52 (exit), New Gloucester (NB or SB), or W. Gardiner NB. None of these locations represented entry points.[24]

A second point of departure from previous surveys was the requirement to distribute cards on ramps that were not served by toll plazas. In order to do this, the MTA coordinated with the state police to place a trooper at each of the selected ramps. The task of the trooper was to slow down traffic and direct vehicles to a toll attendant standing along the ramp's shoulder. The attendant would simply hand the card to the patron and ask the patron to fill it out and mail it back at his convenience.

(b) Step 2 – Develop a standard of statistical validity

In consultation with Dr. Charlie Colgan at the University of Southern Maine, HNTB identified the number of surveys that would need to be distributed at each location in order for the survey to be statistically valid. The goal was to develop a survey that was statistically valid at *each entry point* to the Maine Turnpike.

The formula recommended by Dr. Colgan for determining the required number of responses was:

$$n = \frac{Z^2(.25)N}{Z^2(.25) + (N-1)C^2}$$

where:

- **n** is the required number of responses to be "statistically valid"
- **N** is the population—that is, the average number of patrons that enter the Turnpike at a particular location each day
- **Z** is the Z score (Z=1.96 for a 95% confidence level)
- **C** is the confidence interval desired.

Dr. Colgan recommended that we attempt to achieve a confidence level of 95%, with a confidence interval of ±5%. With this as a basis, the formula simplifies to:

$$n = \frac{0.9604N}{0.9579 + 0.0025N}$$

This step calculated the number of required **responses**. However, it was necessary to translate this into a number of *distributed* cards that would yield the appropriate number of responses. In order to make this calculation, HNTB assumed that **20%** of all distributed cards would be completed and returned to the Turnpike. This number was consistent with previous origin-destination surveys, and it was also consistent with a Park & Ride lot survey conducted in the summer of 2003.

[24] Technically, the Gardiner / I-295 (SB) plaza does not represent an entry point. However, this plaza—together with West Gardiner / I-95 SB—does capture all vehicles that enter the Turnpike in Augusta.

Therefore, the number of distributed cards was calculated as follows:

$$d = \frac{n}{r}$$

Where:

- d = number of distributed surveys at each location
- n = number of required responses to support statistical validity
- r = anticipated response rate (20%)

Table A.3 summarizes the average daily volume at each location, the required number of responses to support statistical validity, and the recommended number of surveys to be distributed.

Table A.3 – Survey Distribution Plan, by Plaza

Location	Average Daily Entering Traffic	# Responses Required	# Surveys to be Distributed
York - NB	22,637	378	1,889
Wells (Exit 19)	6,521	363	1,814
Kennebunk (Exit 25)	4,258	352	1,762
Biddeford (Exit 32)	10,532	371	1,853
Saco (Exit 36)	12,621	373	1,864
Scarborough (Exit 42)	4,700	355	1,776
I-295 (Exit 44 - SB)	11,663	372	1,860
So. Portland (Exit 45)	11,145	371	1,857
Jetport (Exit 46)	6,991	364	1,821
Rand Rd. (Exit 47)	3,456	346	1,729
Riverside St. (Exit 48)	10,398	371	1,853
Falmouth Spur (Exit 52)	8,434	367	1,837
W. Falmouth (Exit 53)	5,423	359	1,794
Gray (Exit 63)	7,144	365	1,823
Auburn (Exit 75)	8,277	367	1,836
Lewiston (Exit 80)	6,370	362	1,812
W. Gardiner / I-95 - SB	4,645	355	1,774
Gardiner / I-295 (NB & SB)	21,006	377	1,886
		Assumed Response Rate:	**20%**

(c) Step 3 – Allocate surveys to weekdays vs. weekends

As Section A.1 pointed out, the MTA made the decision to distribute surveys on both weekdays and weekends. Therefore, the number of surveys calculated in Table A.3 had to be divided into weekday vs. weekend surveys.

To this end, HNTB calculated the total May weekday and weekend traffic at each location.[25] The surveys were then allocated proportionately. Locations that were commuter-oriented with little tourist traffic (e.g. Jetport, Rand Rd.) had a much greater share of surveys to be distributed during weekdays. On the other hand, locations that were more subject to weekend tourist traffic (e.g. York, Wells) were more balanced in their weekday vs. weekend distribution.

Table A.4 summarizes the number of surveys to be distributed at each location, by day. For convenience, the numbers were rounded to the nearest 50.

Table A.4 – Survey Distribution, Weekday vs. Weekend

[25] HNTB considered Monday through Thursday to represent "weekday" traffic, while Friday through Sunday represented "weekend" traffic. The total weekday traffic would equal the weekday ADT multiplied by the total number of weekdays in May. Similarly, the total weekend traffic would equal the weekend ADT multiplied by the total number of weekend days in May. All else being equal, the total weekday traffic should be greater, since there are more weekdays in a month than weekend days.

Location	Total Surveys (from Table 3)	Total Monthly Traffic		# of Surveys	
		Weekday	Weekend	Weekday	Weekend
York - NB	1,889	312,234	296,462	1,000	900
Wells (Exit 19)	1,814	114,531	88,084	1,000	750
Kennebunk (Exit 25)	1,763	78,061	55,087	1,050	750
Biddeford (Exit 32)	1,856	203,163	136,745	1,150	700
Saco (Exit 36)	1,865	230,012	165,570	1,150	750
Scarborough (Exit 42)	1,778	86,115	61,890	1,050	700
I-295 (Exit 44 - SB)	1,861	204,160	39,946	1,050	800
So. Portland (Exit 45)	1,857	204,935	144,462	1,150	750
Jetport (Exit 46)	1,821	183,243	41,742	1,600	250
Rand Rd. (Exit 47)	1,725	84,935	25,679	1,350	400
Riverside St. (Exit 48)	1,854	198,169	135,129	1,150	700
Falmouth Spur (Exit 52)	1,834	143,867	108,515	1,100	750
W. Falmouth (Exit 53)	1,799	110,043	67,096	1,150	650
Gray (Exit 63)	1,822	128,436	92,023	1,100	700
Auburn (Exit 75)	1,838	160,557	105,407	1,100	750
Lewiston (Exit 80)	1,816	127,322	81,053	1,150	650
W. Gardiner / I-95 - SB	1,765	79,141	66,313	1,000	750
Gardiner / I-295 (NB & SB)	1,887	354,008	305,482	1,100	800

(d) Step 4 – Refine distribution plan

The previous step identified the total number of surveys to be distributed at each location on each day. However, further refinements were necessary, as described below.

(i) Refinement #1 – Further subdivide selected plazas

Some locations listed in Table A.4 actually involved two distribution points. More specifically:

- Wells and Gray involved both a toll plaza distribution site and a ramp distribution site
- Kennebunk and the Jetport both involved two different plazas—one for northbound traffic, and one for southbound traffic.
- The Gardiner / I-295 toll plaza involved distribution to both northbound and southbound traffic.
- Lewiston and Auburn had to be divided into separate ramp volumes, since surveys were to be distributed at each on-ramp.

Therefore, the surveys at these locations were divided up, with the distribution being weighted by the volume of traffic served. For example, the Jetport NB plaza serves almost twice the entering volume as the Jetport SB plaza; therefore, about twice as many survey cards were allocated to the Jetport NB plaza.

(ii) Refinement #2 – Modify ramp survey at the Auburn SB on-ramp

The original plan (outlined in Step 1) involved handing out surveys at the Auburn NB and SB ramps. However, the MTA felt that the heavy volume of entering traffic during the peak hour would create a risk of backing traffic up into the upstream intersection. To avoid this, the MTA decided that toll attendants would only hand cards to patrons on the NB on-ramp. Traffic on the SB on-ramp would be handed cards at New Gloucester (SB) instead.

A traffic analysis indicated that about 50% of the traffic at New Gloucester (SB) originates from Auburn. Therefore, only half of the cards to be distributed at New Gloucester (SB) could be expected to reach Auburn patrons. For this reason, the number of surveys to be distributed at New Gloucester had to be twice the number that was to have been distributed at the Auburn SB on-ramp.

(iii) Refinement #3 – Modify ramp survey at the Lewiston NB on-ramp

Similar to Auburn, the original distribution plan (outlined in Step 1) involved handing out surveys at the Lewiston NB and SB ramps. However, the MTA was concerned about the narrowness of the NB on-ramp, which did not provide adequate space for a roadside attendant to distribute surveys. Therefore, HNTB recommended handing out surveys at the West Gardiner / I-95 (NB) plaza instead. This plaza would capture all traffic originating from the Lewiston NB on-ramp, although it would also capture some vehicles that had already received a survey card at another point of origin.

A traffic analysis indicated that only about 22% of the vehicles passing through the West Gardiner (NB) barrier originate from Lewiston. Therefore, only about 2 out of every 9 cards distributed at West Gardiner (NB) would actually reach patrons that had originated at Lewiston. For that reason, the number of surveys to be distributed at West Gardiner (NB) had to be 4.5 times the number of cards that were to have been distributed at the Lewiston NB on-ramp.

In the process of making these refinements, HNTB identified a total of twenty-five different locations at which surveys were to be distributed. These locations, and the number of surveys to be distributed at each, are listed in Table A.5.

Table A.5 – Number of Surveys to be Distributed, by Location and Day

Location	# of Surveys	
	Weekday	Weekend
York - NB	1,000	900
Wells (plaza)	600	450
Wells (SB on-ramp)	400	300
Kennebunk (NB plaza)	700	500
Kennebunk (SB plaza)	350	250
Biddeford	1,150	700
Saco	1,150	750
Scarborough	1,050	700
I-295 - SB	1,050	800
So. Portland	1,150	750
Jetport (NB plaza)	1,050	150
Jetport (SB plaza)	550	100
Rand Rd.	1,350	400
Riverside St.	1,150	700
Falmouth Spur	1,100	750
W. Falmouth	1,150	650
Gray (plaza)	850	550
Gray (NB on-ramp)	250	150
New Gloucester - SB	1,300	800
Auburn (NB on-ramp)	450	300
Lewiston (SB on-ramp)	950	550
W. Gardiner / I-95 - NB	900	500
W. Gardiner / I-95 - SB	1,000	750
Gardiner / I-295 - NB	550	400
Gardiner / I-295 - SB	550	400
Total	**21,750**	**13,250**

(e) Step 5 – Incorporate ETC and commercial patrons

One problem with distributing survey cards at toll plazas is that it tends to exclude ETC patrons. Patrons with a transponder are not required to stop whey they pass through a toll plaza, so the likelihood of their receiving a survey card is minimal. This likelihood is further reduced by the fact that most ETC patrons use lanes (either dedicated ETC lanes or Coin lanes) that are not attended.

In order to address this problem, HNTB recommended mailing surveys to patrons with Transpass accounts. The goal was to reach a statistically representative cross-section of ETC users, including both passenger car accounts and commercial vehicle accounts. Consequently, the Authority mailed out a total of 3800 surveys, divided equally between passenger and commercial accounts. The mailings included a cover letter and a mailback survey card identical to the one handed out at the toll plazas.

In sum, a total of 38,800 surveys were distributed—35,000 at the toll plazas, and 3,800 via the mail. The next section will discuss the response rate to these surveys.

A.3. RESPONSE RATE

(a) Overall responses

As the previous section noted, in order to determine the appropriate number of surveys to distribute in order to achieve statistical validity, HNTB had to assume a certain rate of response to the survey. Based on previous experience, HNTB assumed a response rate of 20%.

In actuality, the response rate was considerable lower. A total of 4,816 cards were received out of the 38,800 that were distributed—a response rate of **12.4%**. Table A.6 summarizes the response rates, breaking them out by method of distribution.

Table A.6 – Response Rate Summary

Distribution Method	Surveys Distributed	Surveys Returned	Response Rate
Toll Plaza	35,000	3,838	11.0%
Mail	3,800	978	25.7%
Overall	**38,800**	**4,816**	**12.4%**

As Table A.6 illustrates, the rate of response to the mailed survey cards was notably higher than for the cards handed out at the plazas. The response rate to the mailed surveys exceeded HTNB's expectations, while the response rate to the surveys distributed at the toll plaza was only half of HNTB's expectation.

(b) Responses by location

Section A.2 outlined HNTB's goal—to achieve a statistically valid survey at every *point of entry* to the Turnpike. The desired level of validity was a 95% confidence level with a 5% confidence interval.

Table A.7 summarizes the number of responses for each Turnpike entry point. The rightmost column documents the confidence interval corresponding to each point of entry, assuming a 95% confidence level. To help understand this table, the following points should be kept in mind:

- The "Returned" column summarizes the number of responses corresponding to each entry point.[26]
- The "Needed" column summarizes the number of responses required for to achieve the desired level of statistical validity.
- If the value in the "Returned" column is greater than the value in the "Needed" column, then the confidence interval will be less than 5%. In other words, if the number of responses exceeds what is needed to achieve a 5% confidence interval, then the confidence interval shrinks and statistical validity improves.
- On the other hand, if the value in the "Returned" column is lower than the number in the "Needed" column, then the confidence interval will be greater than 5%, indicating a decrease in certainty. Most of the entry points fall into this category

[26] Table A.6 indicated a total of 4816 responses. However, the sum of the "returned" column in Table A.7 indicates a total of 4560 responses—a difference of 256 surveys. What accounts for the difference? Those 256 surveys did not provide complete information on Turnpike origins and destinations. Since we were unable to get any valid data on travel patterns from them, we did not include them in calculations of statistical validity. However, since those 256 surveys did provide valid information concerning other aspects of the survey (e.g. vehicle occupancy, Transpass usage, etc.), they were incorporated into the calculation of the overall response rate.

Table A.7 – Response Rate by Entering Plaza

Location	Returned (Actual Sample Size)	Needed (Desired Sample Size)	Entering ADT (Population)	Confidence Interval (based on 95% Confidence Level)
York - NB	719	378	22,719	4%
Wells (Exit 19)	196	363	6,522	7%
Kennebunk (Exit 25)	172	353	4,273	7%
Biddeford (Exit 32)	268	371	10,894	6%
Saco (Exit 36)	292	373	12,706	6%
Scarborough (Exit 42)	130	356	4,753	8%
I-295 (Exit 44 - SB)	163	372	11,910	8%
So. Portland (Exit 45)	272	371	11,215	6%
Jetport (Exit 46)	76	364	6,967	11%
Rand Rd. (Exit 47)	93	345	3,373	10%
Riverside St. (Exit 48)	169	371	10,687	7%
Falmouth Spur (Exit 52)	125	367	8,118	9%
W. Falmouth (Exit 53)	216	360	5,660	7%
Gray (Exit 63)	348	364	7,080	5%
Auburn (Exit 75)	365	368	8,517	5%
Lewiston (Exit 80)	346	363	6,667	5%
W. Gardiner / I-95 - SB	442	353	4,331	4%
Gardiner / I-295 (NB & SB)	166	377	21,306	8%

Two important conclusions may be drawn from Table A.7:

- For all but one location, the confidence interval was 10% or less. This would indicate that the lower-than-expected response rate did not greatly jeopardize the statistical validity of the survey.
- The confidence intervals listed in the table were all based on a confidence level of 95%. If the confidence level were lower to 90%, then *all* confidence intervals would be 10% or less. In other words, the survey easily achieved a 90% confidence level / 10% confidence interval at all locations.[27]

In short, although the response rate was lower than hoped, the survey was still statistically valid. All Turnpike entry points reached the 90/10 standard (90% confidence level, 10% confidence interval); most reached the 95/10 standard; and some achieved the 95/5 standard.

[27] In order to achieve a 90% confidence level / 10% confidence interval for the survey, about 68 responses would be needed at each location. This level of response was easily met at all interchanges. About five times as many responses are needed to achieve a 95% confidence level / 5% confidence interval.