

Technical Memorandum:

**South Portland Bus Service (SPBS)
Passenger On/Off Survey**



Prepared by:
Greater Portland Council of Governments

In Cooperation with:
South Portland Bus Service (SPBS)

Prepared for:
**South Portland Bus Service (SPBS)
Portland Area Comprehensive Transportation Committee (PACTS)
Maine Department of Transportation (MDOT)**

December, 2002

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SOUTH PORTLAND BUS SERVICE ON/OFF PASSENGER SURVEY

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A. INTRODUCTION

Overview

Every two years, the Greater Portland Council of Governments (GPCOG) conducts the On/Off Passenger Survey on behalf of the South Portland Bus Service (SPBS). The On/Off Survey counts the number of persons boarding and alighting a South Portland bus and derives from these counts other useful bus route and stop information. One example is average bus trip length in passenger miles, which is required for reporting to the Federal Transit Administration.

The survey is historically known as the “Brown Sheet Survey”, named after brown-colored spreadsheets displaying the results of the early surveys. The GPCOG transportation planning division conducts the On/Off Survey as part of its role to provide planning assistance to the public transit operators in the region.

Purpose

The purpose of the survey is twofold:

- 1) to prepare an estimate of system wide passenger miles for federal reporting requirements, and
- 2) to provide stop-frequency data for planning passenger amenities such as bus shelters, bus stops and information kiosks.

Methodology

The On/Off Survey is generally conducted in April, which is considered to be a typical month for transit ridership. The survey requires about 62.5 on-bus personnel hours to cover the entire SPBS system. Staff positions are filled first by GPCOG staff, and the remaining hours by temporary personnel. The survey is conducted in conjunction with the METRO On/Off survey to optimize the effort necessary to collect data.

Each route is surveyed once, and an entire route’s data is scheduled to be collected in one day. Staffing the 2001 survey proved to be more successful than in some previous years. In the past, few if any of the routes were completed in a single day, resulting in discontinuous data. Weekday, Saturday and Sunday routes are treated as independent routes in the survey. Exhibit I shows the daily schedule of the 2001 On/Off Survey. Appendix A contains maps for each route of the SPBS system. Appendix B contains a copy of a SPBS routesschedule.

Exhibit I SPBS On/Off Survey Schedule* April 2001

Saturday, April 7	Route One, Route Four
Wednesday, April 11	Route One, Route Three, Route Four

**Note: Make-up runs were made in the following weeks*

Survey staffers ride the SPBS buses and count the persons boarding and departing at each stop for an entire route day. This information is collected and marked on a survey sheet designed specifically for each bus and route. Exhibit II shows a portion of a completed sample survey sheet with an explanation of the sheet design. A copy of an entire blank survey form can be found in Appendix C.

Exhibit II Sample Completed SPBS On/Off Staff Survey Form

2001 SPBS ON/OFF SURVEY OF ROUTE 1: WILLARD SQUARE			
WEEKDAY SERVICE			
TRIP SEQUENCE		Out: 7:10 AM	
DIRECTION		In: 7:40 AM	
SCHEDULED TIME			
Bus 101			
BUS STOPS		ON	OFF
PASSENGERS ALREADY ON			3
HIGH & CONGRESS	HARMON'S FLORIST	I	
536 CONGRESS	OLD 5 & 10	III	
MONUMENT SQUARE	BUS SHELTER		
CASCO BANK	POLE # 557		
TEMPLE & FEDERAL	POLE # 8		II
TEMPLE, TREE, SPRING	POLE #		
CROSS & FORE	POLES #18, 19		II
GLOBE RESTAURANT	POLE # 1/2		I
75 YORK STREET	MID-BLOCK		
PASSENGERS REMAINING			1
Next Scheduled Trip			7:54 AM

General Route ID Information

Bus ID Number

Left-Hand Column: Street on which the bus stop is located

Right-Hand Column: Nearest crossing Street to the bus stop

Outbound departure time for next trip for this bus

Indicates Outbound and Inbound Trip

No. of Passengers on the bus before the start of the trip

No. of Passenger Boardings per stop

No. of Passenger Departures per stop

No. of Passengers On the bus at the end of the run

The SPBS On/Off Survey directly collects two main statistics: boardings (a.k.a. "Ridership," "Ons" or "Number of Passengers") and departures (a.k.a. "Offs"). The boarding/departure information is entered into a Microsoft Excel Spreadsheet that automatically calculates passenger mileage and other summary information. Passenger mileage information is calculated exclusively from the On/Off Survey data, and describes total bus ridership in terms of distance or passenger miles (i.e., five people riding the bus for one mile = five passenger miles).

In previous surveys, the distance between stops was seldom more accurate than to the nearest one tenth of a mile. The end result was a cumulative error in both overall distance and passenger miles. In 1999, using GPCOG's Geographic Information Systems (GIS) capabilities, the mapping department was able to plot each stop and measure the distance between them to the nearest one hundredth of a mile. It is anticipated that this detailed mapping will have many more uses as SPBS embarks on Intelligent Transportation System (ITS) applications for transit.

Route passenger mileage is the summation of the passenger mileage at the individual stop. It should be noted that “passenger mileage” is an aggregate statistic, and thus does not describe riding characteristics of any individual passenger.

Although the On/Off Survey provides merely a “snapshot” of route characteristics for the day the survey is conducted, there is a strong correlation between the route ridership distributions of the On/Off survey and the actual “fare box” ridership counts for the month of April, 2001.

B. SUMMARY ON/OFF SURVEY RESULTS*

Boardings/Departures - On/Off System-wide Totals vs. Monthly Fare-Box Totals

The primary set of system-wide descriptive statistics collected by the On/Off Survey is passenger boardings. Departures are the natural counterpart to passenger boardings, but because departures are roughly equivalent to boardings, reporting both sets of data is redundant at this level of analysis.

The On/Off Survey counted 805 total boardings during the sample week. Exhibit III displays ridership distributions by route comparing it to actual farebox ridership counts for the same days. Overall ridership for the month of April increased by 11% over the May ‘99 survey period. The percent share of ridership among routes for the 2001 survey remained within 2% of those for 1999. However, the actual number of boardings for the month in 2001 varied from 18% fewer (Route One), 3% more (Route Three) and 14% more (Route Four), compared to 1999.

In contrast, the number of passengers “captured” by the survey in 2001 was 18.6% higher than in 1999. Tables comparing the 1999 survey with the 1997 survey are in Appendix D.

Exhibit III						
SPBS Actual Ridership Compared to On/Off Ridership (Boardings)						
Route	SPBS Actual Monthly Totals		SPBS Actual Daily Totals		On/Off Survey Daily Totals	
	Actual Ridership	Percentage	Actual Ridership	Percentage	Survey Ridership	Percentage
1	3,519	28%	248	31%	264	33%
3	1,036	8%	57	7%	39	5%
4	7,878	63%	494	62%	502	62%
Total	12,433	100%	799	100%	805	100%

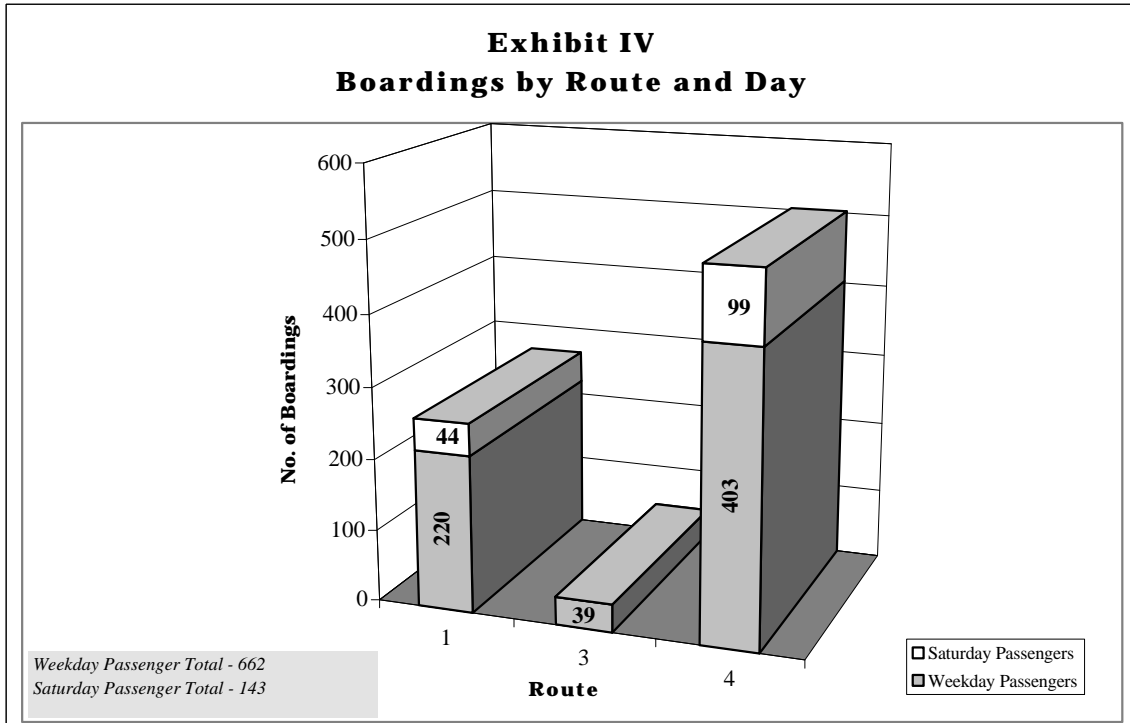
*Monthly fare-box Ridership information provided by the Greater Portland Transit District (METRO)

The distribution of ridership by route reported in the On/Off Survey is similar to actual monthly ridership distributions. Route Four – *Maine Mall* has the highest ridership in the On/Off survey with 502 boardings (62% of the total ridership of the On/Off Survey), followed by Route One – *Willard Square* with 264 boardings (33%). The farebox totals show Route Four as having the highest ridership with 494 persons (62%), and Route One with the second highest ridership of 248 persons (31%). Route Three - *Crosstown* has the lowest ridership for both the On/Off Survey (39 persons or 5%) and the lowest farebox totals (57 persons or 7%).

* For summary tables of the SPBS On/Off Survey Results, see Appendix F - Summary Tables

Boardings/Departures - On/Off Totals by Route and Day

Like the farebox totals collected by SPBS, the On/Off Survey separates weekday, Saturday and Sunday routes to show differences in route characteristics by day. Exhibit IV displays the distribution of boardings by route for the On/Off Survey as in Exhibit III, but goes further to show how the different days of the week contribute to total route ridership.



Reminder: The weekday category describes data for only one weekday during the week and not the aggregation of all weekdays during the week. This standard applies to daily data in the On/Off survey.

Exhibit IV displays passenger boardings by route in the following descending order: Route Four (502), One (264) and Three (39). As this chart plainly shows, Routes Four and One hold a much larger proportion of the total system ridership than Route Three.

Only Routes One and Four offer Saturday service. Saturday boardings make a small to modest contribution to these routes' total ridership.

Higher weekday ridership may be partially attributed to commuters, limited Saturday service and/or other factors. Route Four services the Maine Mall Area of South Portland (see Appendix A - Route Maps), and higher Saturday ridership on that route is probably the result of Saturday shoppers.

Exhibit V
Percentage of Weekday Boardings by Route

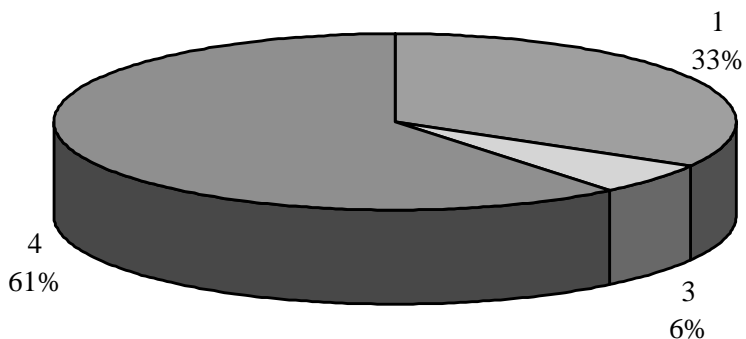
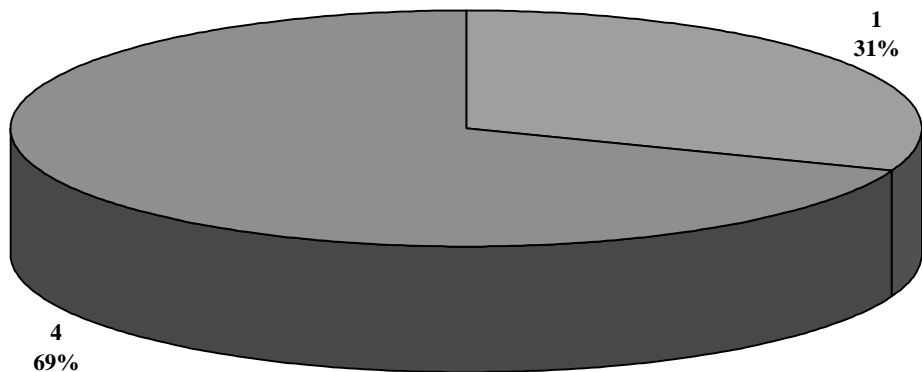


Exhibit VI
Percentage of Saturday Boardings by Route

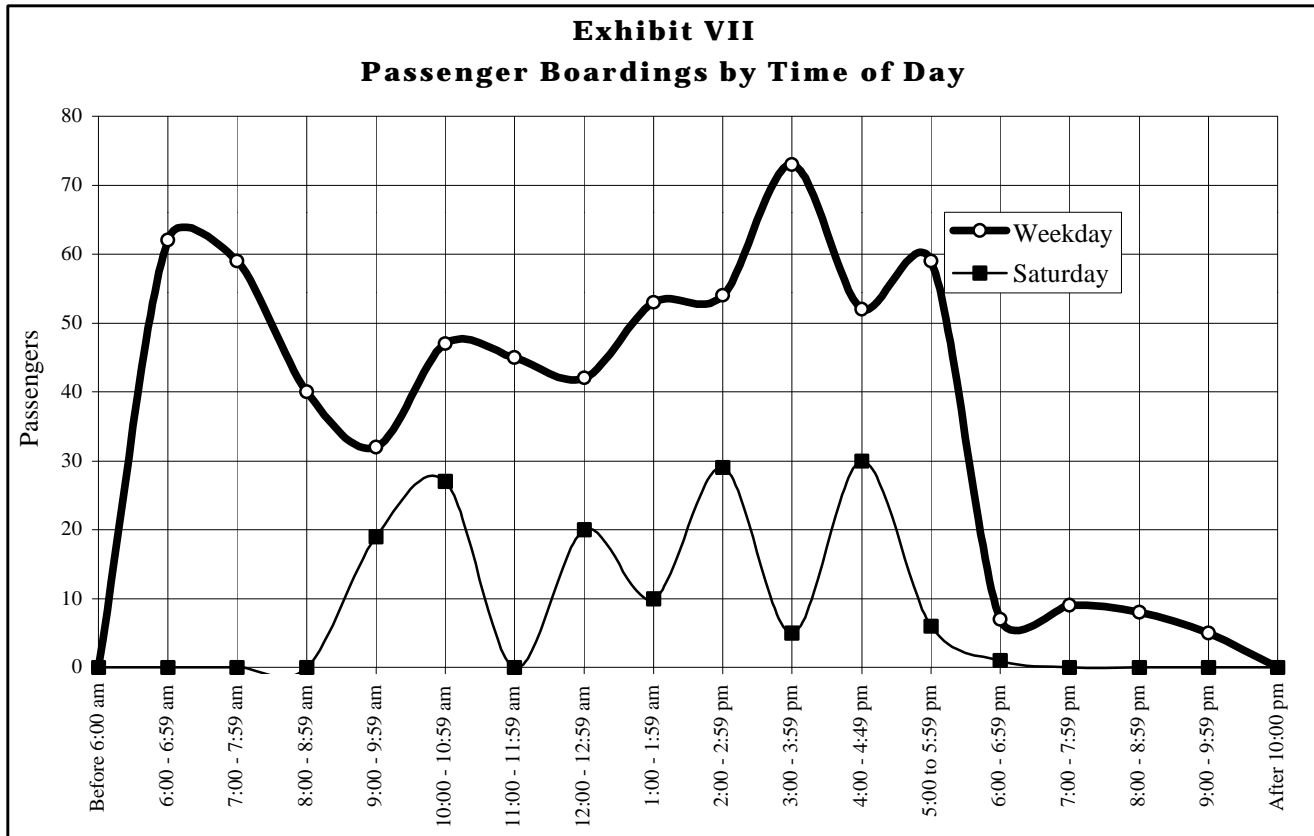


Exhibits V, and VI isolate weekday and Saturday boardings to highlight distribution patterns attributable to weekday /weekend variations.

The boarding distribution of weekday routes (Exhibit V) and Saturday routes (Exhibit VI) are both similar to the total boarding distributions shown in Exhibit III. Route Four rose from 62% over-all to 69% during the week, while Route One remained at 33% overall and during the week.

Passenger Boardings by Time of Day

Exhibit VII displays passenger boardings by time of day. Passenger boardings for the routes of the SPBS transit system are combined and divided into their hourly components to show boarding trends within the daily ridership (for Passenger Boardings/Departures by Time of Day for the Individual Routes, see Appendix E). Boarding times are not actual, but are determined by the starting time of their corresponding outbound or inbound trip.



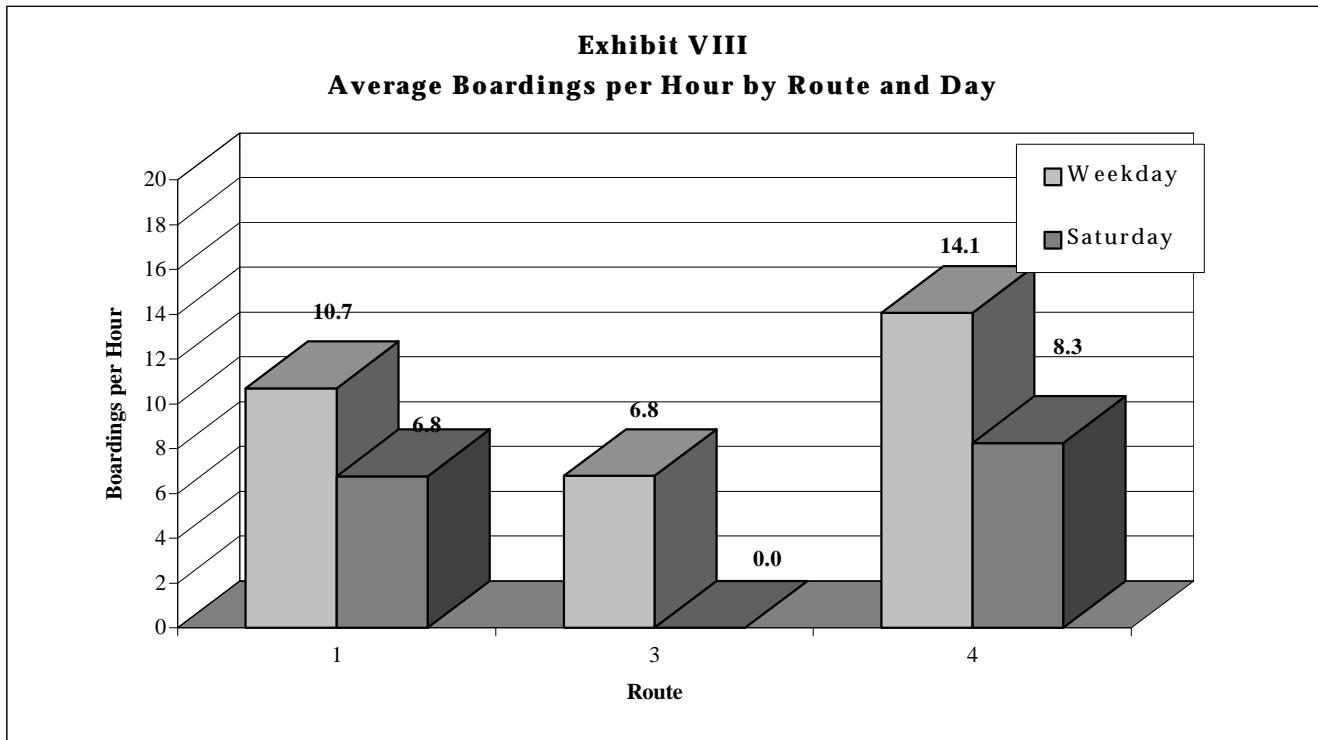
Note: Starting times outbound or inbound trips are earlier than the actual boarding times.

As Exhibit VII shows, weekday boardings rise steadily from the onset of the service day, peaking at 6:00 to 6:59 a.m., then fall and rise once again to peak at 10:00 to 10:59 a.m. and again at 1:00 to 1:59 p.m. The highest weekday peak is experienced during 3:00 to 3:59 p.m. A second afternoon peak takes place at 5:00 to 5:50 p.m. after which the number of boardings drops sharply then flattens out until the end of the service day.

Saturday boarding patterns appear to rise and fall sharply about every two hours. The small number of riders for Saturday, and the fact that the two routes are served by the same bus make the peaks look more significant than they really are.

Boardings per Hour

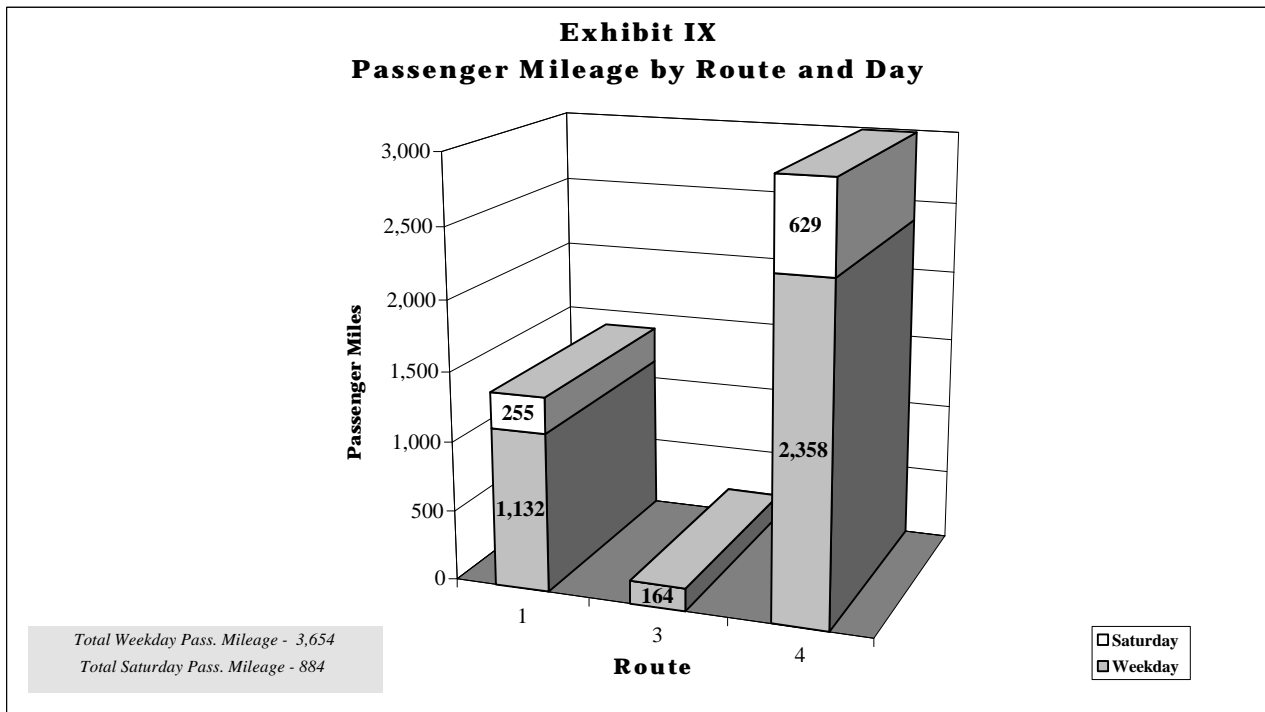
Another way to examine bus-boarding statistics is to divide the number of persons riding the bus by the total hours of bus service. Some bus routes appear to have more boardings because they have more buses in operation or longer service hours. Boardings per hour describe the concentration of ridership, holding constant for differences in number of buses and service hours.



Route Four's high weekday ridership rates (Exhibits III & IV) are echoed by its high concentration of passengers (Exhibit VIII). Route One weekday has the second highest concentration of passengers at 10.7 passengers per hour. Route Three weekday appears to have a relatively high concentration of riders, similar to Saturday boardings on One and Four. When the shorter service day of Route Three is taken into account (6 hours for Rt 3 compared to over 16 hours for Rts. 1 and 4) the boardings per hour appear to be less significant.

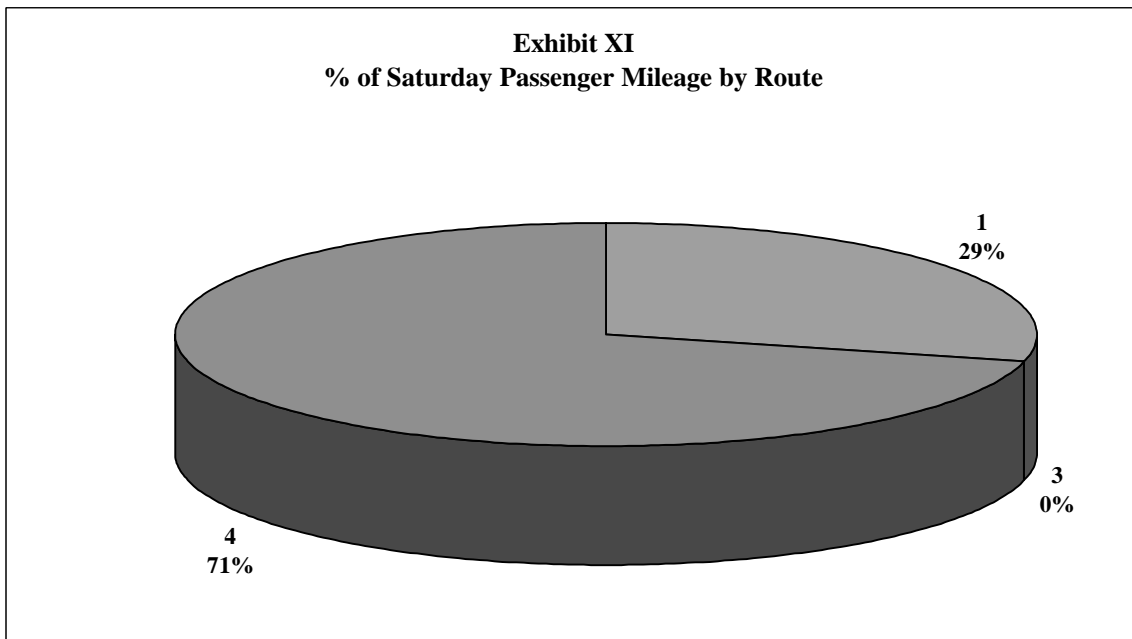
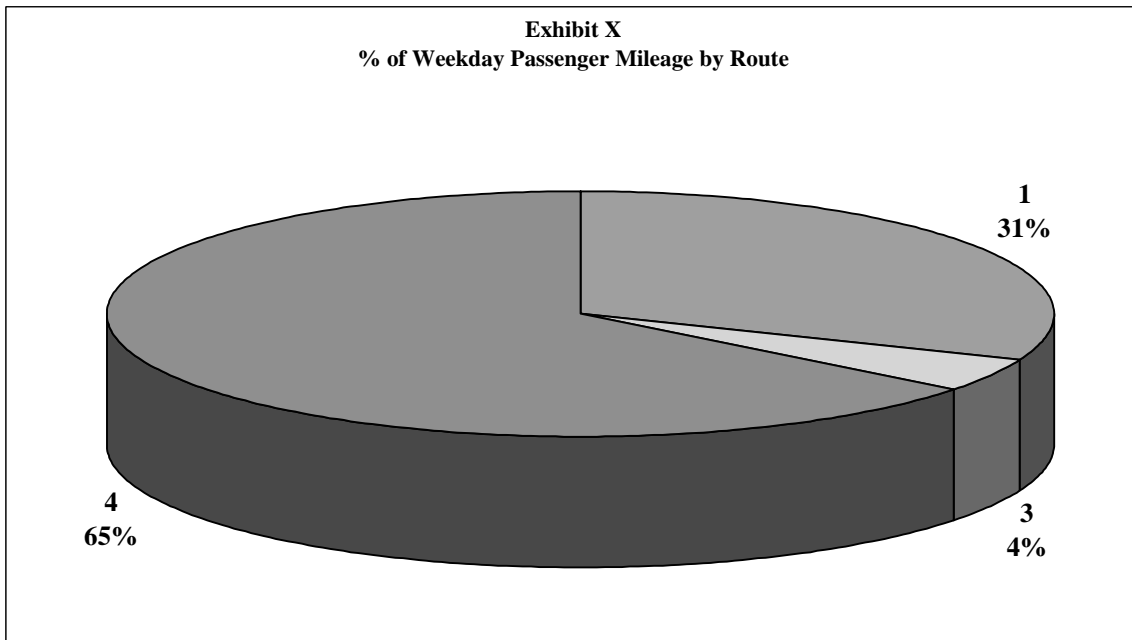
Passenger Mileage

As stated in the methodology section, passenger mileage describes both how many persons are riding the bus and how far. Exhibit IX shows passenger mileage by route and day.



The distribution of passenger mileage follows a distribution pattern similar to boardings. Route Four has the highest total passenger mileage (2,988), followed by Route One (1,387), and Route Three (164). Weekdays constitute 81% of all passenger mileage, while Saturdays constitute 19%. Route Four weekday has the greatest passenger mileage of any per day route (2,358), followed by Route One Weekday (1,132), and Route Four Saturday (629).

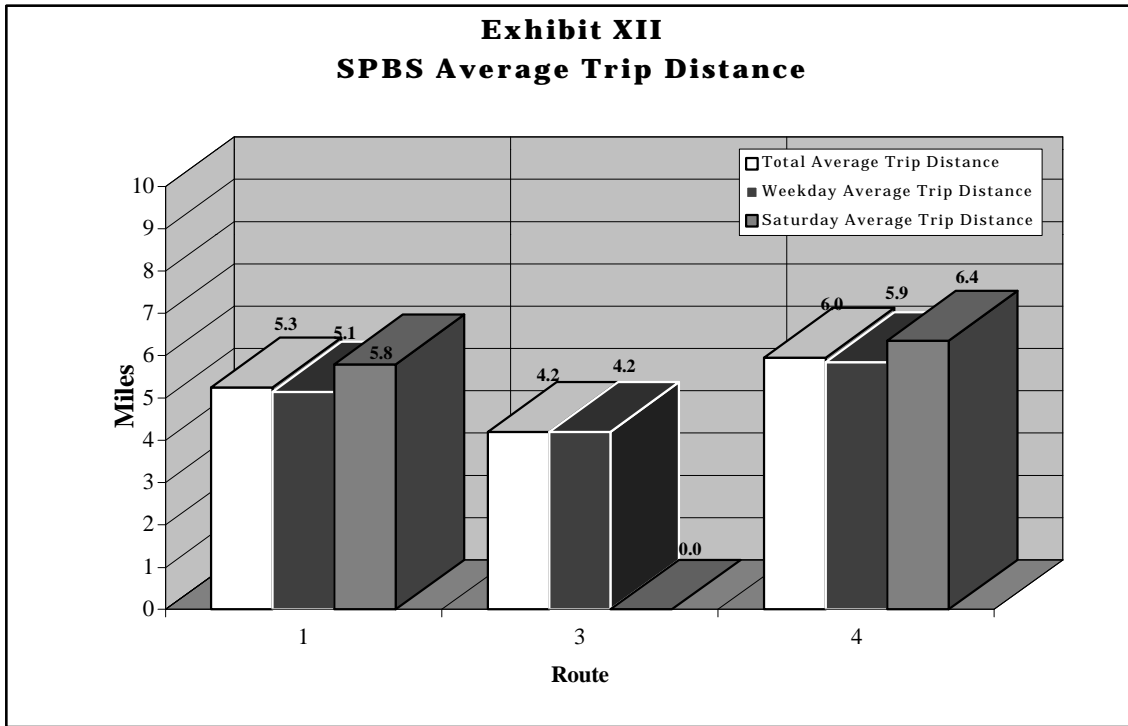
Exhibits X and XI isolate weekday, Saturday and Sunday passenger mileage to highlight distribution patterns attributable to weekday/weekend variations.



Route Four comprises the largest percentage of both weekday and Saturday passenger miles. Route One's Saturday passenger mileage (29%) is very similar to its weekday mileage (31%).

Average Trip Distance:

Average trip distance is obtained by dividing each route’s passenger mileage by the number of passengers (i.e. boardings). The average passenger trip distance describes the distance the average passenger travels on that route.



As shown in Exhibit XII, some routes have longer or shorter average trips, a byproduct of general trip geographical characteristics. Route Four has the longest average passenger trip distance (6.0 miles) for all days combined (total average trip distance). Route Four also has the longest weekday average trip distance (5.9 miles) and the longest Saturday trip distance (6.4 miles.) Route One is second in total average trip distance (5.3 miles), weekday average trip distance (5.1 miles), and Saturday distance (5.8 miles).

Route	Weekdays	Saturdays
1	15.13	10.47
3	19.93	-
4	30.08	18.57