TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA/TX-83/ +1072-1F		

4. Title and Subtitle	5. Report Date
Park-and-Pool Lots in Rural, Nonurbanized Areas	August 1983
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Richard L. Peterson and Roberta Sato	Technical Report 1072-1F

9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute The Texas A&M University System College Station, Texas 77843	11. Contract or Grant No. Study No.2-10-83-1072
	13. Type of Report and Period Covered Final - September 1982 August 1983
12. Sponsoring Agency Name and Address Texas State Department of Highways and Public Transportation P. O. Box 5051, Austin, Texas 78763	14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with Urban Mass Transportation Administration
Research Study Title: Park-and-Pool Lots in Rural Nonurbanized Areas

16. Abstract

Through the Cooperative Research Program with the Texas State Department of Highways and Public Transportation, the Texas Transporation Institute has been involved in extensive evaluations of high-occupancy vehicle facilities throughout Texas. Park-and-Ride studies were first performed in the Dallas area in 1979 and extended to the Houston and San Antonio Metropolitan Areas in 1980. In 1982, The Texas Transportation Institute undertook investigations of Park-and-Go and Park-and-Pool facilities in and around the Dallas/Fort Worth region. This study presents the result of an investigation of Park-and-Pool activity in rural, nonurbanized areas throughout the State of Texas and compares the results with prior research findings.

17. Key Words	18. Distribution Statement
Park-and-Ride, Park-and-Go, Park-and-Pool, Transit, Mass Transportation, HOV Facilities, Ridesharing, Buspool, Carpool, Vanpool, Corridor Parking, Marketing, Rural Transportation, Transportation Planning, Priority Treatment.	No restrictions. This document is available to the public through the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

19 Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	281	

Form DOT F 1700.7 (8-69)

PARK-AND-POOL LOTS IN RURAL, NONURBANIZED AREAS

BY

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Technical Report 1072-IF
Research Study Number 2-10-83-1072

Sponsored by
State Department of Highways and Public Transportation
in cooperation with
The U.S. Department of Transportation
Urban Mass Transportation

Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843

August 1983

ACKNOWLEDGEMENTS

To successfully undertake a project of this nature, the cooperation and assistance of a number of organizations and agencies are necessary. The Texas Transportation Institute was provided with this assistance, and the cooperation of the following individuals is gratefully acknowledged: Messrs. J.R. Stone (District 2), Bob Hodge (District 2), Don Walden (Dallas/Fort Worth Regional Planning Office), Mr. Mark Young (Dallas/Fort Worth Regional Planning Office), F.C. Young (District 20), D.D. Williamson (District 17), Herman C. Gadeke, Jr. (District 15), Carl V. Ramert (District 13), Reuben J. Petrusek, Jr. (District 13), Oliver F. Stork (Houston Urban Project), Omer F. Poorman (District 12), Richard J. Kabat (District 12), James R. Evans (District 10), and Elton B. Evans (District 9). In addition, special recognition is due Mr. Phillip L. Wilson, State Transportation Planning Engineer, (D-10, Austin) and Mr. Don Dial (D-10, Austin) for their help and guidance throughout the research effort.

ABSTRACT

Through the Cooperative Research Program with the Texas State Department of Highways and Public Transportation, the Texas Transportation Institute has been involved in extensive evaluations of high-occupancy vehicle facilities throughout Texas. Park-and-Ride studies were first performed in the Dallas area in 1979 and extended to the Houston and San Antonio Metropolitan Areas in 1980. In 1982, The Texas Transportation Institute undertook investigations of Park-and-Go and Park-and-Pool facilities in and around the Dallas/Fort Worth region. This study presents the result of an investigation of Park-and-Pool activity in rural, nonurbanized areas throughout the State of Texas and compares the results with prior research findings.

Key Words: Park-and-Ride, Park-and-Go, Park-and-Pool, Transit, Mass Transportation, HOV Facilities, Ridesharing, Buspool, Carpool, Vanpool, Corridor Parking, Rural Transportation, Transportation Planning, Marketing, Priority Treatment.

SUMMARY

The study of Park-and-Pool lots in rural areas identified and surveyed users of 78 locations throughout Texas. Results of the data analysis of returned surveys is presented in the section entitled "Survey Results" and addresses both personal and travel characteristics of Park-and-Pool commuters. This original data, consisting of 367 returned commuter surveys, was then aggregated with prior but similar studies of Park-and-Pool users to provide a total data base of 1,344 completed questionnaires from 128 mode-change facilities. The section entitled "Marketing Considerations" presents user group profiles of personal characteristics for buspoolers, carpoolers and vanpoolers based upon the analyses of the aggregated data. Table S-1 summarizes the personal characteristics of the ridesharing commuters by pooling mode.

Tabel S-1. Summary of Personal Characteristics of Park-and-Pool Users By Pooling Mode

Personal Characteristic Measure:	Buspoolers	Carpoolers	Vanpoolers
Age (Years)			
Average (mean)	39.4	37.6	39.5
50th Percentile (median)	35.7	35.3	38.4
Sex			
Male	46.7%	58.1%	55.6%
Female	53.3%	41.9%	44.4%
Occupation			
Professional	36.1%	34.2%	40.5%
Clerical	30.7%	19.5%	24.2%
Managerial	11.2%	12.1%	12.3%
Craftsman	9.8%	20.0%	14.0%
Education (Years)			
Average (mean)	14.1	14.1	13.9
50th Percentile (median)	13.4	13.2	13.1

An investigation of travel characteristics was also undertaken for the Park-and-Pool participants to develop representative market zones for promoting these type of facilities. The observed travel patterns were analyzed by general location of the Park-and-Pool site and are summarized in Table S-2. The data on commuter travel are key elements necessary for assessing transportation benefits derived from mode-change parking areas.

Table S-2. Summary of Travel Characteristics of Park-and-Pool Users By Lot Location

Travel Characteristics & Measure:	Poolers from Rural Lots	Poolers from Urban Fringe Lots	Poolers from Urban Lots
Pooling Mode			
Carpool	66.7%	61.5%	56.6%
Vanpool	26.5%	33.2%	29.6%
Buspool	6.4%	5.3%	13.5%
Pool Size (Person Per Vehicle)			
Carpool	3.36 ppv	3.32 ppv	3.35 ppv
Vanpool	9.07 ppv	9.24 ppv	9.63 ppv
Buspool	26.77 ppv	25.50 ppv	15.97 ppv
Home-to-Lot Travel Distance (miles)			
Average (mean)	6.52 mi	6.20 mi	5.02 mi
50th Percentile (median)	3.97 mi	3.87 mi	2.72 mi
Lot-to-Destination Travel Distance (miles)			
Average (mean)	34.44 mi	29.05 mi	21.47 mi
50th Percentile (median)	34.10 mi	24.91 mi	19.88 mi
Travel Frequency (mean)	4.90 da/wk	4.89 da/wk	4.92 da/wk

The "Pooling Benefits" section of the report analyzes the Park-and-Pool study sites in terms of annual reductions in vehicle miles of travel (VMT) and gallons of fuel saved by the ridesharing commuters. Table S-3 summarizes the estimated benefits for an average Park-and-Pool user originating from rural, urban fringe and urban lot locations. As shown in the table, the

estimated reduction in annual VMT per rural pooler is some 9,300 to 12,600 vehicle miles or approximately 56.3% more savings than realized by an urban lot user.

Table S-3. Summary of Estimated Annual Benefits Per Park-and-Pool User By Lot Location

Measure of Benefit:	Benefits per Commuter Using a:		
	Rural Lot	Urban Fringe Lot	Urban Lot
Annual VMT Reduction			
Low Estimate (mean)	9,341 miles	8,531 miles	5,895 miles
High Estimate (mean)	12,636 miles	11,537 miles	8,162 miles
Annual Fuel Savings			
Low Estimate (mean)	588 gallons	587 gallons	371 gallons
High Estimate (mean)	795 gallons	726 gallons	514 gallons

Based upon the travel characteristics of Texas commuters and the survey of Park-and-Pool practices employed by other state agencies, the report presents "Planning Guidelines" and analysis criteria for Park-and-Pool facilities. The guidelines along with other data contained within the report should prove useful to transportation officials and planners concerned with the efficient management of the transportation system.

IMPLEMENTATION STATEMENT

This project, as well as previous work performed by the Institute, is oriented toward assisting the State Department of Highways and Public Transportation in the planning, implementation, and evaluation of priority treatment projects known as Park-and-Pool facilities. Prior work has concentrated on commuter travel in and around major urban areas. This research considers travel demand from rural areas of the State.

Numerous new Park-and-Pool lots and other mode change facilities continue to be built in the State of Texas with the Department being frequently involved in the planning and the funding of those improvements. The results from this and other similar studies should enhance the cost-effectiveness of Park-and-Pool improvements in both urban and rural areas of Texas.

DISCLAIMER

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INTRODUCTION

The rapid population growth within the State of Texas has resulted in a correspondingly rapid growth in transportation demand and traffic congestion. In addition to rapid population growth, the problem of sustaining travel mobility is compounded by limited financial resources and a general reduction in the people-moving capacity of existing highways and freeways. During the last 30 years, the average vehicle occupancy rate has declined from about 4 persons per vehicle to less than 1.3 persons per vehicle. This vehicle occupancy reduction has essentially resulted in a 68% decrease in the effective capacity of the existing roadway system.

The State Department of Highways and Public Transportation is responsible for the design, construction and operation of highways, freeways and farm-to-market roads to accommodate present and future transportation demand. In an attempt to increase the effective capacity and productivity of the existing transportation network and to reduce related energy consumption, the Department has initiated studies and evaluations of various priority treatment strategies for high-occupancy vehicles. Park-and-Pool facilities are examples of priority treatment strategies to increase the productivity of the roadway system in Texas and to reduce transportation energy consumption.

Park-and-Pool is a term used to describe a parking area or facility where commuters can rendezvous, park one or more of their vehicles, and share a ride to a common destination. The parking areas may be designated lots with sign delineation or informal rendezvous, staging areas on public right-of-way or private property. The State Department of Highways and Public Transportation has constructed parking lots in both rural and urban areas throughout Texas to encourage ridesharing by the commuting public.

The research effort documented herein is a continuation of, and a complement to, previous studies of priority treatment strategies sponsored by the State Department of Highways and Public Transportation and conducted by the Texas Transportation Institute. A 1981 study (Research Report 205-13) first investigated some 25 formal Park-and-Pool lots within the San Antonio and Houston urbanized areas. This initial work was expanded to the Dallas/Fort Worth region in 1982 and resulted in an analysis of Park-and-Pool activity along the I-30 freeway corridor (Research Report 205-18) and an investigation of Park-and-Go lots in the City of Fort Worth (Research Report 205-19). A 1982-83 study (Research Report 205-21) analyzed and compared ridesharing characteristics of commuters using both Park-and-Pool and Park-and-Go facilities in rural and urban areas around and within Fort Worth. The results of this research effort, in combination with prior work, provide guidelines for planning future Park-and-Pool and/or other mode-change facilities in urbanized and rural areas throughout the State and a methodology for assessing the effectiveness of these types of improvements.

This report presents the results of data analyses and is organized into five major sections:

1. Survey Results;
2. Marketing Considerations;
3. Pooling Benefits;
4. Planning Guidelines; and,
5. Major Findings.

The "Survey Results" section summarizes the travel and personal characteristics of commuters surveyed in this study. The "Marketing Considerations" section aggregates all available data on Park-and-Pool users within Texas and presents a comparison of user characteristics along with catchment zones or market areas for these types of mode change facilities.

The "Pooling Benefits" section investigates the net annual savings in vehicle miles of travel (VMT) and gallons of fuel resulting from commuters' use of Park-and-Pool and related benefit-cost (BC) ratios associated with the provision of these parking facilities. Based upon this research, the "Planning Guidelines" section sets forth a procedure for identifying and assessing potential Park-and-Pool lots in Texas. Finally, the "Major Findings" section of the report summarizes and highlights the principal results of this investigation on rural pooling activity within the State.

STUDY OBJECTIVES

The objective of this research effort was to provide data useful in locating, sizing and assessing the effectiveness of mode change facilities known as Park-and-Pool lots in rural, nonurbanized areas of Texas. This study investigates ridesharing activity in rural locations of the State to identify viable transportation options for the commuting public. In addition to presenting the results of a commuter survey conducted as part of this research, comparisons are made with previous investigations of ridesharing in urbanized and urban fringe areas.

The major tasks accomplished in performing this study were:

- Review of relevant literature and prior studies;
- Identification of Park-and-Pool Sites for data collection;
- Design and distribution of a commuter survey instrument;
- Limited survey of state agencies to determine critical factors associated with locating successful Park-and-Pool facilities;
- Analysis of survey data and comparison of data with previous investigations;
- Benefit-Cost (BC) Analysis of Park-and-Pool facilities; and,
- Documentation of the study, major findings and appropriate recommendations.

RELEVANT LITERATURE AND STUDIES

This investigation of Park-and-Pool activity in rural, nonurbanized areas is a complement to previous research efforts sponsored by the State Department of Highways and Public Transportation and conducted by the Texas Transportation Institute. Efforts were made to design and conduct this study so as to enhance the quality and reliability of data associated with the characteristics of commuters engaged in ridesharing to and from a common location.

The information obtained from a commuter survey is analyzed and aggregated with data obtained in four previous research projects. The four relevant research efforts, conducted by the Institute, are:

Park-and-Pool Facilities, Survey Results and Planning Data, Research Report 205-13, February 1981.

Park-and-Pool Lots, Dallas/Fort Worth Area: An Analysis of Survey Data, Research Report 205-18, May 1982.

Fort Worth Park-and-Go Facilities An Evaluation of Survey Data, Research Report 205-19, August 1982.

Park-and-Pool Lots In The Fort Worth Area: An Analysis of Survey Data, Research Report 205-21, August 1983.

Report 205-13 documents the first investigation of Park-and-Pool facilities undertaken in the San Antonio and Houston areas. This research included the distribution of commuter surveys at 25 different sites and the analysis of 266 returned surveys. (1)

Report 205-18 presents the findings of a 1981-82 study of Park-and-Pool lots within the I-30 freeway corridor of Dallas/Fort Worth. A total of 21 sites were investigated and resulted in 235 survey forms being returned for analysis. (2)

The 205-19 effort looked at the characteristics of bus patrons in Fort Worth using change-of-mode facilities known as Park-and-Go lots. A total of

8 Park-and-Go lots were surveyed using an on-board questionnaire distributed to boarding bus partrons. The study resulted in the return of 113 questionnaires with subsequent data analysis of buspooler characteristics and perceptions. (3)

The 1983 Research Report 205-21 documents an investigation of 37 pooling facilities in and around the City of Fort Worth including 8 Park-and-Go lots and 29 Park-and-Pool lots. Data collection resulted in a total of 363 commuter surveys being returned for analysis of commuter travel patterns and personal characteristics. (4)

In an attempt to assess the current state-of-the-art for planning Park-and-Pool facilities and to assemble relevant data for this study effort, two additional sources were utilized in the literature review and investigation.

1. Texas A&M University's Automated Information Retrieval Service (AIRS)
2. Transportation professionals in other states involved with Park-and-Pool programs.

The Automated Information Retrieval Service (AIRS) provides customized searches of published literature in over 150 indexes, abstracting services, and directories. Identification of relevant work is based on the occurrence of data elements, keywords, subject codes, author names, etc. The researcher creates a profile of the particular subject area being investigated and specifies the key words or terms used by AIRS in the literature search. The three principal transportation directories used in the AIRS search for relevant Park-and-Pool data were:

- Transportation Research Information Service (TRIS)
- National Technical Information Service (NTIS)
- SSIE: Reports of Scientific Research Projects Currently in Progress

Over 300 reports and publications were identified by AIRS which related to ridesharing and corridor parking activities. Abstracts of these published works were obtained and reviewed for possible utilization in this Park-and-Pool research. The applicable publications have been referenced herein where appropriate and are included in the References Section at the end of the text.

Letters of inquiry were mailed to some 26 state planning officials throughout the nation requesting any available or published planning guidelines, policies, studies and/or reports dealing with Park-and-Pool facilities. Those states contacted and invited to participate in this study effort consisted of:

Arizona	Missouri
California	Nebraska
Colorado	New Mexico
Connecticut	New York
Georgia	Ohio
Illinois	Oklahoma
Indiana	Oregon
Maine	Pennsylvania
Massachusetts	Rhode Island
Maryland	Tennessee
Michigan	Utah
Minnesota	Virginia
Mississippi	Washington

Considerable information was obtained from the mailout inquiry and has been incorporated, as appropriate, within this final report.

STUDY PROCEDURE

In addition to the information sources described in the "Relevant Literature and Studies" section, the collection of primary research data was undertaken to determine the travel and personal characteristics of commuters engaged in ridesharing activity from rural locations throughout Texas. To accomplish the study objectives, Park-and-Pool sites were identified within the State for possible inclusion in the data collection effort. Two survey instruments were designed for use in collecting Park-and-Pool site information and determining commuter or user characteristics. The returned surveys were coded and inputed to the computer system of Texas A&M University. Data analysis was accomplished with the assistance of the Statistical Analysis System (SAS) available to researchers of the Texas Transportation Institute. Data analysis from this current research work is presented in the "Survey Results" section which includes the following major topics:

- Park-and-Pool Facilities
- Personal Characteristics of Commuters
- Travel Characteristics of Commuters
- Impressions and Perceptions of Commuters

The original data obtained in this study were then aggregated with existing data bases obtained from previous studies of Park-and-Pool facilities. The aggregated data base was used in the development of subsequent sections of this report dealing with marketing considerations, pooling benefits, and planning guidelines associated with Park-and-Pool facilities.

Park-and-Pool Sites

A May 21, 1982 survey of State Department of Highways and Public Transportation (SDHPT) Districts was mailed out by the State Transportation Planning Engineer. The results of that survey provided the initial listing of all known Park-and-Pool facilities within Texas. Over 110 sites located in 39 Texas Counties were identified by the SDHPT District Offices in response to the mailout inquiry. Following a review of the initial listing and conversations with the SDHPT District personnel, a total of 78 Park-and-Pool sites were selected for inclusion in field data collection efforts. The 78 sites were geographically dispersed in 9 SDHPT Districts within the following 29 Texas Counties:

Atascosa
Austin
Bosque
Comal
Denton
Gregg
Guadalupe
Burleson
Hardin
Harris
Henderson
Hill
Jasper
Kendall
Lavaca
Liberty
McLennan
Medina
Milam
Montgomery
Newton
Orange
Rusk
Smith
Tyler
Van Zandt
Victoria
Wharton
Wilson

Table 1 presents the Park-and-Pool Study site locations of the 78 lots along with the 9 SDHPT Districts included in this research. Figure 1 shows the location and distribution of the study sites.

A survey form, entitled Rural Park-and-Pool Site Investigation, was utilized by field personnel in collecting and summarizing information about each of the 78 study sites. A copy of the form is included in Appendix A of

Table 1. Park-and-Pool Study Site Locations

Lot Identification:	SDHPT District Number:	Office:	Site Location:
ATA 1	15	San Antonio	SH-16 and FM-476
ATA 2	15	San Antonio	FM-476 at Super S. Foods; in Pleasanton
AUS1	13	Yoakum	I-10 and FM-1458
AUS 2	13	Yoakum	US-90 and SH-36
BOS 1	9	Waco	SH-144 in Walnut Springs
BOS 2	9	Waco	SH-22 near Meridan
BOS 3	9	Waco	SH-22 and FM-56
BUR 1	17	Bryan	SH-21 and FM-908
BUS 2	17	Bryan	SH-21 and FM-2000
BUR 3	17	Bryan	SH-21 and FM-1362
COM 1	15	San Antonio	I-35 and FM-482
COM 2	15	San Antonio	US-81 (bus.) and Loop-337
DEN 1	18	Dallas	US-377 and FM-455
DEN 2	18	Dallas	US-377 and FM-428
DEN 3	18	Dallas	I-35 and US-380
DEN 4	18	Dallas	I-35E and Loop-288
DEN 5	18	Dallas	I-35E at State School Rd. in Denton
DEN 6	18	Dallas	I-35E at Safeway; in Lewisville
DEN 7	18	Dallas	I-35E and FM-1171; at Church
GRE 1	10	Tyler	US-259 north edge of Longview
GRE 2	10	Tyler	SH-42 and SH-135
GUA 1	15	San Antonio	US-90 and SH-123
GUA 2	15	San Antonio	I-10 and SH-46
HAD 1	20	Beaumont	US-96 north edge of Beaumont
HAD 2	20	Beaumont	US-96 north of Beaumont 3 miles
HAR 2	12	Houston	I-10 at Mason Road
HAR 3	12	Houston	I-10 at Fry Road
HAR 4	12	Houston	I-10 at Crosby-Lynchburg Road
HEN 1	10	Tyler	SH-19 south edge of Athens
HEN 2	10	Tyler	SH-31 and FM-314
HIL 1	9	Waco	SH-22 and Loop-810
JAS 1	20	Beaumont	US-190 at Houston Street; in Jasper
JAS 2	20	Beaumont	US-96 and FM-363
JAS 3	20	Beaumont	US-96 and FM-1004 West
JAS 4	20	Beaumont	US-96 and FM-105
JAS 5	20	Beaumont	SH-62 and FM-2246
JAS 6	20	Beaumont	SH-62 in Buna
KEN 1	15	San Antonio	I-10 at Cascade-Cavern Road
KEN 2	15	San Antonio	I-10 and SH-46
LAV 1	13	Yoakum	US-77 and SH-111
LIB 1	20	Beaumont	SH-146 and FM-834
LIB 2	20	Beaumont	SH-146 south of US-90
LIB 3	20	Beaumont	US-59 at San Jacinto River

Table 1. Park-and-Pool Study Site Locations (Cont'd)

Lot Identification:	SDHPT District Number:	Office:	Site Location:
MCL 1	9	Waco	SH-6 and Loop-396
MCL 2	9	Waco	US-84 and FM-1695
MED 1	15	San Antonio	US-90 in Castroville
MIL 1	17	Bryan	US-79/190 and FM-2095
MON 1	12	Houston	I-45 and FM-1488
MON 2	12	Houston	US-59 at Community Drive
MON 3	12	Houston	US-59 and FM-2090
MON 4	12	Houston	I-45 at Gladstell Street
MON 5	12	Houston	US-59 north of FM-1485 some 4 miles
NEW 1	20	Beaumont	US-190 and SH-87
NEW 2	20	Beaumont	SH-87 and FM-363
NEW 3	20	Beaumont	SH-87 and FM-1004
NEW 4	20	Beaumont	SH-87 and FM-253
NEW 5	20	Beaumont	SH-87 and SH-12
ORA 1	20	Beaumont	SH-12 and SH-62
ORA 2	20	Beaumont	SH-87 and FM-105
ORA 3	20	Beaumont	SH-87 at Cow Bayou; in Bridge City
ORA 4	20	Beaumont	SH-87 southwest edge of Bridge City
RUS 1	10	Tyler	US-259 at traffic circle
SMI 1	10	Tyler	SH-31 west of Loop-323
SMI 2	10	Beaumont	I-20 and FM-849
TYL 1	20	Beaumont	US-69 south of Woodville
TYL 2	20	Beaumont	US-69 and FM-1943
TYL 3	20	Beaumont	FM-92 and FM-1943
TYL 4	20	Beaumont	FM-92 and FM-1013
VAN 1	10	Tyler	SH-243 west of Canton
VAN 2	10	Tyler	SH-198 south of Canton
VAN 2	10	Tyler	SH-19 south of Canton
VIC 1	13	Yoakum	US-87 and FM-447
VIC 2	13	Yoakum	FM-236 and FM-622
VIC 3	13	Yoakum	US-59/77 and FM-236
VIC 4	13	Yoakum	US-87 and Loop-175
VIC 5	13	Yoakum	US-87 and FM-616
WHA 1	13	Yoakum	US-59 and FM-1161
WIL 1	15	San Antonio	US-181 and SH-97

PARK-AND-POOL SITES

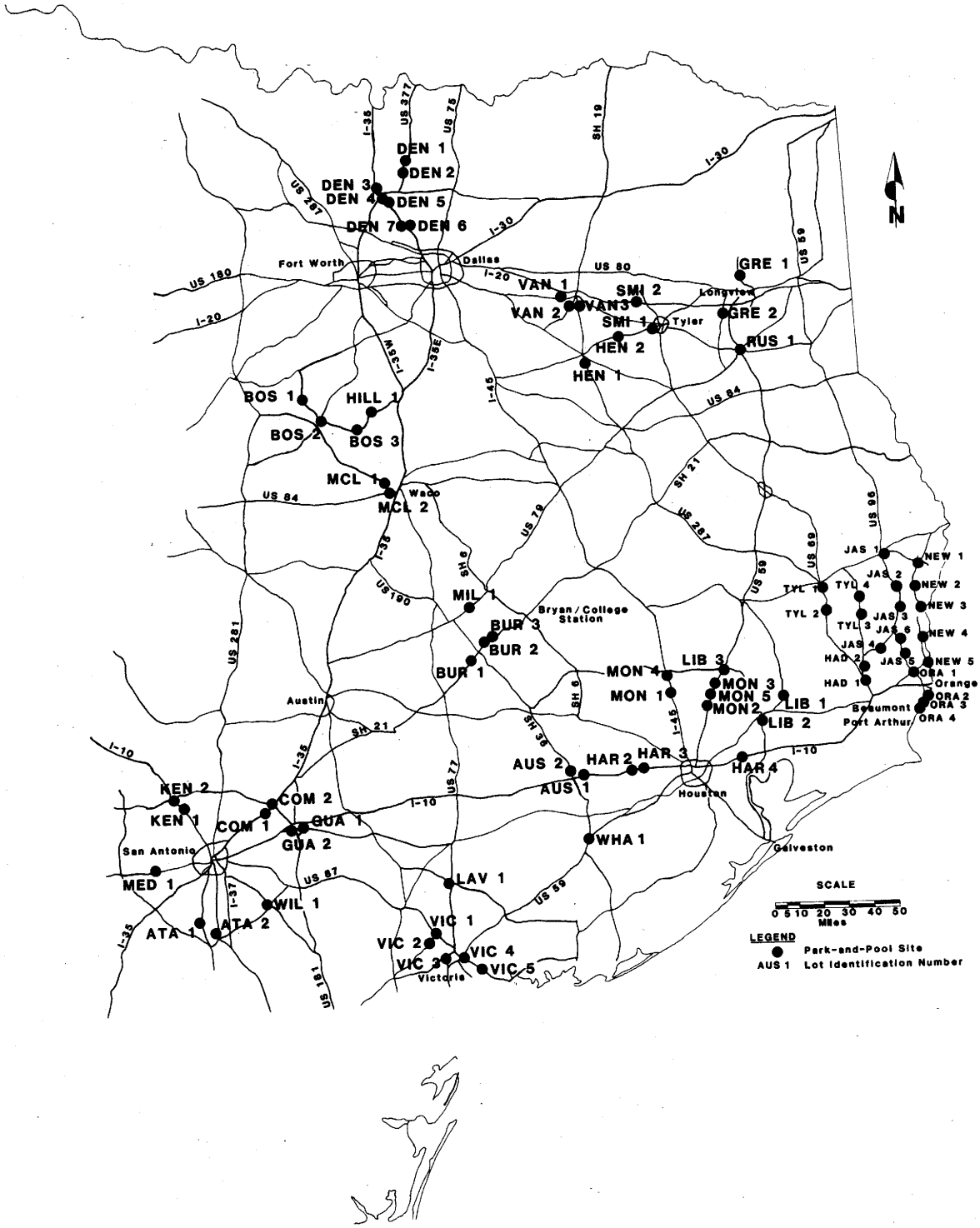


Figure 1: Location and Designation of 78 Park-and-Pool Study Sites

this report. Information on the following items was recorded for each of the Park-and-Pool facilities:

- Total number of parked vehicles
- Number of subcompact vehicles
- Number of standard vehicles
- Number of pickups
- Number of vans
- Number of other types of vehicles
- Date and time that lot was surveyed
- Approximate lot capacity
- The type of lot surface (i.e., gravel, asphalt, etc)
- Adjacent land use to the lot
- Improvements (if any) made to parking area
- Name of nearest town.

In addition to the above items, the observer sketched the layout of the parking area, verified the location and ownership of the lot, and noted the general area or setting (rural or urban fringe) of the facility. The findings of this investigation are included in the Survey Results section.

Commuter Surveys

The commuter survey form was designed for distribution to, and completion by, the commuters using the Park-and-Pool facilities. The commuter survey instrument, accompanied by a cover letter and a postage-paid return envelope, was placed on the windshield of each parked vehicle identified at the 78 study sites. The survey instrument and cover letter are included in Appendix A. The questionnaire was designed to collect both personal and travel information on the commuters using the Park-and-Pool facilities. In addition, the instrument was intended to complement previous studies and to provide similiar and comparable data. Each survey was coded with an identification number to cross reference the returned forms to the particular Park-and-Pool sites.

A total of 856 commuter surveys were distributed with 367, or 42.9%, being returned for analysis. Table 2 provides a listing of the number of parked commuter vehicles, returned surveys and percent return rate for each of the 78 Park-and-Pool lots. In addition, the table also identifies the town nearest the lot and the general setting of the lot (rural or urban fringe) for each of the study sites.

Table 2 Study Sites for Rural Park-and-Pool Project

Lot ID	Nearest Town To Lot	County	Setting of Lot	Number of Commuter Vehicles	Total Surveys Returned	Percent Returned
ATA 1	Poteet	Atascosa	Rural	4	2	50.00
ATA 2	Pleasanton	Atascosa	Rural	8	3	37.50
AUS 1	San Felipe	Austin	Rural	18	8	44.44
AUS 2	Sealy	Austin	Rural	18	6	33.33
BOS 1	Walnut Springs	Bosque	Rural	3	0	0.00
BOS 2	Meridian	Bosque	Rural	4	1	25.00
BOS 3	Laguna Park	Bosque	Rural	0	0	.
BUR 1	Caldwell	Burleson	Rural	2	2	100.00
BUR 2	Caldwell	Burleson	Rural	3	1	33.33
BUR 3	Cooks Point	Burleson	Rural	4	3	75.00
COM 1	Solms	Comal	Rural	21	11	52.38
COM 2	New Braunfels	Comal	Rural	40	15	37.50
DEN 1	Pilots Point	Denton	Rural	14	5	35.71
DEN 2	Aubrey	Denton	Rural	4	3	75.00
DEN 3	Denton	Denton	Rural	2	1	50.00
DEN 4	Denton	Denton	Rural	19	7	36.84
DEN 5	Denton	Denton	Rural	15	9	60.00
DEN 6	Lewisville	Denton	Rural	8	1	12.50
DEN 7	Lewisville	Denton	Rural	5	2	40.00
GRE 1	Longview	Gregg	Rural	0	0	.
GRE 2	Kilgore	Gregg	Rural	0	0	.
GUA 1	Seguin	Guadalupe	Rural	13	7	53.85
GUA 2	Seguin	Guadalupe	Rural	9	4	44.44
HAD 1	Beaumont	Hardin	Rural	11	3	27.27
HAD 2	Beaumont	Hardin	Rural	12	4	33.33
HAR 2	Katy	Harris	Urban Fringe	30	18	60.00
HAR 3	Barker	Harris	Urban Fringe	42	23	54.76
HAR 4	Four Corners	Harris	Urban Fringe	9	7	77.78
HEN 1	Athens	Henderson	Rural	0	0	.
HEN 2	Brownsboro	Henderson	Rural	15	11	73.33
HIL 1	Whitney	Hill	Rural	9	1	11.11
JAS 1	Jasper	Jasper	Rural	7	3	42.86
JAS 2	Kirbyville	Jasper	Rural	17	6	35.29
JAS 3	Call	Jasper	Rural	1	0	0.00
JAS 4	Evadale	Jasper	Rural	9	2	22.22
JAS 5	Gist	Jasper	Rural	0	0	.
JAS 6	Buna	Jasper	Rural	0	0	.
KEN 1	Boerne	Kendall	Rural	12	8	66.67
KEN 2	Boerne	Kendall	Rural	11	6	54.55
LAV 1	Yoakum	Lavaca	Rural	5	2	40.00
LIB 1	Hardin	Liberty	Rural	7	0	0.00
LIB 2	Dayton	Liberty	Rural	21	10	47.62
LIB 3	Cleveland	Liberty	Rural	0	0	.

Table 2: Study Sites for Rural Park-and-Pool Project (Cont'd)

Lot ID	Nearest Town To Lot	County	Setting of Lot	Number of Commuter Vehicles	Total Surveys Returned	Percent Returned
MCL 1	Waco	McLennan	Urban Fringe	4	1	25.00
MCL 2	Woodway	McLennan	Urban Fringe	0	0	.
MED 1	Castroville	Medina	Rural	14	7	50.00
MIL 1	Gause	Milam	Rural	2	1	50.00
MON 1	Camp Strake	Montgomery	Urban Fringe	31	10	32.26
MON 2	Porter	Montgomery	Urban Fringe	65	23	35.38
MON 3	Splendora	Montgomery	Rural	7	2	28.57
MON 4	Conroe	Montgomery	Rural	76	36	47.37
MON 5	New Caney	Montgomery	Rural	8	4	50.00
NEW 1	Newton	Newton	Rural	5	3	60.00
NEW 2	Bleakwood	Newton	Rural	3	0	0.00
NEW 3	Trout Creek	Newton	Rural	2	0	0.00
NEW 4	Buna	Newton	Rural	0	0	.
NEW 5	Deweyville	Newton	Rural	5	4	80.00
ORA 1	Mauriceville	Orange	Urban Fringe	9	4	44.44
ORA 2	Orange	Orange	Urban Fringe	0	0	.
ORA 3	Bridge City	Orange	Urban Fringe	25	10	40.00
ORA 4	Bridge City	Orange	Urban Fringe	0	0	.
RUS 1	Henderson	Rusk	Rural	14	7	50.00
SMI 1	Tyler	Smith	Rural	7	0	0.00
SMI 2	Mt. Sylvan	Smith	Rural	2	2	100.00
TYL 1	Woodville	Tyler	Rural	1	1	100.00
TYL 2	Warren	Tyler	Rural	5	1	20.00
TYL 3	Fred	Tyler	Rural	3	2	66.67
TYL 4	Spurger	Tyler	Rural	2	0	0.00
VAN 1	Canton	Van Zandt	Rural	2	1	50.00
VAN 2	Canton	Van Zandt	Rural	0	0	.
VAN 3	Canton	Van Zandt	Rural	11	0	0.00
VIC 1	Nursery	Victoria	Rural	5	0	0.00
VIC 2	Mission Valley	Victoria	Rural	8	5	62.50
VIC 3	Victoria	Victoria	Urban Fringe	3	2	66.67
VIC 4	Victoria	Victoria	Urban Fringe	66	28	42.42
VIC 5	Placedo	Victoria	Rural	4	2	50.00
WHA 1	Hungerford	Wharton	Rural	4	2	50.00
WIL 1	Floresville	Wilson	Rural	31	14	45.16
TOTALS	NA	NA	NA	856	367	42.87

SURVEY RESULTS

This section of the report presents the results of the 78 Park-and-Pool site investigations and the analysis of 367 returned commuter surveys. The characteristics of participating commuters are summarized by the following principal categories:

- Personal Characteristics
- Travel Characteristics
- Impressions and Perceptions

Where appropriate, the commuter survey information has been disaggregated by pooling mode (i.e., buspool, carpool, vanpool) and/or by lot location (i.e., rural, urban fringe) in addition to being presented for the entire data base.

Park-And-Pool Facilities

The number of vehicles observed at the 78 study sites ranged from 0 to 76 and averaged slightly more than 12 vehicles per lot. As shown in Table 3, some 18.6% of the vehicles receiving a survey at the Park-and-Pool sites were subcompacts.

Table 3. Types of Vehicles Surveyed at Park-and-Pool Sites

Vehicle Type:	Total Number Observed:	Percent of All Surveyed:
Standard	340	39.7%
Pickup	324	37.8%
Subcompact	159	18.6%
Van	21	2.5%
Other	12	1.4%
All Types	856	100.0%

Approximately 81% of the study sites were located on public property and/or highway rights-of-way. The estimated capacity of the parking areas ranged from 6 to 150 spaces and averaged slightly more than 32 parking spaces per lot. Comparing the average usage to the average capacity reveals a typical utilization of some 37%; however, some of the study sites were not being used at all while others were at or well beyond capacity.

The type of parking surface observed for the Park-and-Pool facilities varied from dirt to concrete as shown below:

Paved Asphalt Surface -	47.9% of the lots
Dirt or Grass -	28.2% of the lots
Gravel or Stone -	22.5% of the lots
Paved Concrete -	1.4% of the lots

The most common landuse type adjacent the surveyed sites was "commercial" as summarized below:

Commercial Landuse -	54.3% of the lots
Agricultural Landuse -	35.7% of the lots
Residential Landuse -	10.0% of the lots

Some 64% of the surveyed Park-and-Pool lots had one or more improvements made to the parking area. Of those facilities which had been improved, the most common enhancement was improved egress/ingress as presented below:

Improved Egress/Ingress -	61% of the improved lots
Market Parking Stalls -	41% of the improved lots
Signing -	38% of the improved lots
Wheel Stops -	25% of the improved lots
Lighting -	21% of the improved lots
Trash Containers -	6% of the improved lots
Telephone -	3% of the improved lots

Commuter Characteristics

A total of 856 parked commuter vehicles at the 78 Park-and-Pool lots received a survey questionnaire. Of those surveys distributed, 367 (42.9%) were returned for analysis. This section of the report presents the results of the data analysis performed on the commuters' responses.

Personal Characteristics

Age

The age of participating commuters ranged from 18 to 80 years and averaged 38.8 years. Table 4 shows the age of commuters by pooling mode while Table 5 presents a summary of age by lot location. Commuters in rural areas are slightly older than those surveyed in urban fringe locations by approximately 4 years. Figure 2 graphically illustrates the cumulative frequency distribution of commuters' age.

Table 4. Age of Commuters in Years

Age:	Buspoolers (n=27)	Carpoolers (n=220)	Vanpoolers (n=101)	All Poolers (n=350)
Average (mean)	46.0	37.3	40.3	38.8
50th Percentile	42.5	35.3	38.5	36.4
85th Percentile	59.9	49.4	51.9	51.2
Range:				
Low	26 years	18 years	16 years	18 years
High	80 years	62 years	64 years	80 years

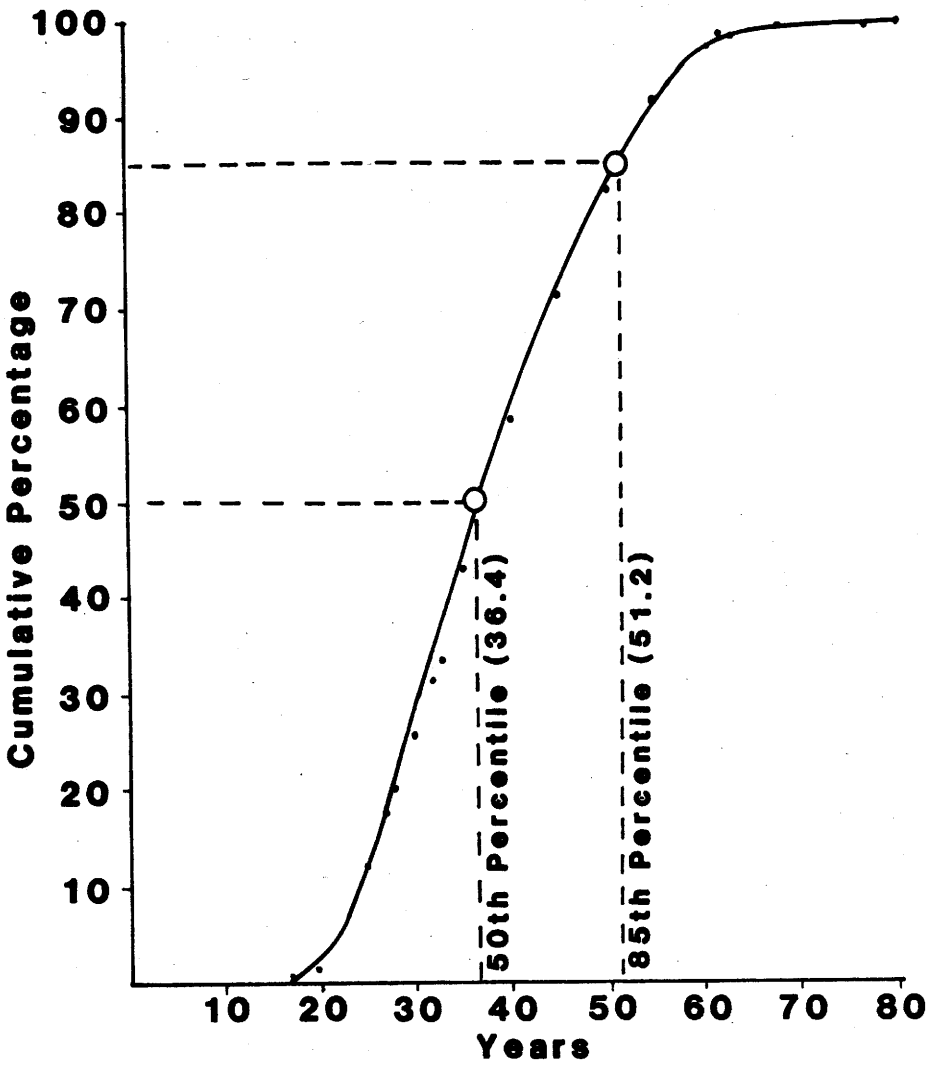


Figure 2: Cumulative Frequency Distribution, Age of Commuters (n=350)

Table 5. Age of Commuters in Years, By Lot Location

Age:	Rural Locations (n=228)	Urban Fringe Locations (n=122)	All Poolers (n=350)
Average (mean)	40.3	36.0	38.8
50th Percentile	39.4	35.0	36.4
85th Percentile	52.7	45.2	51.2
Range:			
Low	18 years	18 years	18 years
High	80 years	61 years	80 years

Sex

Approximately 67% of the Park-and-Poolers were male as shown in Tables 6 and 7. Table 6 disaggregates the survey data by pooling mode while Table 7 shows the sex response by location of the lot. As shown, a higher percentage (74.8%) of commuters in urban fringe areas were male than those Park-and-Pool participants in rural areas (62.7% were male).

Table 6. Sex of Commuters

Sex:	Buspoolers (n=27)	Carpoolers (n=224)	Vanpoolers (n=103)	All Poolers (n=356)
Male	66.7%	69.2%	61.2%	66.9%
Female	33.3%	30.8%	38.8%	33.1%

Table 7. Sex of Commuters, By Lot Location

Sex:	Rural Locations (n=233)	Urban Fringe Locations (n=123)	All Poolers (n=356)
Male	62.7%	74.8%	66.9%
Female	37.3%	25.2%	33.1%

Occupation

Over half (56.6%) of the participating commuters were engaged in professional or crafts employment. Table 8 presents the occupation of surveyed commuters by pooling mode while Table 9 shows the occupations of poolers from rural versus urban fringe locations. It is interesting to note that over 67% of the vanpoolers were either professional or managerial compared to some 41% of the carpool participants.

Table 8. Occupation of Commuters

Occupation	Buspoolers (n=27)	Carpoolers (n=224)	Vanpoolers (n=104)	All Poolers (n=357)
Professional	40.8%	32.6%	52.9%	38.9%
Craftsman	14.8%	20.5%	12.5%	17.7%
Clerical	14.8%	15.2%	15.4%	15.1%
Laborer	7.4%	20.5%	3.8%	15.1%
Managerial	11.1%	8.5%	14.4%	10.4%
Student	----	1.4%	1.0%	1.1%
Private Household	11.1%	----	----	.8%
Sales	----	.5%	----	.3%
Service Worker	----	.4%	----	.3%
Unemployed	----	.4%	----	.3%

Table 9. Occupation of Commuters, By Lot Location

Occupation	Rural Locations (n=234)	Urban Fringe Locations (n=123)	All Poolers (n=357)
Professional	37.2%	42.3%	38.9%
Craftsman	16.7%	19.5%	17.7%
Clerical	16.3%	13.0%	15.1%
Laborer	14.5%	16.3%	15.1%
Managerial	11.1%	8.9%	10.4%
Student	1.7%	----	1.1%
Private Household	1.3%	----	.8%
Sales	.4%	----	.3%
Service Worker	.4%	----	.3%
Unemployed	.4%	----	.3%

Education

The level of education ranged from 6 to 25 years and averaged 13.7 years. Tables 10 and 11 show the years of education by pooling mode and lot location, respectively. Minor differences in the educational level of commuters in rural versus urban fringe areas were noted. Figure 3 shows the cumulative frequency distribution for the years of education inquiry.

Table 10. Years of Education

Education Level:	Buspoolers (n=28)	Carpoolers (n=220)	Vanpoolers (n=98)	All Poolers (n=347)
Average (mean)	13.6	13.6	13.9	13.7
50th Percentile	13.0	12.3	13.0	12.5
85th Percentile	16.4	15.8	16.4	16.0
Range:				
Low	6 years	6 years	6 years	6 years
High	23 years	25 years	21 years	25 years

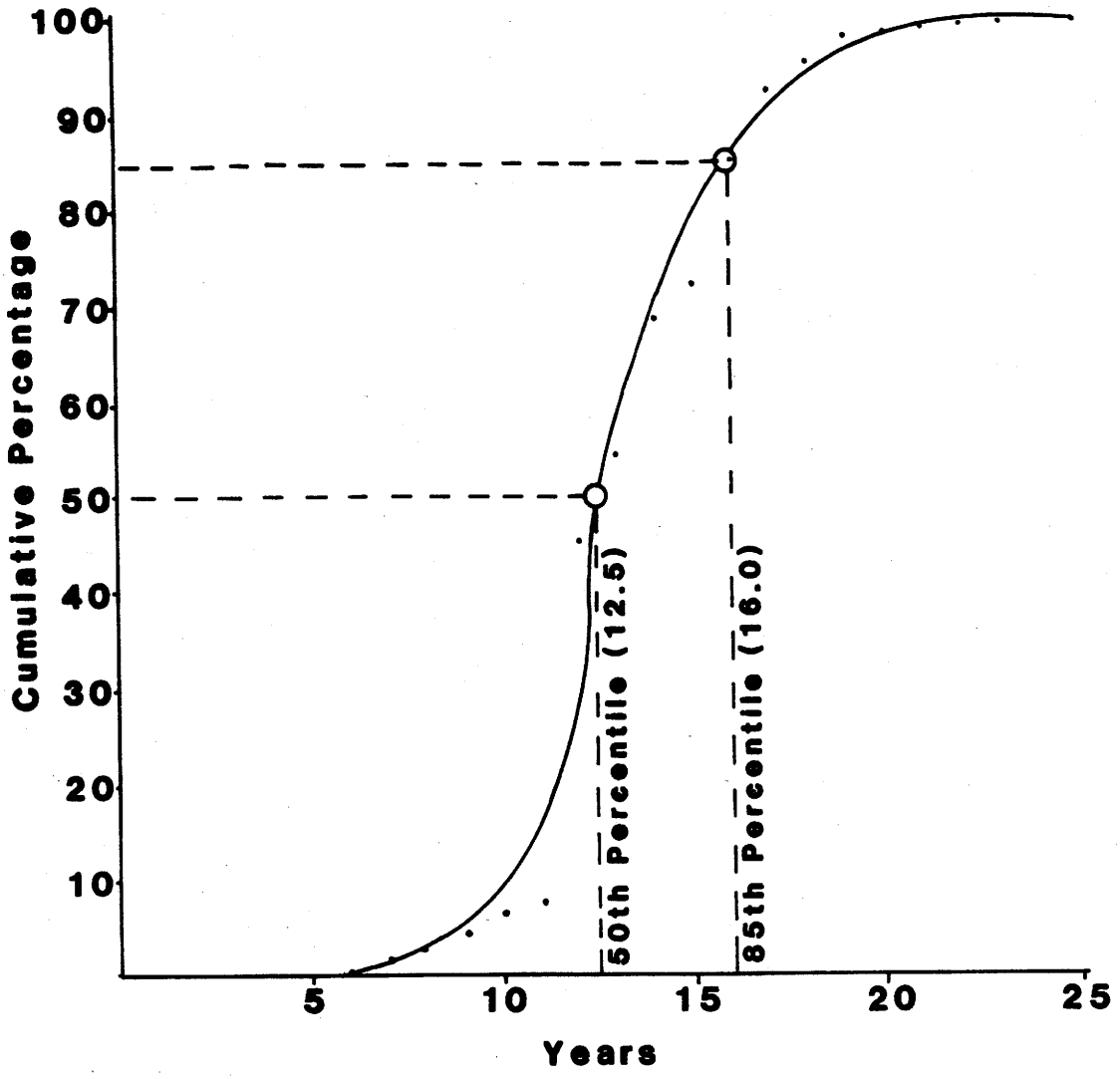


Figure 3: Cumulative Frequency Distribution, Years of Education (n=347)

Table 11. Years of Education, By Lot Location

Education Level:	Rural Locations (n=229)	Urban Fringe Locations (n=118)	All Poolers (n=347)
Average (mean)	13.6	13.9	13.7
50th Percentile	12.5	12.7	12.5
85th Percentile	15.9	16.3	16.0
Range:			
Low	6 years	7 years	6 years
High	25 years	21 years	25 years

Travel Characteristics

Present Mode of Travel

Some 63% of the participating commuters were traveling from the Park-and-Pool lot to their final destination by carpool. Table 12 presents the pooling mode for all surveyed commuters and shows the modal distribution for rural and urban fringe lots. Vanpooling was more evident in urban fringe areas than in rural areas; approximately 42% vanpool from urban fringe lots versus 22% from rural lots.

Table 12. Mode of Travel From Lot to Destination

Mode:	Poolers From Rural Lots (n=240)	Poolers from Urban Fringe Lots (n=125)	All Poolers (n=365)
Carpool	70.4%	49.6%	63.3%
Vanpool	21.7%	42.4%	28.8%
Buspool	7.5%	8.0%	7.7%
Other Mode	.4%	----	.2%

The average carpool had 3.28 persons per vehicle while the average vanpool observed in the survey had 8.03 persons per vehicle. Table 13 presents the 50th percentile and mean size of the three pooling modes (carpool, vanpool, buspool) recorded in the study.

Table 13. Average Vehicle Occupancy Rates in Person Per Vehicle (PPV) for Pools

Mode	50th Percentile	Mean
Carpool (n=230)	2.76 ppv	3.28 ppv
Vanpool (n=103)	6.96 ppv	8.03 ppv
Buspool (n=19)	35.63 ppv	30.90 ppv

Travel Frequency

Eighty-eight percent of the responding commuters traveled from the Park-and-Pool site 5 days per week. The average travel frequency was 4.88 days per week as shown in Tables 14 and 15. Table 14 shows the travel frequency by pooling mode while Table 15 presents the frequency by lot location.

Table 14. Frequency of Travel from Lot to Destination

Frequency in Days per Week:	Buspoolers (n=27)	Carpoolers (n=228)	Vanpoolers (n=104)	All Poolers (n=360)
6	----	2.6%	----	1.7%
5	100.0%	86.0%	90.4%	88.0%
4	----	7.9%	7.7%	7.5%
3	----	3.1%	1.9%	2.5%
2	----	.4%	----	.3%
Overall Average (mean)	5.00 days per week	4.87 days per week	4.88 days per week	4.88 days per week

Table 15. Frequency of Travel from Lot to Destination, By Lot Location

Frequency in Days per Week:	Rural Locations (n=236)	Urban Fringe Locations (n=124)	All Poolers (n=360)
6	.9%	3.2%	1.7%
5	89.4%	85.5%	88.0%
4	7.2%	8.1%	7.5%
3	2.1%	3.2%	2.5%
2	.4%	----	.3%
Overall Average (mean)	4.88 days per week	4.89 days per week	4.88 days per week

Trip Purpose

Over 98% of the commuters were traveling for the purpose of work while slightly more than 1% were pooling to school. Table 16 shows the trip purpose by pooling mode while Table 17 presents the purpose by lot location. All of the commuters from the urban fringe locations were traveling to and from work as revealed in Table 17.

Table 16. Trip Purpose for Commuters

Trip Purpose:	Buspoolers (n=28)	Carpoolers (n=231)	Vanpoolers (n=105)	All Poolers (n=365)
Work	100.0%	98.3%	99.0%	98.6%
School	----	1.3%	1.0%	1.1%
Other	----	.4%	----	.3%

Table 17. Trip Purpose for Commuters, By Lot Location

Trip Purpose:	Rural Locations (n=240)	Urban Fringe Locations (n=125)	All Poolers (n=365)
Work	97.9%	100.0%	98.6%
School	1.7%	----	1.1%
Other	.4%	----	.3%

Arrival Mode to Lot

On the average, 1.16 persons per parked vehicle arrive at the Park-and-Pool facilities. Over 89% of the commuters drive alone to the parking area. Table 18 shows the number of persons arriving at the lot by pooling mode while Table 19 presents the arrival occupancies by location of the facilities. A slightly higher number of commuters arrive at rural lots per vehicle (1.19 persons) than at urban fringe lots (1.10 persons per vehicle).

Table 18. Persons Arriving at Lot in Vehicle

Number of Persons Arriving	Buspoolers (n=25)	Carpoolers (n=209)	Vanpoolers (n=93)	All Poolers (n=328)
7	4.0%	----	----	.3%
4	----	1.0%	1.1%	.9%
3	----	2.4%	1.1%	1.8%
2	8.0%	5.7%	10.7%	7.3%
1	88.0%	90.9%	87.1%	89.7%
Overall Average (mean)	1.32 ppv	1.13 ppv	1.16 ppv	1.16 pvv

Table 19. Persons Arriving at Lot in Vehicle, By Lot Location

Number of Persons Arriving:	Rural Locations (n=213)	Urban Fringe Locations (n=115)	All Poolers (n=328)
7	.5%	----	.3%
4	1.4%	----	.9%
3	2.4%	.9%	1.8%
2	7.0%	7.8%	7.3%
1	88.7%	91.3%	89.7%
Overall Average (mean)	1.19 ppv	1.10 ppv	1.16 ppv

Type of Vehicles

Each survey form was cross coded to allow matching of survey response to the particular lot and the identification of the commuter's type of vehicle. As was previously shown in Table 3, the types of parked vehicles observed at the lots included:

39.7% standard;
37.8% pickup; and
18.6% subcompact

The actual response of participating commuters closely parallels the distribution of survey forms by type of vehicle. Tables 20 and 21 present the vehicle types of survey participants for pooling mode and lot location, respectively. For the purpose of calculating Park-and-Pool benefits (discussed in a subsequent section of this report), the size or type of parked vehicle is an important consideration in determining fuel savings resulting from pooling activity.

Table 20. Type of Vehicle Left at Parking Area for Respondent

Vehicle Type:	Buspoolers (n=28)	Carpoolers (n=228)	Vanpoolers (n=105)	All Poolers (n=364)
Standard	53.6%	39.0%	44.8%	41.8%
Pickup	28.6%	36.0%	28.6%	33.5%
Subcompact	17.8%	21.0%	23.8%	21.4%
Van	----	3.1%	2.8%	2.7%
Other	----	.9%	----	.6%

Table 21. Type of Vehicle Left at Parking Area for Respondent, By Lot Location

Vehicle Type:	Rural Locations Locations (n=239)	Urban Fringe Locations (n=125)	All Poolers (n=364)
Standard	44.3%	36.8%	41.8%
Pickup	31.8%	36.8%	33.5%
Subcompact	22.2%	20.0%	21.4%
Van	1.3%	5.6%	2.7%
Other	.4%	.8%	.6%

Prior Mode of Travel

The commuter survey asked: "Before you started using this parking area, how did you normally travel from home to your current destination?" Approximately 45% of the respondents indicated that they drove alone before using the Park-and-Pool lot. The responses received to this prior travel mode inquiry are summarized in Tables 22 and 23. Table 22 shows the prior

travel mode by pool type while Table 23 presents the previous mode by lot location.

Table 22. Prior Mode of Travel for Commuters

Prior Mode Response	Buspoolers (n=28)	Carpoolers (n=229)	Vanpoolers (n=105)	All Poolers (n=363)
Drove Alone	25.0%	50.2%	38.1%	44.9%
Carpool	35.7%	40.6%	33.3%	38.0%
Did not make trip	25.0%	7.4%	6.7%	8.5%
Vanpool	----	.5%	16.2%	5.0%
Buspool	10.7%	----	2.9%	1.7%
Other Mode	3.6%	1.3%	2.8%	1.9%

Table 23. Prior Mode of Travel for Commuters, By Lot Location

Prior Mode Response	Rural Location (n=238)	Urban Fringe Locations (n=125)	All Poolers (n=363)
Drove Alone	45.8%	43.2%	44.9%
Carpool	39.5%	35.2%	38.0%
Did not make trip	8.8%	8.0%	8.5%
Vanpool	2.5%	9.6%	5.0%
Buspool	2.1%	.8%	1.7%
Other Mode	1.3%	3.2%	1.9%

Time of Arrival/Departure

The Park-and-Poolers were asked what time they arrived at the lot in the morning and what time they left the lot in the afternoon. Arrival times varied from 3:00 a.m. to 11:35 a.m. Over 50% of the commuters arrived at the

lot before 6:20 a.m. Table 24 presents a summary of arrival times by pooling mode while Table 25 summarizes the arrival times by lot location. Figure 4 shows the cumulative frequency distribution of arrival time for all commuters at the Park-and-Pool facilities.

Table 24. Arrival Time At Lot in the Morning

Measure:	Buspoolers (n=28)	Carpoolers (n=226)	Vanpoolers (n=105)	All Poolers (n=361)
50th Percentile	6:08 a.m.	6:28 a.m.	6:03 a.m.	6:19 a.m.
85th Percentile	6:34 a.m.	7:13 a.m.	6:30 a.m.	7:04 a.m.
Range:				
Earliest	4:30 a.m.	4:30 a.m.	4:10 a.m.	3:00 a.m.
Latest	11:35 a.m.	11:00 a.m.	7:30 a.m.	11:35 a.m.

Table 25. Arrival Time at Lot in the Morning, By Lot Location

Measure:	Rural Locations (n=238)	Urban Fringe Locations (n=123)	All Poolers (n=361)
50th Percentile	6:22 a.m.	6:17 a.m.	6:19 a.m.
85th Percentile	7:11 a.m.	6:46 a.m.	7:04 a.m.
Range:			
Earliest	3:00 a.m.	4:10 a.m.	3:00 a.m.
Latest	11:35 a.m.	11:00 a.m.	11:35 a.m.

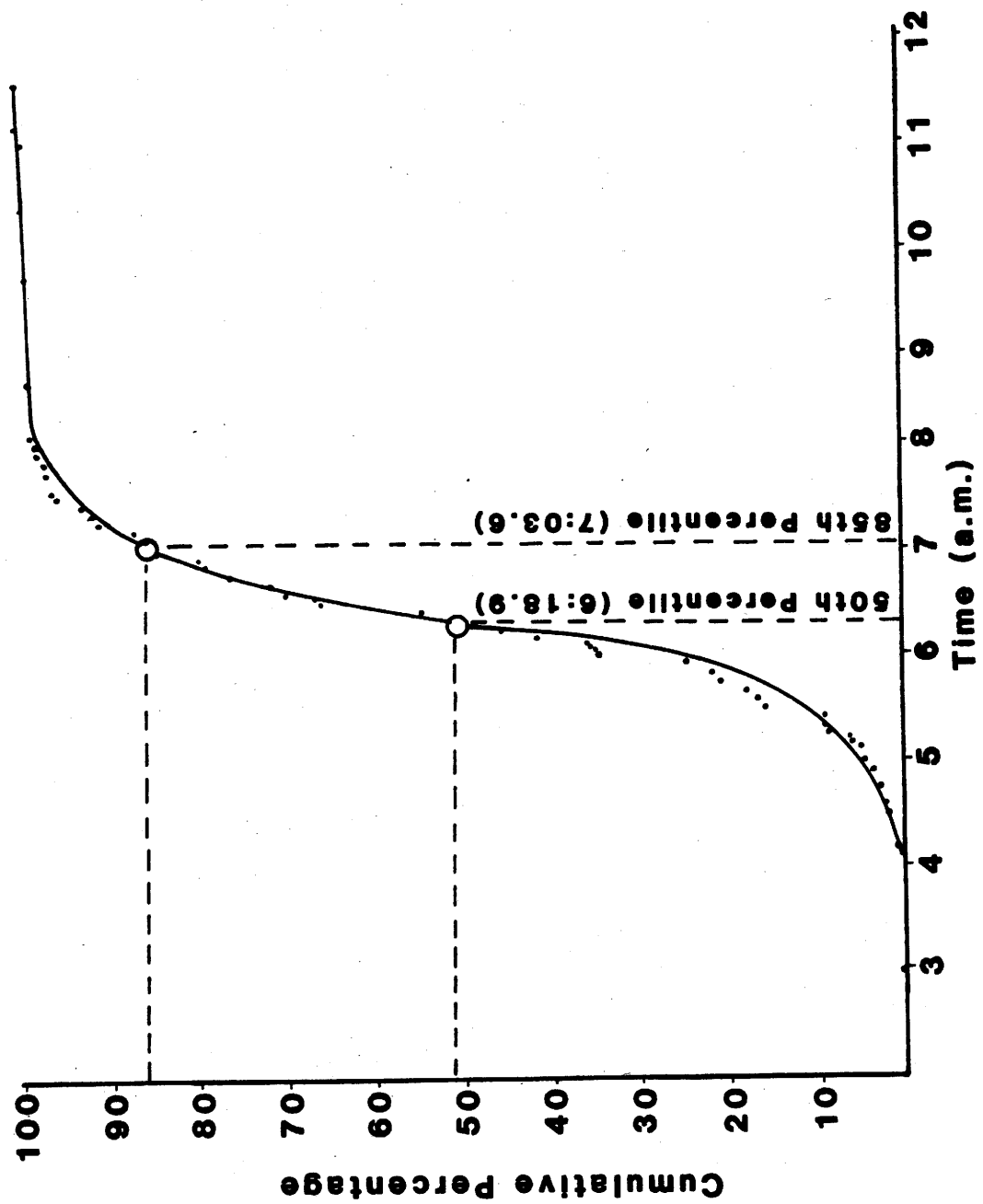


Figure 4: Cumulative Frequency Distribution, Arrival Time At Lot (n=361)

Table 26 presents the departure times from the lot by pooling mode while Table 27 shows departures by lot location. Some 50% of the commuters leave the parking area before 5:05 p.m. The cumulative frequency distribution for departure times is shown for all participating poolers in Figure 5 and ranges from 2:00 p.m. till 8:55 p.m.

Table 26. Departure Time From Lot in the Evening

Measure:	Buspoolers (n=28)	Carpoolers (n=224)	Vanpoolers (n=104)	All Poolers (=358)
50th Percentile	5:57 p.m.	4:58 p.m.	5:13 p.m.	5:05 p.m.
85th Percentile	6:34 p.m.	5:57 p.m.	6:06 p.m.	6:12 p.m.
Range:				
Earliest	4:04 p.m.	2:00 p.m.	2:05 p.m.	2:00 p.m.
Latest	7:15 p.m.	8:55 p.m.	7:15 p.m.	8:55 p.m.

Table 27. Departure Time From Lot in the Evening, By Lot Location

Measure:	Rural Locations (n=236)	Urban Fringe Locations (n=122)	All Poolers (n=358)
50th Percentile	5:05 p.m.	5:06 p.m.	5:05 p.m.
85th Percentile	6:03 p.m.	6:24 p.m.	6:12 p.m.
Range:			
Earliest	2:00 p.m.	2:25 p.m.	2:00 p.m.
Latest	7:45 p.m.	8:55 p.m.	8:55 p.m.

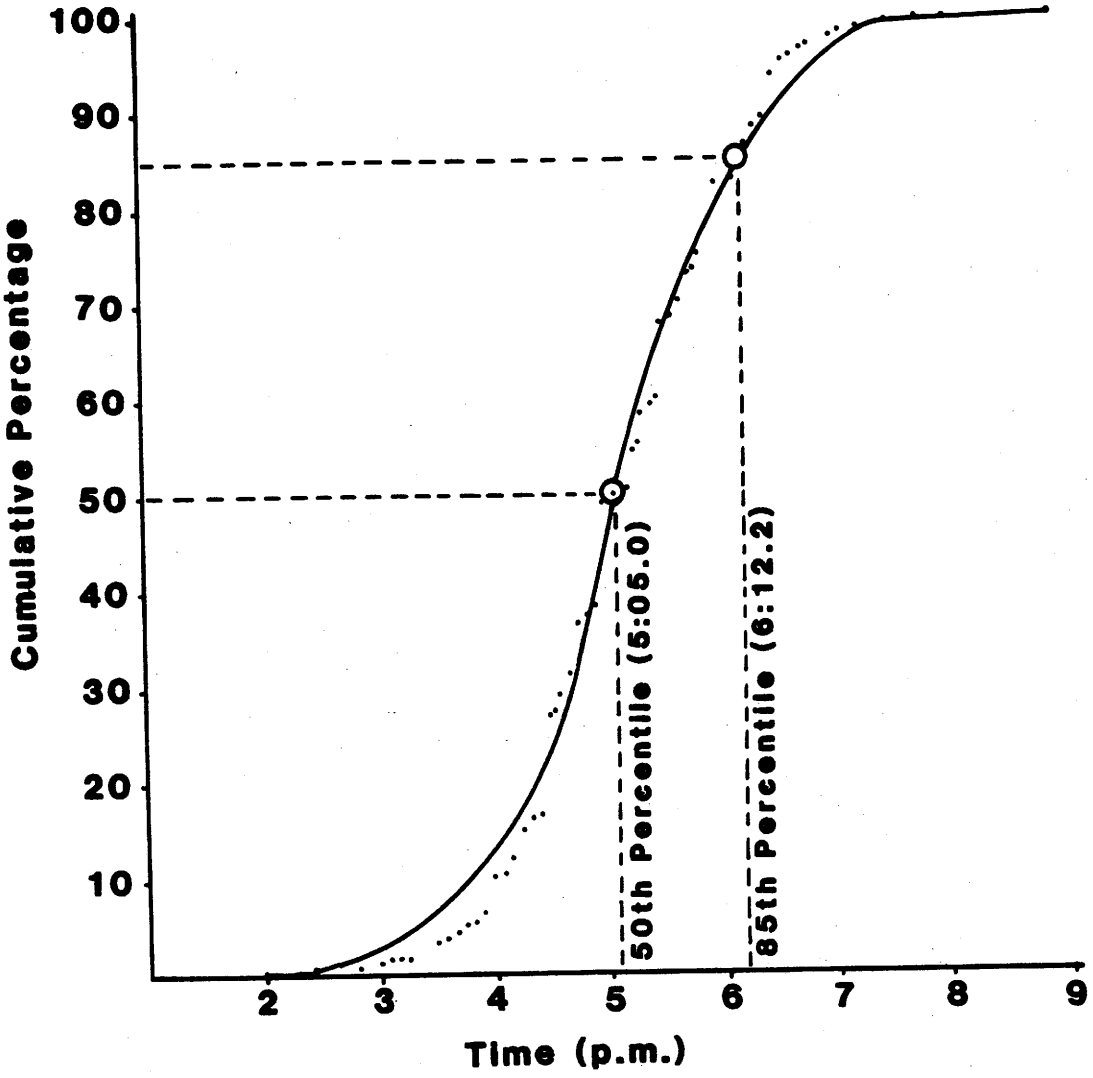


Figure 5: Cumulative Frequency Distribution Departure Time From Lot (n=358)

Home to Lot Travel Distance/Time

Commuters were asked "How far do you travel in the morning to reach this parking area?" Responses to this question were requested to be given in both miles and minutes. Tables 28 and 29 show the travel distances in miles for pooling mode and lot location, respectively. The home to lot travel distances ranged from 1 to 52 miles and averaged 6.69 miles. Carpoolers tend to travel further to the parking area than do buspoolers or vanpoolers as shown in Table 28. Only minor difference in home to lot travel distances were observed between rural lots and urban fringe lots as summarized in Table 29. Figure 6 presents the cumulative frequency distribution for the home-to-lot distances.

Table 28. Home-to-Lot Travel Distances in Miles

Measure	Buspoolers (n=28)	Carpoolers (n=229)	Vanpoolers (n=105)	All Poolers (n=363)
Average (mean)	4.00	7.24	6.24	6.69
50th Percentile	2.57	4.66	2.81	4.11
85th Percentile	5.90	13.65	10.50	11.70
Range:				
Low	1 miles	1 miles	1 miles	1 miles
High	12 miles	52 miles	46 miles	52 miles

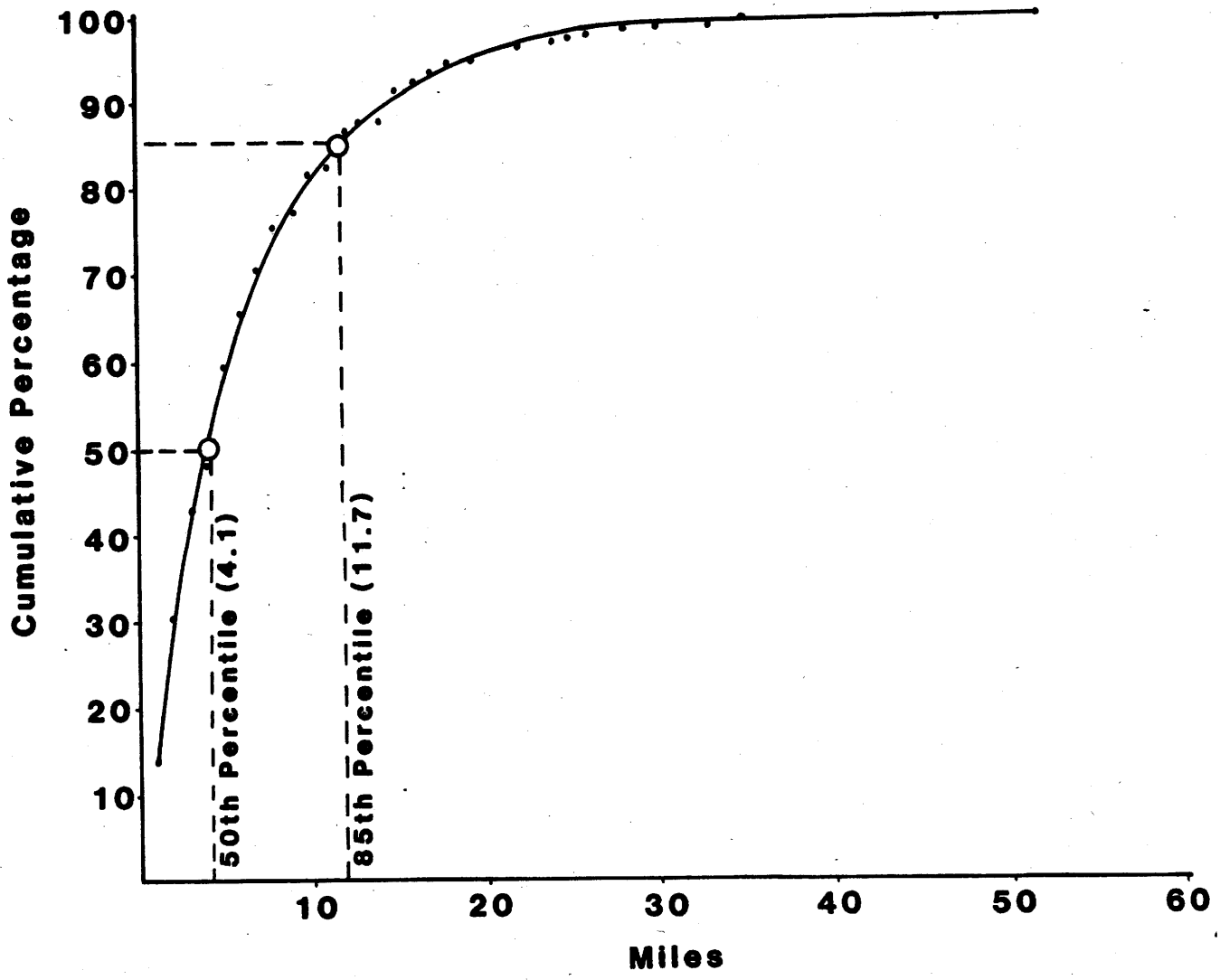


Figure 6: Cumulative Frequency Distribution, Home-to-Lot Travel Distance (n=363)

Table 29. Home-to-Lot Travel Distances in Miles, By Lot Location

Measure:	Rural Locations (n=238)	Urban Fringe Locations (n=125)	All Poolers (n=363)
Average (mean)	6.56	6.92	6.69
50th Percentile	4.00	4.35	4.11
85th Percentile	11.66	11.75	11.70
Range:			
Low	1 miles	1 miles	1 miles
High	52 miles	46 miles	52 miles

Travel times from home to lot ranged from 1 to 60 minutes and averaged 11.10 minutes for the participating commuters. Tables 30 and 31 present the travel times for pool type and lot location, repectively. Figure 7 shows the cumulative frequency distribution for home to lot travel times as indicated by all participating Park-and-Poolers.

Table 30. Home-to-Lot Travel Times in Minutes

Measure	Buspoolers (n=27)	Carpoolers (n=218)	Vanpoolers (n=96)	All Poolers (n=342)
Average (mean)	9.11	11.70	10.38	11.10
50th Percentile	9.15	9.53	9.00	9.33
85th Percentile	10.95	18.35	14.49	14.98
Range:				
Low	3 min.	1 min.	1 min.	1 min.
High	15 min.	60 min.	60 min.	60 min.

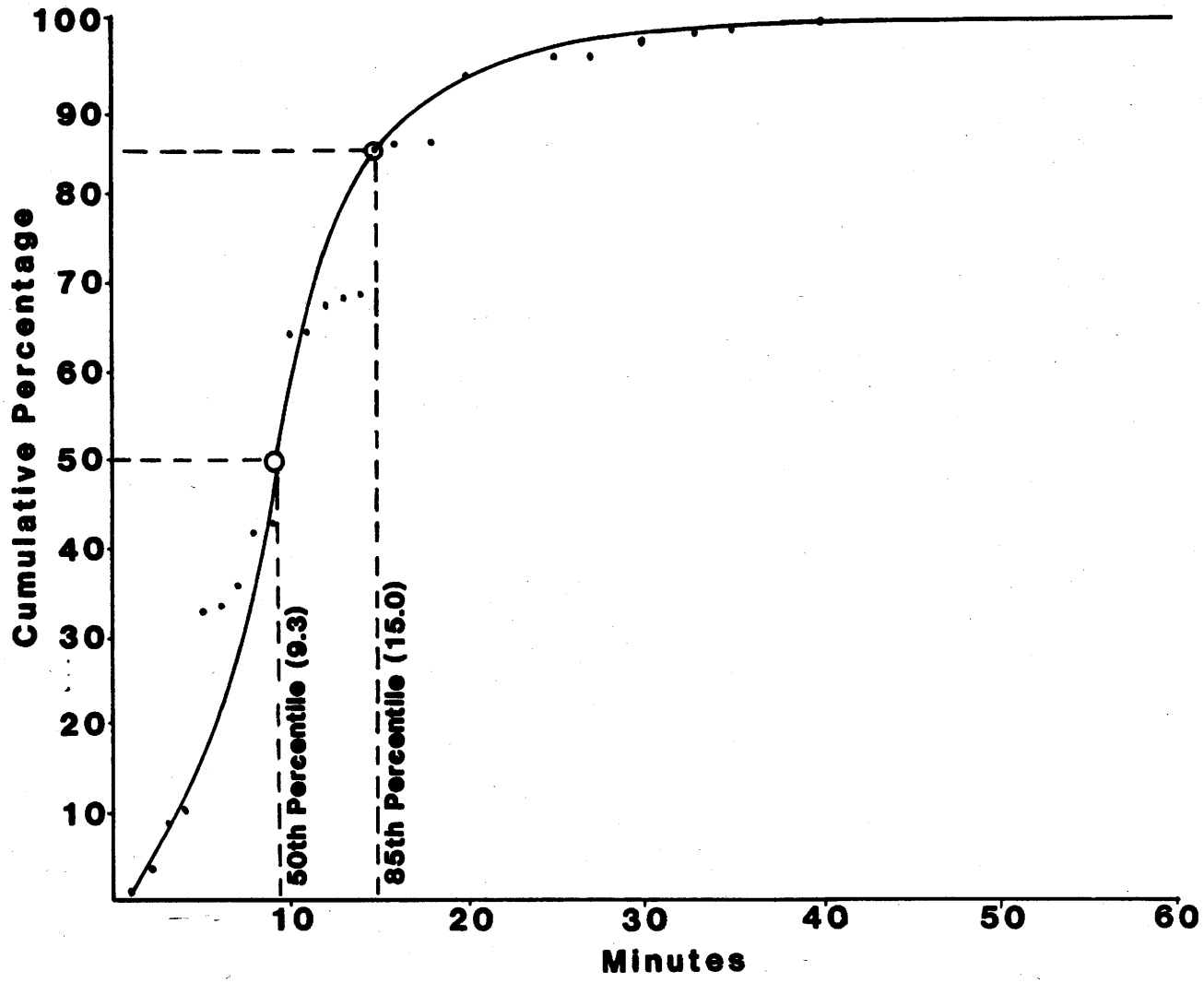


Figure 7: Cumulative Frequency Distribution, Home-to-Lot Travel Time (n=342)

Table 31. Home-to-Lot Travel Times in Minutes, By Lot Location

Measure:	Rural Locations (n=224)	Urban Fringe Locations (n=118)	All Poolers (n=342)
Average (mean)	11.16	11.00	11.10
50th Percentile	9.29	8.81	9.33
85th Percentile	14.92	15.12	14.98
Range:			
Low	1 min	1 min	1 min
High	60 min	60 min	60 min

The typical commuter, based upon the 50th percentile response, travels some 4.1 miles from their home to the parking area and requires approximately 9.3 minutes to make the journey.

Lot to Destination Travel Distance/Time

The survey asked "How far is it from this location to your final destination?" The respondent was requested to answer in both miles and minutes. Travel from the lots to the destinations ranged from 5 to 95 miles and averaged some 32.6 miles as shown in Tables 32 and 33. Only slight differences in lot to destination distances were observed for the three pooling modes (carpool, vanpool, buspool) as shown in Table 32. However, based upon the survey findings, a commuter using a rural Park-and-Pool lot travels some 16.4% further to their final destination than does a commuter using an urban fringe lot (34.2 miles versus 29.4 miles). Figure 8 presents the cumulative frequency distribution of all survey participants for the lot to destination travel distance.

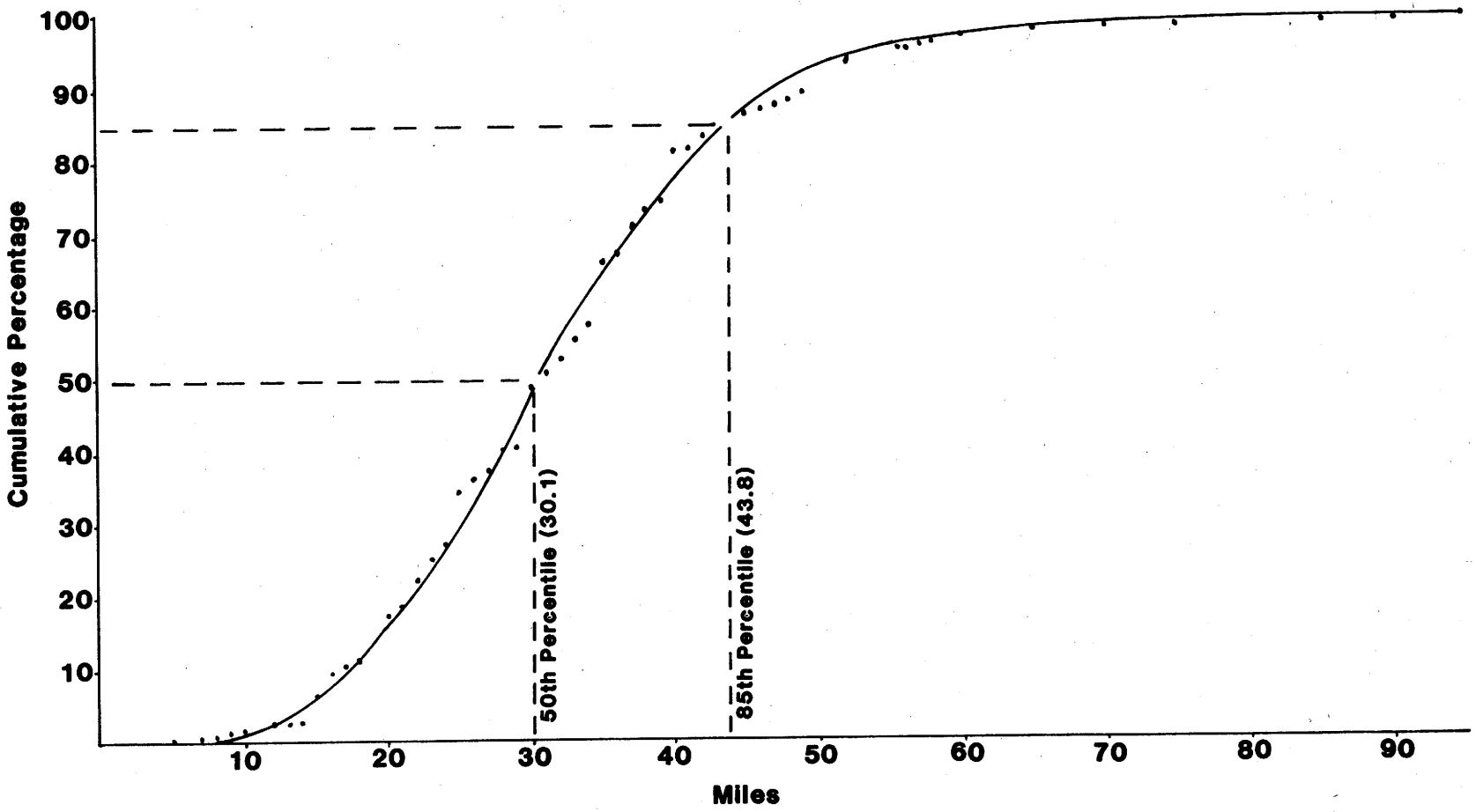


Figure 8: Cumulative Frequency Distribution, Lot-to-Destination Travel Distance (n=357)

Table 32. Lot-to-Destination Travel Distances in Miles

Measure	Buspoolers (n=26)	Carpoolers (n=229)	Vanpoolers (n=102)	All Poolers (n=357)
Average (mean)	37.00	31.36	34.14	32.57
50th Percentile	35.00	28.95	33.75	30.12
85th Percentile	52.12	42.32	43.02	43.77
Range:				
Low	12 miles	5 miles	15 miles	5 miles
High	75 miles	90 miles	95 miles	95 miles

Table 33. Lot-to-Destination Travel Distances in Miles, By Lot Location

Measure:	Rural Locations (n=235)	Urban Fringe Locations (n=122)	All Poolers (n=357)
Average (mean)	34.21	29.40	32.57
50th Percentile	34.19	24.86	30.12
85th Percentile	45.92	34.82	43.77
Range:			
Low	5 miles	9 miles	5 miles
High	90 miles	95 miles	95 miles

Tables 34 and 35 present the travel times between lot and destination for pooling mode and lot location, respectively. Travel times varied from 8 to 100 minutes and average some 44.2 minutes. Figure 9 shows the cumulative frequency distribution for the lot to destination travel times noted by all survey respondents.

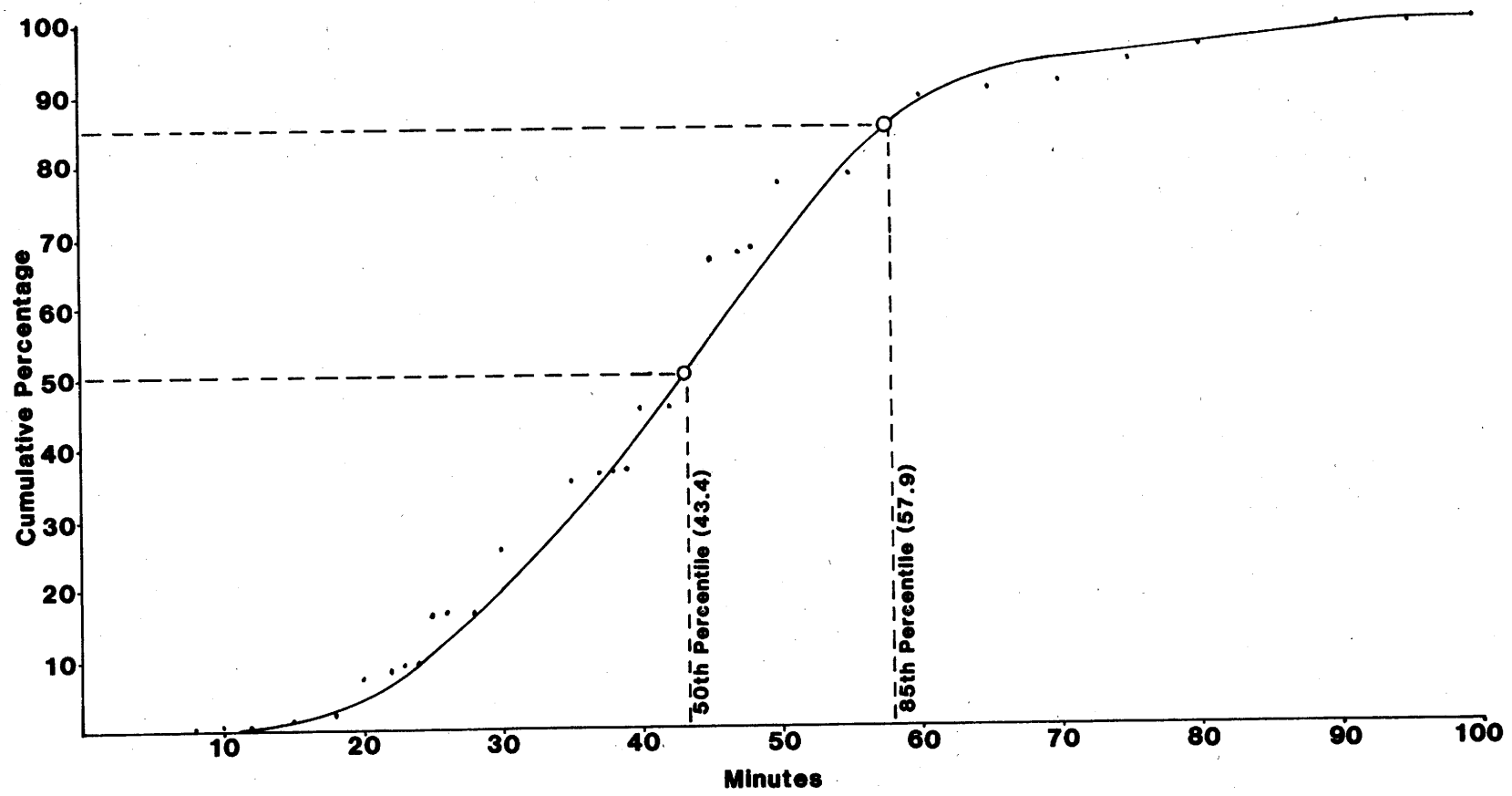


Figure 9: Cumulative Frequency Distribution, Lot-to-Destination Travel Time (n=347)

Table 34. Lot-to-Destination Travel Time in Minutes

Measure	Buspoolers (n=26)	Carpoolers (n=225)	Vanpoolers (n=96)	All Poolers (n=347)
Average (mean)	52.69	40.64	50.12	44.17
50th Percentile	48.00	38.88	45.00	43.36
85th Percentile	65.50	55.35	59.86	57.89
Range:				
Low	25 min.	8 min.	20 min.	8 min.
High	90 min.	100 min.	95 min.	100 min.

Table 35. Lot-to-Destination Travel Time in Minutes, By Lot Location

Measure:	Rural Location (n=228)	Urban Fringe Locations (n=119)	All Poolers (n=347)
Average (mean)	44.74	43.08	44.17
50th Percentile	43.44	40.60	43.36
85th Percentile	58.30	56.89	57.89
Range:			
Low	8 min	15 min	8 min
High	100 min	90 min	100 min

Based upon the 50th percentile response, the typical commuter travels some 30.1 miles and approximately 43.4 minutes to reach their final destination. Park-and-Poolers from rural lots average 45.9 miles per hour while poolers from urban fringe areas average 40.9 miles per hour between lot and destination. This 5 mile per hour difference in computed average speed reflects the relative mobility of rural areas versus urban fringe areas.

How Pool Was Formed

Commuters were asked, "How was your carpool or vanpool formed?" Some 85% of all pools were formed by either the commuters' employer or through co-workers. Table 36 summarizes the responses received to this inquiry and shows a breakdown by pooling mode. As expected a much higher percentage (38.5%) of vanpools, were organized by, or with assistance from, the employer. The most popular way a carpool is formed is through co-workers (86% of the carpool respondents organized their pool in this fashion). Table 37 presents a summary of responses by lot location and shows that over 82% of rural poolers organize through either co-workers or friends compared to some 68% of urban fringe poolers organizing in these ways.

Table 36. How Pool Was First Organized

Response:	Buspoolers (n=20)	Carpoolers (n=228)	Vanpoolers (n=104)	All Poolers (n=354)
Co-Workers	40.0%	86.0%	48.1%	72.0%
Employer	5.0%	1.8%	38.5%	13.0%
Friends	-----	7.0%	3.8%	5.7%
Computer Matching Ser.	-----	1.8%	-----	1.1%
Classmates	-----	.9%	1.0%	.9%
Other Means	55.0%	2.5%	8.6%	7.3%

Table 37. How Pool Was First Organized, By Lot Location

Response:	Rural Locations (n=233)	Urban Fringe Locations (n=121)	All Poolers (n=354)
Co-Workers	74.2%	67.8%	72.0%
Employer	7.3%	24.0%	13.0%
Friends	8.2%	.8%	5.7%
Computer Matching Service	1.7%	----	1.1%
Classmates	1.3%	----	.9%
Other Means	7.3%	7.4%	7.3%

How Long Lot Has Been Used

The survey asked "How long have you been using this Park-and-Pool lot?" Responses ranged from 1 to 99 months and averaged 20.5 months or about 1.7 years. Tables 38 and 39 summarize the responses by pooling mode and by lot location, respectively. The typical vanpool and carpool participant has been using the parking facility for over 13 months. Poolers from rural lots have been using the parking areas considerably longer than poolers from urban fringe lots (an average of 24.4 months for rural users versus 13.2 months for urban fringe users). Figure 10 shows the cumulative frequency distributive for the length of time that all Park-and-Pool respondents have been using the parking area.

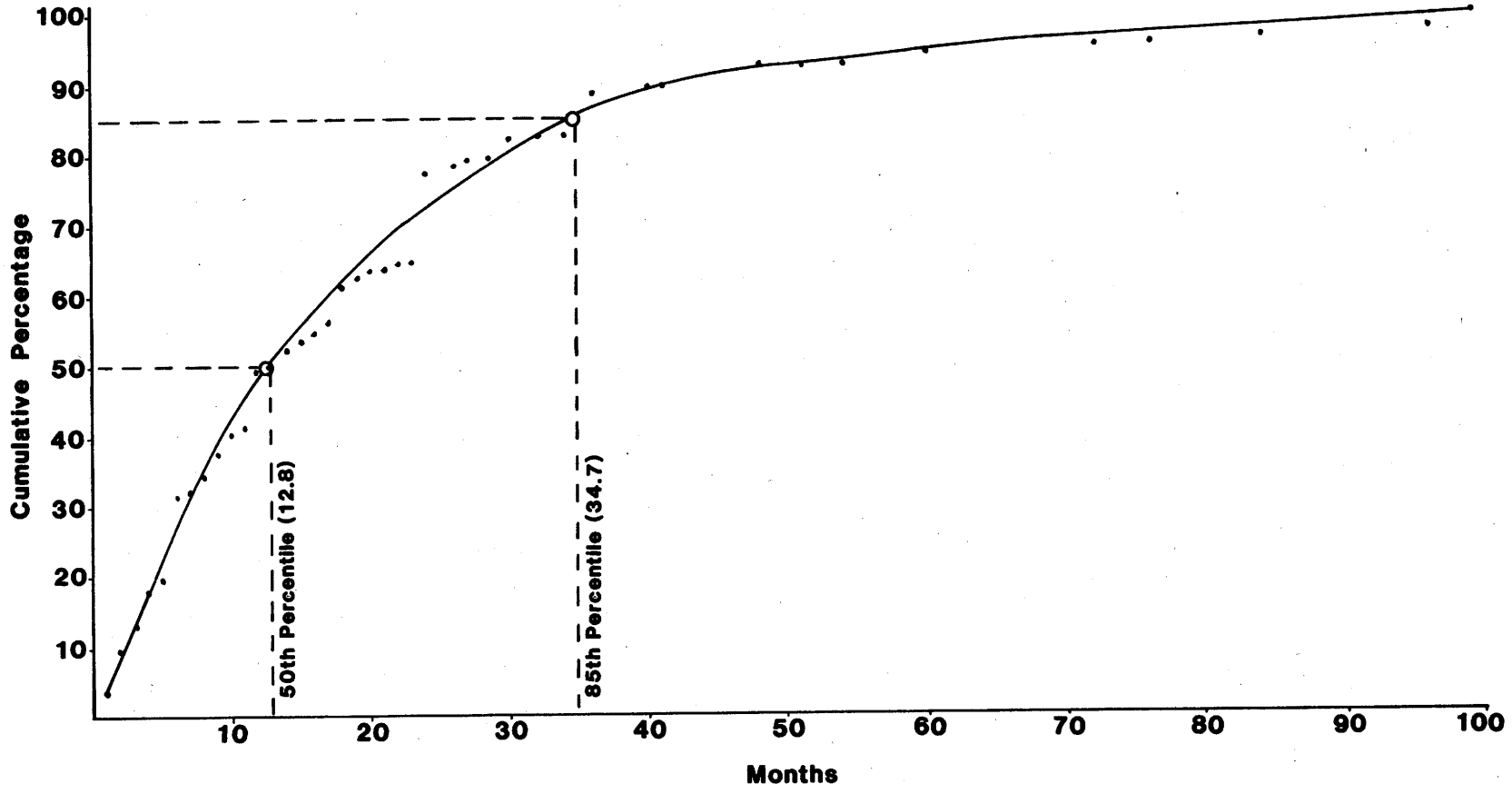


Figure 10: Cumulative Frequency Distribution, Length of Time Using Lot (n=342)

Table 38. Number of Months Commuter Has Been Using Lot

Measure:	Buspoolers (n=26)	Carpoolers (n=211)	Vanpoolers (n=104)	All Poolers (n=342)
Average (mean)	12.2	21.8	19.8	20.5
50th Percentile	8.5	13.1	13.7	12.8
85th Percentile	23.0	33.4	34.8	34.4
Range:				
Low	1 month	1 month	1 month	1 month
High	54 months	99 months	96 months	99 months

Table 39. Number of Months Commuter Has Been Using Lot, By Lot Location

Measure:	Rural Locations (n=222)	Urban Fringe Locations (n=120)	All Poolers (n=342)
Average (mean)	24.4	13.2	20.5
50th Percentile	16.4	9.6	12.8
85th Percentile	40.7	23.6	34.4
Range:			
Low	1 month	1 month	1 month
High	99 months	60 months	99 months

Effect of Lot on Pool Formation

Commuters were asked "How did the availability of this parking area effect the formation of your carpool/vanpool or using the bus?" Responses to this question are summarized in Table 40 by pooling mode and in Table 41 by lot location. Almost 62% of the survey participants indicated that they either would not be pooling if the lot were not available or that the lot was

one factor which influenced the current travel mode. Some 38% of the respondents indicated that the lot had no effect upon their current pooling activity.

Table 40. Effect of Lot on Pooling Habits

Response:	Buspoolers (n=27)	Carpoolers (n=225)	Vanpoolers (n=103)	All Poolers (n=356)
This lot was one of several factors which encouraged me to carpool/vanpool/bus.	48.2%	47.1%	59.2%	50.6%
This parking area had no effect on my use of carpool/vanpool/bus.	22.2%	41.8%	34.0%	38.2%
I would not be using carpool/vanpool/bus if this parking area was not here.	29.6%	11.1%	6.8%	11.2%

Table 41. Effect of Lot on Pooling Habits, By Lot Location

Response:	Rural Locations (n=236)	Urban Fringe Locations (n=120)	All Poolers (n=356)
This lot was one of several factors which encouraged me to carpool/vanpool/bus.	50.0%	51.7%	50.6%
This parking area had no effect on my use of carpool/vanpool/bus.	39.8%	35.0%	38.2%
I would not be using carpool/vanpool/bus if this parking area was not here.	10.2%	13.3%	11.2%

How Learned of Lot

The questionnaire asked "How did you first learn about this particular Park-and-Pool location?" Table 42 presents the responses by pooling mode while Table 43 summarizes the answers by lot location. Some 52.4% of the Park-and-Poolers learned of the facility by either noticing others using the area or by seeing a highway/street sign.

Table 42. How Commuter Learned of Parking Area

How Learned:	Buspoolers (n=28)	Carpoolers (n=229)	Vanpoolers (n=104)	All Poolers (n=363)
Noticed Others Using Area	25.0%	41.5%	34.6%	38.6%
Co-Workers or Employer	35.7%	24.0%	44.2%	30.6%
Highway Sign	7.1%	18.3%	5.8%	13.8%
Friends or Relative	21.5%	8.3%	5.8%	8.5%
Radio/TV/Newspaper	3.6%	1.8%	-----	1.4%
Other Means	7.1%	6.1%	9.6%	7.1%

Table 43. How Commuter Learned of Parking Area, By Lot Location

How Learned:	Rural Locations (n=238)	Urban Fringe Locations (n=125)	All Poolers (n=363)
Noticed Others Using Area	34.9%	45.6%	38.6%
Co-Workers or Employer	29.0%	33.6%	30.6%
Highway Sign	18.5%	4.8%	13.8%
Friends or Relative	10.5%	4.8%	8.5%
Radio/TV/Newspaper	-----	4.0%	1.4%
Other Means	7.1%	7.2%	7.1%

Reason for Pooling

Commuters were asked "In deciding to carpool or vanpool, which one of the following considerations was 'most' important to you?" The choices given on the survey form were: cost of driving; cost of parking; stress of driving; energy savings; and, other (specify). Tables 44 and 45 present the responses received to this survey question. Some 81% of the responses indicated that the primary reason for pooling was the cost of driving.

Table 44. Commuters' Most Important Reason for Pooling

Reason:	Buspoolers (n=25)	Carpoolers (n=228)	Vanpoolers (n=102)	All Poolers (n=356)
Cost of Driving	52.0%	89.0%	68.6%	80.6%
Stress of Driving	36.0%	3.5%	24.5%	11.8%
Energy Savings	4.0%	5.3%	2.0%	4.2%
Cost of Parking	-----	-----	2.9%	.9%
Other Reason	8.0%	2.2%	2.0%	2.5%

Table 45. Commuters' Most Important Reason for Pooling, By Lot Location

Reason:	Rural Locations (n=232)	Urban Fringe Locations (n=124)	All Poolers (n=356)
Cost of Driving	84.5%	73.4%	80.6%
Stress of Driving	8.2%	18.6%	11.8%
Energy Savings	4.3%	4.0%	4.2%
Cost of Parking	.4%	1.6%	.9%
Other Reason	2.6%	2.4%	2.5%

Employee Incentives for Pooling

The survey asked "Does your employer or school provide any incentives for carpools or vanpools?" If the commuter responded yes, he/she was asked to specify the type of incentives provided. Tables 46 and 47 summarize the answers received to this inquiry by pooling mode and by lot location, respectively. Approximately 31% of the commuters indicated that some form of incentive was provided for pooling. A higher percentage (39%) of commuters using urban fringe lots indicated that incentives were provided than did those commuters using rural lots (27% of rural lot users stated their employer provided incentives).

Table 46. Does Commuters' Employer Provide Pooling Incentives

Response:	Buspoolers (n=28)	Carpoolers (n=227)	Vanpoolers (n=100)	All Poolers (n=356)
Yes	46.4%	18.1%	57.0%	31.2%
No	53.6%	81.9%	43.0%	68.8%

Table 47. Does Commuters' Employer Provide Pooling Incentive, By Lot Location

Response:	Rural Locations	Urban Fringe Locations	All Poolers
Yes	27.0%	39.0%	31.2%
No	73.0%	61.0%	68.8%

Tables 48 and 49 summarize the types of incentives indicated by those commuters answering yes to the question. The most commonly listed incentive of all participants was an employer sponsored vanpool program. As shown in Table 48, the most common incentives mentioned by carpoolers was preferential or subsidized parking.

Table 48. Type of Employer Incentives Provided

Incentive:	Buspoolers (n=13)	Carpoolers (n=34)	Vanpoolers (n=53)	All Poolers (n=100)
Vanpool Program	15.4%	17.7%	54.7%	37.0%
Money	38.5%	8.8%	24.5%	21.0%
Preferential Parking	7.7%	29.4%	13.2%	18.0%
Rideshare Promotion	15.4%	14.7%	1.9%	8.0%
Subsidized Parking	----	14.7%	1.9%	6.0%
Combination of 2 or more of above	----	2.9%	----	1.0%
Other Type Incentive(s)	23.0%	11.8%	3.8%	9.0%

Table 49. Type of Employer Incentives Provided, By Lot Location

Incentive:	Rural Locations (n=61)	Urban Fringe Locations (n=39)	All Poolers (n=100)
Vanpool Program	31.1%	46.1%	37.0%
Money	14.8%	30.8%	21.0%
Preferential Parking	27.9%	2.6%	18.0%
Rideshare Promotion	6.6%	10.3%	8.0%
Subsidized Parking	4.9%	7.7%	6.0%
Combination of 2 or more of above	1.6%	-----	1.0%
Other Type Incentive(s)	13.1%	2.5%	9.0%

Preference for Express Bus Service

Vanpoolers and carpoolers were asked: "If convenient express bus service was provided from this location to your destination, would you prefer to : continue carpooling/vanpooling; or, ride the bus?" Tables 50 and 51 summarize the responses received to this question. Some 64% of the survey participants indicated that they would prefer to continue their present pooling habits. A slightly higher percentage of carpoolers (38.2%) indicated they would switch to riding the bus than did the vanpoolers (30.5%). Riding the bus option appears more desirable to poolers from rural areas than it does to urban fringe poolers (42.2% of rural poolers indicated they would ride the bus versus 23.4% of the urban fringe poolers).

Table 50. Commuters' Preference for Express Bus Service

If Convenient express bus service was provided, would prefer to:	Carpoolers (n=217)	Vanpoolers (n=95)	All Poolers (n=313)
Continue Carpooling/Vanpooling	61.8%	69.5%	64.2%
Ride the Bus	38.2%	30.5%	35.8%

Table 51. Commuters' Preference for Express Bus Service, By Lot Location

If convenient express bus service was provided, would prefer to:	Rural Locations (n=206)	Urban Fringe Locations (n=107)	All Poolers (n=313)
Continue Carpooling/Vanpooling	57.8%	76.6%	64.2%
Ride the Bus	42.2%	23.4%	35.8%

Impressions and Perceptions

Feeling of Security at Lot

Commuters were asked "Do you feel it is safe to leave your car parked at this location?" As shown in Tables 52 and 53 some 58% of the survey respondents thought it was safe to leave their car while 42% were not sure or did not think it was safe.

Table 52. Commuters' Feeling of Security at Parking Area

Does Commuter feel it is safe to leave car at lot?	Buspoolers (n=28)	Carpoolers (n=229)	Vanpoolers (n=104)	All Poolers (n=362)
Yes	39.3%	65.1%	49.0%	58.3%
No	17.8%	9.2%	15.4%	11.6%
Not sure	42.9%	25.7%	35.6%	30.1%

Table 53. Commuters' Feeling of Security at Parking Area, By Lot Location

Does commuter feel it is safe to leave car at lot?	Rural Locations (n=238)	Urban Fringe Locations (n=124)	All Poolers (n=362)
Yes	63.4%	48.4%	58.3%
No	10.1%	14.5%	11.6%
Not sure	26.5%	37.1%	30.1%

Money Considerations

The survey asked "Do you save money by using the Park-and-Pool location?" If the commuter answered yes or no, they were asked how much they saved or lost per month. As presented in Tables 54 and 55, over 71% of the responding commuters felt that they did save money by using the Park-and-Pool facility while only 2.5% felt they did not save money. A slightly higher percentage (76.0%) of urban fringe poolers indicated that they saved money than did poolers from rural lots (68.9% indicated a money savings).

Table 54. Does Use of Lot Save Commuter Money

Response:	Buspoolers (n=28)	Carpoolers (n=228)	Vanpoolers (n=105)	All Poolers (n=363)
Yes	71.4%	73.7%	66.7%	71.4%
No difference	10.7%	13.6%	19.0%	15.1%
Not sure	14.3%	10.1%	12.4%	11.0%
No	3.6%	2.6%	1.9%	2.5%

Table 55. Does Use of Lot Save Commuter Money, By Lot Location

Response:	Rural Locations (n=238)	Urban Fringe Locations (n=125)	All Poolers (n=363)
Yes	68.9%	76.0%	71.4%
No difference	16.0%	13.6%	15.1%
Not sure	11.8%	9.6%	11.0%
No	3.3%	.8%	2.5%

Table 56 shows the dollar savings indicated by the Park-and-Pool users while Table 57 summarizes the dollars lost. In general, the typical commuter feels a savings of approximate $54 per month by using the Park-and-Pool lot. Figure 11 presents the cumulative frequency distribution of dollar savings indicated by the survey participants. Using the average monthly savings, travel frequency, and lot to destination distance, the Park-and-Pool users are estimating their savings at $3.24 per day or 4.97 cents per pooling mile of travel.

Table 56. Dollars Saved Per Month By Commuters

Measure:	Money Savings per Month Indicated by Respondents (n=225)
Average (mean)	$ 68.51
50th Percentile	$ 53.75
85th Percentile	$ 97.50
Range:	
Low	$ 5.00
High	$350.00

Table 57. Dollars Lost Per Month by Commuter

Measure:	Money Lost per Month Indicated by Respondents (n=3)
Average (mean)	$28.33
50th Percentile	$26.25
85th Percentile	$28.88
Range:	
Low	$25.00
High	$30.00

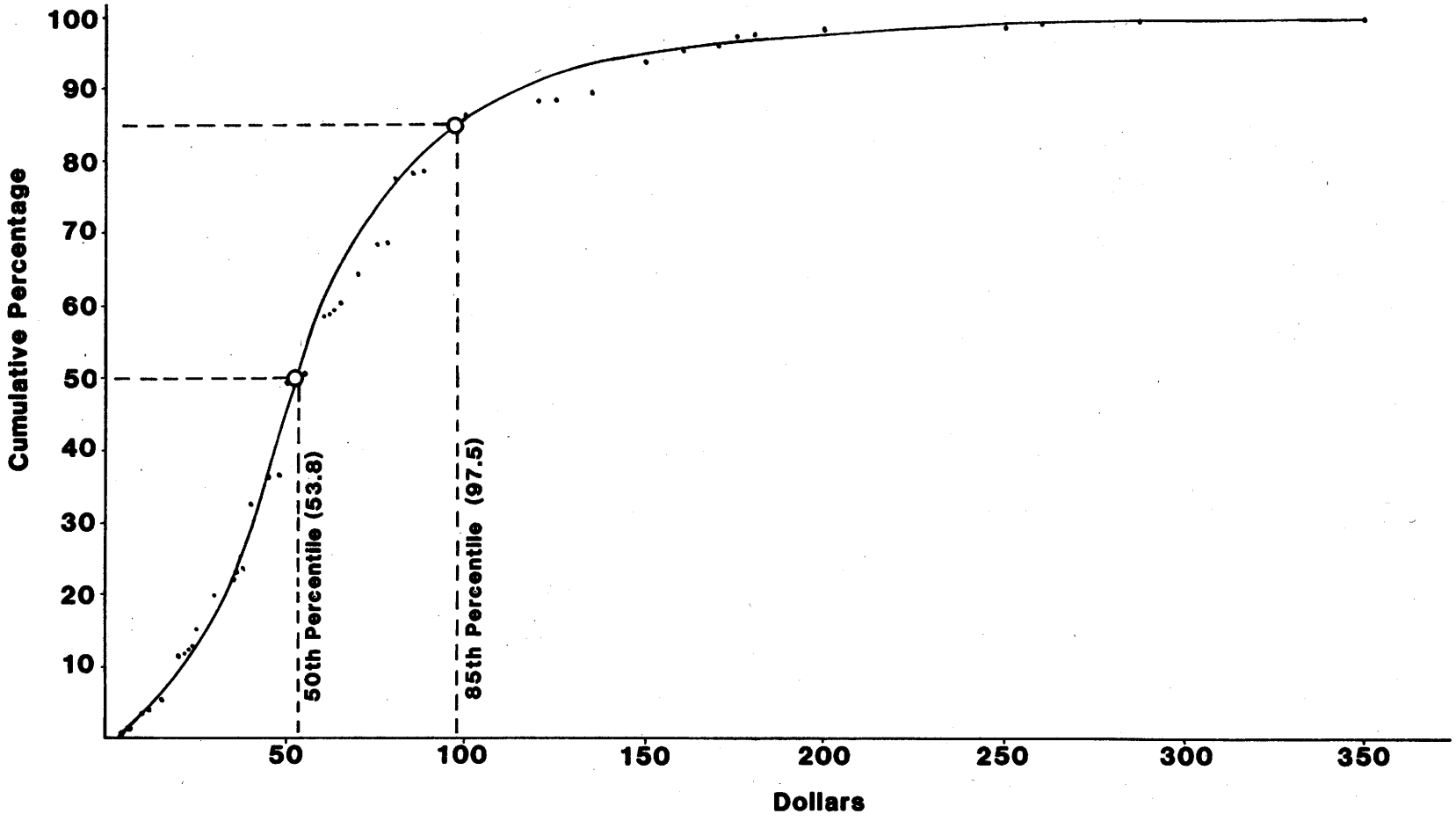


Figure 11: Cumulative Frequency Distribution, Money Saved Per Month (n=225)

Time Considerations

Commuters were asked "Do you save time by using this Park-and-Pool location?" If the commuter responded yes or no, they were requested to indicate the amount of time saved or lost per day by using the facility. Tables 58 and 59 summarize the responses received to this question by pooling mode and by lot location, respectively. Some 28% of the commuters indicated a time savings while about 18% felt they lost time. Table 60 presents the responses from those poolers indicating a savings of time while Table 61 shows the time lost by those respondents answering no to the question. Similiarly, Figures 12 and 13 show the cumulative frequency distribution for the time saved and time lost responses, respectively.

Table 58. Does Use of Lot Save Commuter Time

Response	Buspoolers (n=28)	Carpoolers (n=228)	Vanpoolers (n=103)	All Poolers (n=361)
Yes	42.9%	26.7%	27.2%	28.0%
No difference	14.3%	43.9%	37.9%	39.9%
Not Sure	17.8%	11.0%	19.4%	13.8%
No	25.0%	18.4%	15.5%	18.3%

Table 59. Does Use of Lot Save Commuter Time, By Lot Location

Response:	Rural Locations (n=237)	Urban Fringe Locations (n=124)	All Poolers (n=361)
Yes	27.8%	28.2%	28.0%
No difference	41.8%	36.3%	39.9%
Not sure	15.2%	11.3%	13.8%
No	15.2%	24.2%	18.3%

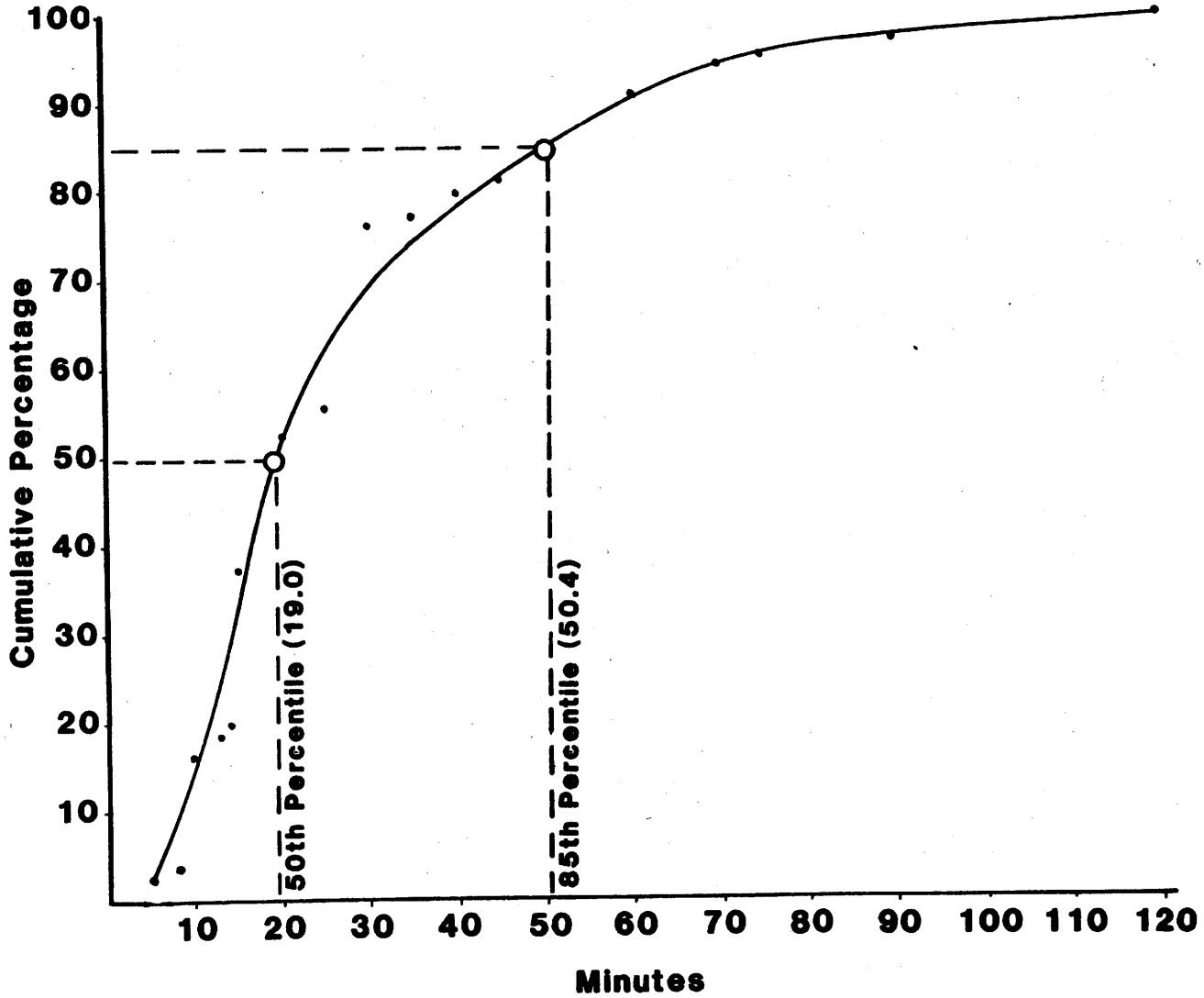


Figure 12: Cumulative Frequency Distribution, Time Saved per Day (n=85)

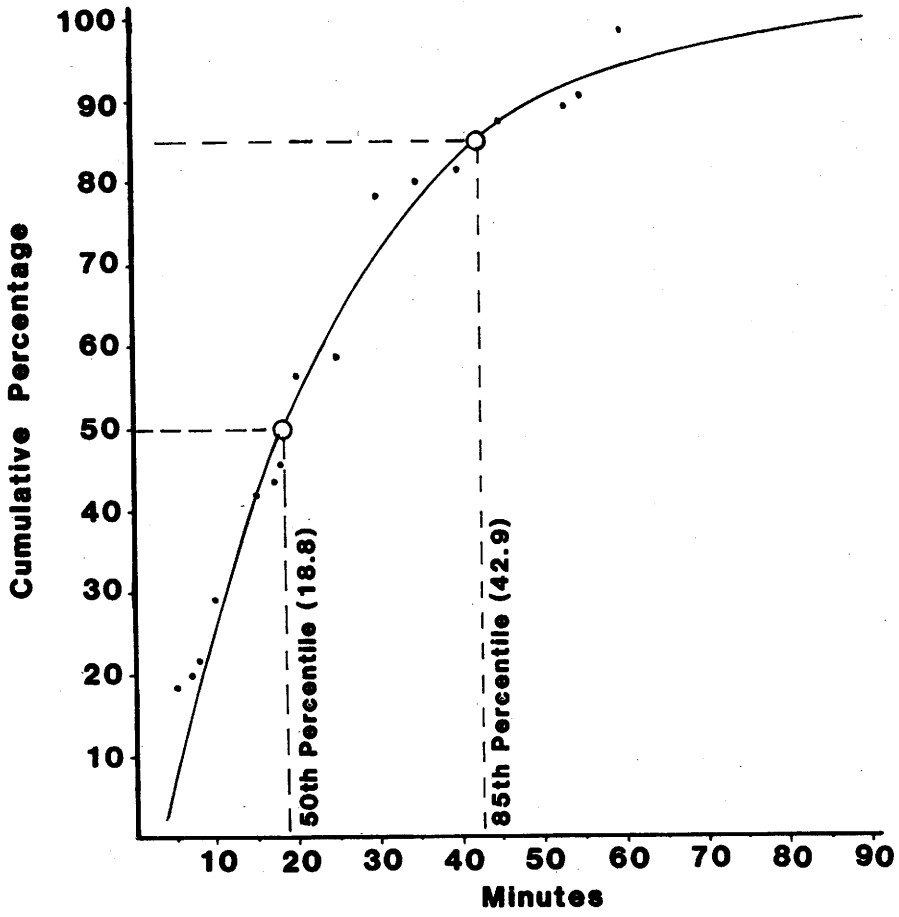


Figure 13: Cumulative Frequency Distribution, Time Lost per Day (n=55)

Table 60. Minutes Saved Per Day by Commuter

Measure:	Time Savings per Day Indicated by Respondents (n=85)
Average (mean)	30.3 minutes
50th Percentile	19.0 minutes
85th Percentile	50.4 minutes
Range:	
Low	5 minutes
High	120 minutes

Table 61. Minutes Lost Per Day By Commuter

Measure:	Time Lost per Day Indicated by Respondents (n=55)
Average (mean)	24.8 minutes
50th Percentiel	18.3 minutes
85th Percentile	42.9 minutes
Range:	
Low	3 minutes
High	90 minutes

Given the mixed feeling of commuters on the time savings question, a summary of personal and travel characteristics for those which save time versus those which lose time is presented in Table 62. Generally speaking, commuters which feel they "lose" time travel farther from their home to the lot, feel more like they are saving money and travel in a smaller pool to their destination than do those commuters which "save" time.

Table 62. Comparison of Commuter Characteristics Regarding Time Savings Inquiry

Characteristics:	Commuters Which Save Time (n=101)	Commuters Which Lose Time (n=66)
Years of Education (mean)	13.5 years	14.2 years
Age of Commuter (mean)	39.3 years	38.4 years
Time Using Lot (mean)	19.6 months	15.3 months
Distance from Home to Lot (mean)	6.1 miles	7.5 miles
Distance from Lot to Destination (mean)	35.7 miles	33.4 miles
Commuters Which Save Money	73.3%	81.8%
Commuters Which Lose Money	4.0%	7.6%
VOR of Pool (all modes)	8.17 ppv	6.53 ppv
Type of Pool:		
Carpool	60.4%	64.6%
Vanpool	27.7%	24.6%
Buspool	11.9%	10.8%

Comments and Remarks

The survey participants were invited to provide any comments or suggestion relevant to the study. A listing of all remarks received from participating commuters is included in Appendix B of this report. The remarks have been cross referenced to the Park-and-Pool lot identification code shown previously in Tables 1 and 2.

Tables 63 and 64 provide a summary of the general types of comments, remarks and/or suggestions received from the survey participants. The most frequently recorded comment was an expression of appreciation for the Park-and-Pool facility with the concern for safety comment being the second most frequent.

Table 63. Commuters' Comments or Suggestions

General Remark:	Buspoolers (n=23)	Carpoolers (n=186)	Vanpoolers (n=89)	All Poolers (n=301)
Appreciate Parking Area	4.3%	18.8%	23.6%	18.9%
Lot Needs Better Security	26.1%	12.4%	16.9%	14.6%
Lot Needs Lighting	4.3%	7.0%	12.4%	8.3%
Lot Needs Paving	4.3%	5.4%	10.1%	6.6%
Need More Park-and-Pool Lots	4.3%	5.4%	4.5%	5.0%
Need Improved Bus or Transit Service	8.7%	3.8%	6.7%	5.0%
Lot Needs Enlarging	4.3%	4.8%	1.1%	3.7%
Lot Needs Better Signing	----	3.8%	2.2%	3.0%
Lot Needs Trash Receptacles	----	3.8%	1.1%	2.7%
Lot Needs Improved Access	----	1.6%	----	1.0%
Lot Needs Telephones	----	.5%	2.2%	1.0%
Other Comment or Suggestion	43.7%	32.7%	19.2%	30.2%

Table 64. Commuters' Comments or Suggestions, By Lot Location

General Remark:	Rural Locations (n=205)	Urban Fringe Locations (n=96)	All Poolers (n=301)
Appreciate Parking Area	22.0%	12.5%	18.9%
Lot Needs Better Security	12.7%	18.8%	14.6%
Lot Needs Lighting	6.8%	11.5%	8.3%
Lot Needs Paving	3.4%	13.5%	6.4%
Need More Park-and-Pool Lots	7.3%	----	5.0%
Need Improved Bus or Transit Service	6.3%	2.1%	5.0%
Lot Needs Enlarging	5.4%	----	3.6%
Lot Needs Better Signing	3.4%	2.1%	3.0%
Lot Needs Trash Receptacles	2.4%	3.1%	2.7%
Lot Needs Improved Access	.5%	2.1%	1.0%
Lot Needs Telephones	1.5%	----	1.0%
Other Comment or Suggestion	28.3%	34.3%	32.9%

MARKETING CONSIDERATIONS

Considerable information has been compiled from the distribution and return of commuter surveys during this and previous study efforts associated with Park-and-Pool type facilities. Two primary factors must be considered in developing an effective marketing program for ridesharing activity:

1. The user (target) groups; and
2. The geographic marketing areas.

The research of mode change facilities sponsored by the State Department of Highways and Public Transportation (SDHPT) has enabled the collection of data on personal and travel characteristics of ridesharing commuters in urban, urban fringe and rural areas of Texas. The reliability of survey data and conclusions drawn from data analysis greatly increases with the size of the data base. Therefore, in order to more accurately define the user group and geographic marketing areas for ridesharing activity, the following four studies and related survey data have been aggregated, where possible with the information collected in this project:

Research Report 205-13
(Park-and-Pool; San Antonio/Houston) (1) ..... 266 returns

Research Report 205-18
(Park-and-Pool; Dallas/Arlington/Fort Worth) (2) . 235 returns

Research Report 205-19
(Park-and-Go; Fort Worth) (3) ..... 113 returns

Research Report 205-21
(Park-and-Pool; Fort Worth) (4) ..... 363 returns

In all, a total survey base of 1,344 commuter responses from 128 mode change lots throughout the State of Texas were available for use in defining the target group and marketing areas. Appendix C provides a listing of studies sites for each of the research efforts and for the aggregated listing of all available data.

This section of the report summarizes the personal characteristics of commuters by pool type and by lot location to define the representative user or target group. In addition, selective travel characteristics from the aggregated data base are presented in an attempt to describe representative catchment zones or market areas for Park-and-Pool facilities.

User Group Considerations

The user or target group characteristics of Park-and-Pool commuters are an important consideration in the design of promotional activities and marketing efforts for ridesharing. Through the consideration of demographics of current poolers, public and private entities may design, develop and implement marketing strategies directed at the non-pooling commuter to encourage a mode switch to a buspool, carpool, or vanpool.

Buspooler Profile

Due to the similarities between Park-and-Pool and Park-and-Go facilities, all available data from the other four ridesharing studies plus the results of this research effort have been aggregated to develop a representative profile of the Texas buspooler. However, since Research Report 205-19 (3) was conducted differently (on-board survey versus windshield survey) than the other Park-and-Pool studies, information on buspoolers from the Park-and-Go study is only aggregated for personal characteristics and not for travel characteristics, presented in a subsequent section of this report. Approximately 9% of all Park-and-Pool users fall into the buspool category.

Age

Table 65 summarizes the ages of buspooling commuters observed in this and in prior research efforts (1) (2) (3) and (4). The age of buspoolers

range from 19 to 81 years and averages 39.4 years. The median (50th Percentile) age of buspoolers in urban and urban fringe areas is 34 to 35 years old while the median age observed for rural lots is 45 years.

Table 65. Age Profile of Buspoolers, By Lot Location

Age:	Rural Buspoolers (n=27)	Urban Fringe Buspoolers (n=16)	Urban Buspoolers (n=161)	Al Buspoolers (n=204)
Average (mean)	46.4	35.5	38.6	39.4
50th Percentile	45.0	34.0	34.9	35.7
85th Percentile	61.0	42.7	54.6	54.7
Range:				
Low	25 years	20 years	19 years	19 years
High	80 years	53 years	81 years	81 years

Figure 14 presents the cumulative frequency distribution of the buspoolers' age along with the 50th and 85th percentile ages. Marketing strategies for buspooling should be designed for the 34 to 36 year old commuter.

Sex

Table 66 presents a summary of sex by lot location for the surveyed buspoolers. As shown in the table, buspooling commuters in urban areas are more predominately female (58.1%) while those in rural areas seem to be more typically male (59.3%). However, given the limited number of buspool respondents in rural and urban fringe areas, a balanced marketing program directed toward both male and female commuters is recommended.

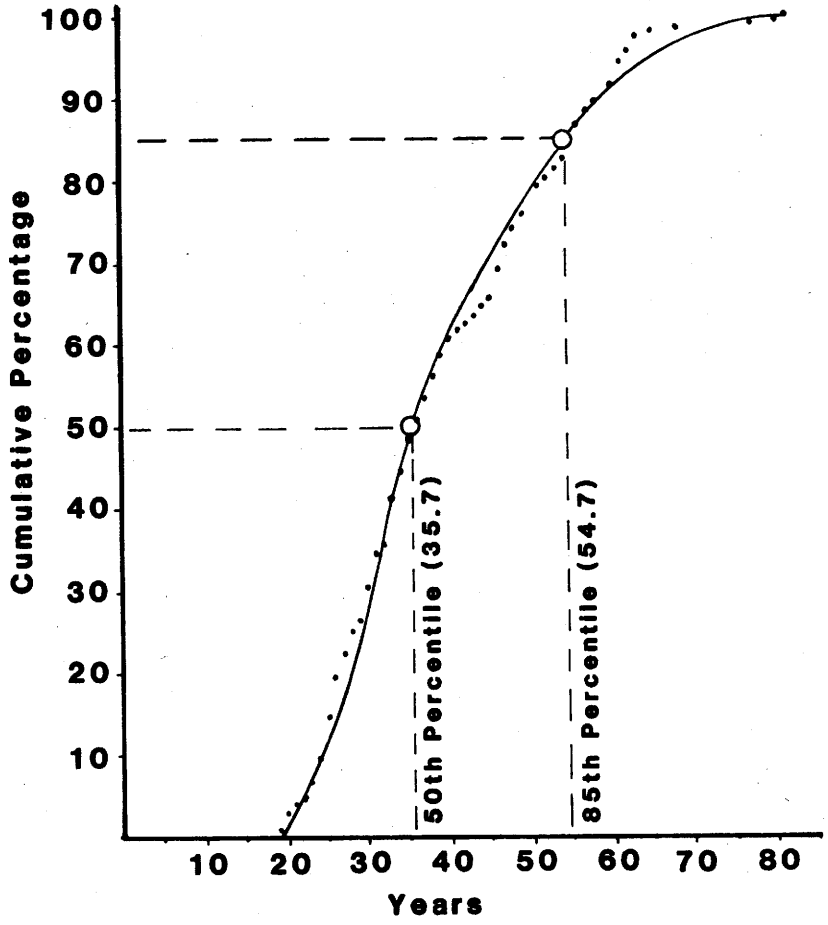


Figure 14: Cumulative Frequency Distribution, Age Profile of Buspoolers (n=204)

Table 66. Sex Profile of Buspoolers, By Lot Location

Sex:	Rural Buspoolers (n=27)	Urban Fringe Buspoolers (n=16)	Urban Buspoolers (n=167)	All Buspoolers (n=210)
Male	59.3%	75.0%	41.9%	46.7%
Female	40.7%	25.0%	58.1%	53.3%

Occupation

Table 67 presents the occupations observed for buspoolers by lot location and for all respondents. A relatively high percentage (33.3%) of urban buspoolers are engaged in clerical work which could be expected due to the high percentage of female commuters (see sex above). However, over 47% of the urban buspoolers are engaged in professional and managerial occupations. Considering all buspooling commuters these three occupations (professional, managerial, and clerical) account for some 78% of the survey respondents which provides the necessary focus for marketing activities.

Table 67. Occupation Profile of Buspoolers, By Lot Location

Occupation:	Rural Buspoolers (n=26)	Urban Fringe Buspoolers (n=17)	Urban Buspoolers (n=205)	All Buspoolers
Professional	26.9%	58.8%	35.2%	36.1%
Clerical	19.3%	23.5%	33.3%	30.7%
Managerial	11.5%	----	12.3%	11.2%
Craftsman	11.5%	11.8%	9.3%	9.8%
Operative	11.5%	----	3.1%	3.9%
Service Worker	---	----	3.7%	2.9%
Sales	3.9%	----	1.9%	1.9%
Laborer	3.9%	5.9%	.6%	1.5%
Private Household	11.5%	----	----	1.5%
Retired	---	----	.6%	.5%

Education

Table 68 shows the educational level of participating buspoolers. The years of education range from 4 to 23 and average 14.1 years. Generally speaking, buspooling commuters observed at the Park-and-Pool/Park-and-Go lots are a well educated group having a high school diploma plus 2 years of college.

Table 68. Education Profile of Buspoolers, By Lot Location

Years of Education	Rural Buspoolers (n=27)	Urban Fringe Buspoolers (n=17)	Urban Buspoolers (n=161)	All Buspoolers (n=205)
Average (mean)	13.3	14.8	14.2	14.1
50th Percentile	12.5	14.2	13.4	13.4
85th Percentile	15.6	16.8	16.5	16.5
Range:				
Low	6 years	12 years	4 years	4 years
High	23 years	18 years	22 years	23 years

Figure 15 presents the cumulative frequency distribution of the buspoolers' educational level. Marketing efforts should be directed toward the more highly educated commuter; those with a high school degree and beyond.

Carpooler Profile

The aggregation of Park-and-Pool data allows for the development of a typical profile of commuters engaged in carpooling. Personal characteristics associated with age, sex, occupation and education are presented within this section of the report for commuters participating in this form of ride-sharing. Marketing efforts directed at carpoolers should reach approximately

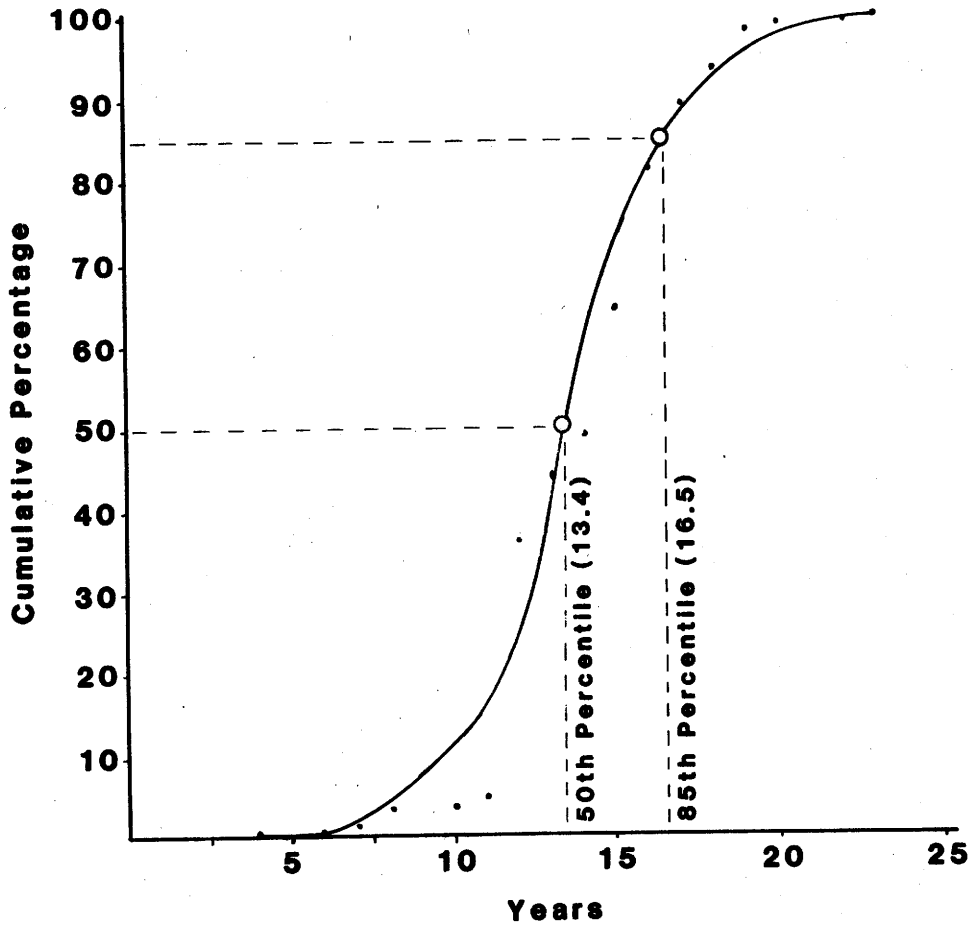


Figure 15: Cumulative Frequency Distribution Educational Profile of Buspoolers (n=205)

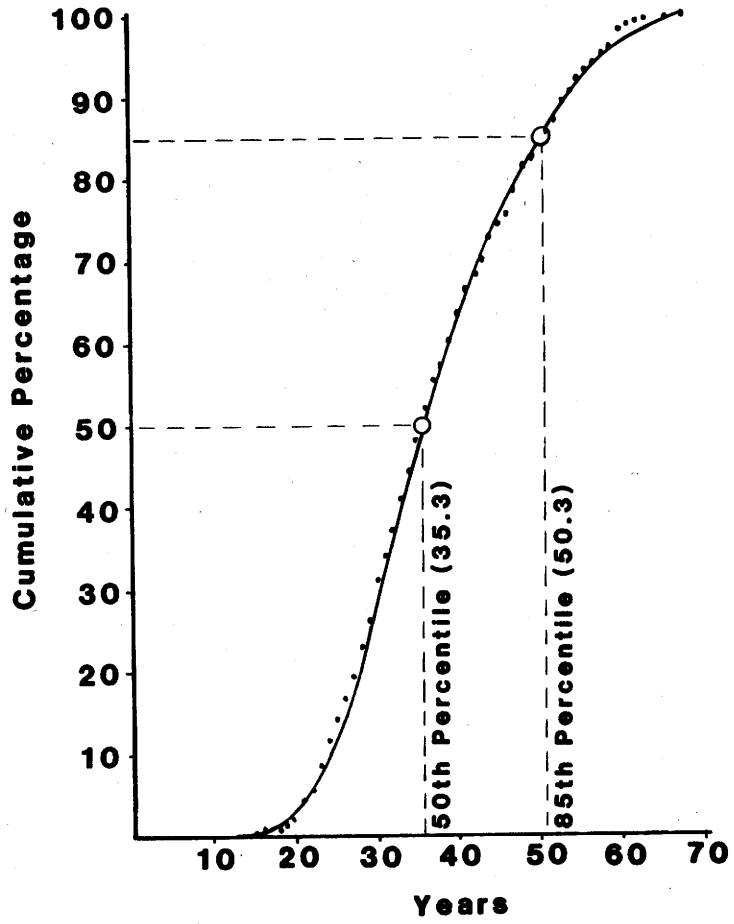


Figure 16: Cumulative Frequency Distribution, Age Profile of Carpoolers (n=715)

62% of all potential Park-and-Pool commuters, based upon current travel characteristics.

Age

Table 69 presents the age profile of carpoolers by lot location observed in this and previous research work. The age of carpool participants ranges from 15 to 68 years and averages 37.6 years. The typical or median age of a commuter engaged in carpooling is between 35 and 36 years.

Table 69. Age Profile of Carpoolers, By Lot Location

Age:	Rural Carpoolers (n=286)	Urban Fringe Carpoolers (n=199)	Urban Carpoolers (n=230)	All Carpoolers (n=715)
Average (mean)	38.0	36.8	37.6	37.6
50th Percentile	36.6	35.2	34.6	35.3
85th Percentile	50.3	48.0	52.4	50.3
Range:				
Low	16 years	18 years	15 years	15 years
High	63 years	60 years	68 years	68 years

Figure 16 shows the cumulative frequency distribution of the age for carpooling commuters. Marketing efforts should be directed at commuters in their mid thirties as indicated by the 50th percentile (35.3) of the carpoolers' age distribution.

Sex

Table 70 shows the sex of carpoolers by lot location. Carpool participants in rural areas tend to be more predominately male (62.2% of respondents) than participants from urban areas (43.2% of respondents). From a marketing approach, promotion of carpooling in urban areas for female

commuters would encompass approximately 57% of the potential users based upon the survey results. In rural and urban fringe areas, promotional activities directed at male commuters would target some 62% to 70% of the potential market. However, given scarce resources for marketing and promotion of carpooling plus the overlap in mass media coverage between urban and rural areas, a balanced promotional program directed at both male and female commuters is generally recommended.

Table 70. Sex Profile of Carpoolers, By Lot Location

Sex:	Rural Carpoolers (n=294)	Urban Fringe Carpoolers (n=203)	Urban Carpoolers (n=234)	All Carpoolers (n=731)
Male	62.2%	69.5%	43.2%	58.1%
Female	37.8%	30.5%	56.8%	41.9%

Occupation

The occupations of carpooling commuters are summarized in Table 71 for all participants and disaggregate by lot location. As shown in the table, over 23% of carpoolers in urban areas are engaged in clerical work which corresponds to the relatively high number of female commuters using these lot locations (see sex above). Over 80% of urban lot carpooling participants are employed in professional, clerical or managerial positions. Some 74% to 78% of rural and urban fringe carpoolers are engaged in professional, clerical or craftsman occupations. From a marketing prospective, over 85% of the potential carpool users can be targeted in the following four occupational categories: 1) professional; 2) craftsman; 3) clerical; and, 4) managerial.

Table 71. Occupation Profile of Carpoolers, By Lot Location

Occupation	Rural Carpoolers (n=288)	Urban Fringe Carpoolers (n=192)	Urban Carpoolers (n=231)	All Carpoolers (n=711)
Professional	29.9%	33.9%	39.8%	34.2%
Craftsman	24.3%	29.7%	6.5%	20.0%
Clerical	20.1%	14.1%	23.4%	19.5%
Managerial	9.7%	8.9%	17.7%	12.1%
Laborer	10.4%	9.4%	1.3%	7.2%
Sales	1.1%	1.5%	6.1%	2.8%
Student	2.1%	.5%	1.7%	1.5%
Service Worker	1.1%	.5%	2.2%	1.3%
Operative	1.0%	1.5%	1.3%	1.3%
Unemployed	.3%	----	----	.1%

Education

Table 72 shows the educational profile of carpoolers by lot location. Education ranged from 6 to 25 years and averaged 14.1 years for the surveyed carpoolers. The commuters engaged in this form of ridesharing from urban lots are very well educated having, on the average, a high school diploma plus 3 years of advanced schooling or college. The median (50th percentile) education of carpoolers from rural Park-and-Pool lots was slightly more than 12 years or just beyond the high school level.

Table 72. Education Profile of Carpoolers, By Lot Location

Years of Education	Rural Carpoolers (n=290)	Urban Fringe Carpoolers (n=200)	Urban Carpoolers (n=231)	All Carpoolers (n=721)
Average (mean)	13.5	14.0	15.0	14.1
50th Percentile	12.1	13.2	15.1	13.2
85th Percentile	15.6	15.9	16.9	16.1
Range:				
Low	6 years	7 years	9 years	6 years
High	25 years	20 years	22 years	25 years

Figure 17 presents the cumulative frequency distribution for all carpoolers contained in the data base. Promotional efforts for carpooling should be directed at the well educated commuter or those having at least a high school diploma and some college.

Vanpooler Profile

Vanpool participants were surveyed at Park-and-Pool sites in this and four other research efforts, (1) (2) (3) and (4) conducted by the Texas Transportation Institute. Vanpooling was observed from lots located in urban, urban fringe, and rural areas of the State. This section of the report summarizes the personal characteristics of vanpoolers in an attempt to present a typical user profile for these ridesharing commuters. About 29% of all Park-and-Pool commuters will be reached by marketing strategies directed at vanpooling activity.

Age

The age characteristics of vanpooling commuters, by lot location, are summarized in Table 73. As shown in the table, vanpoolers range in age from

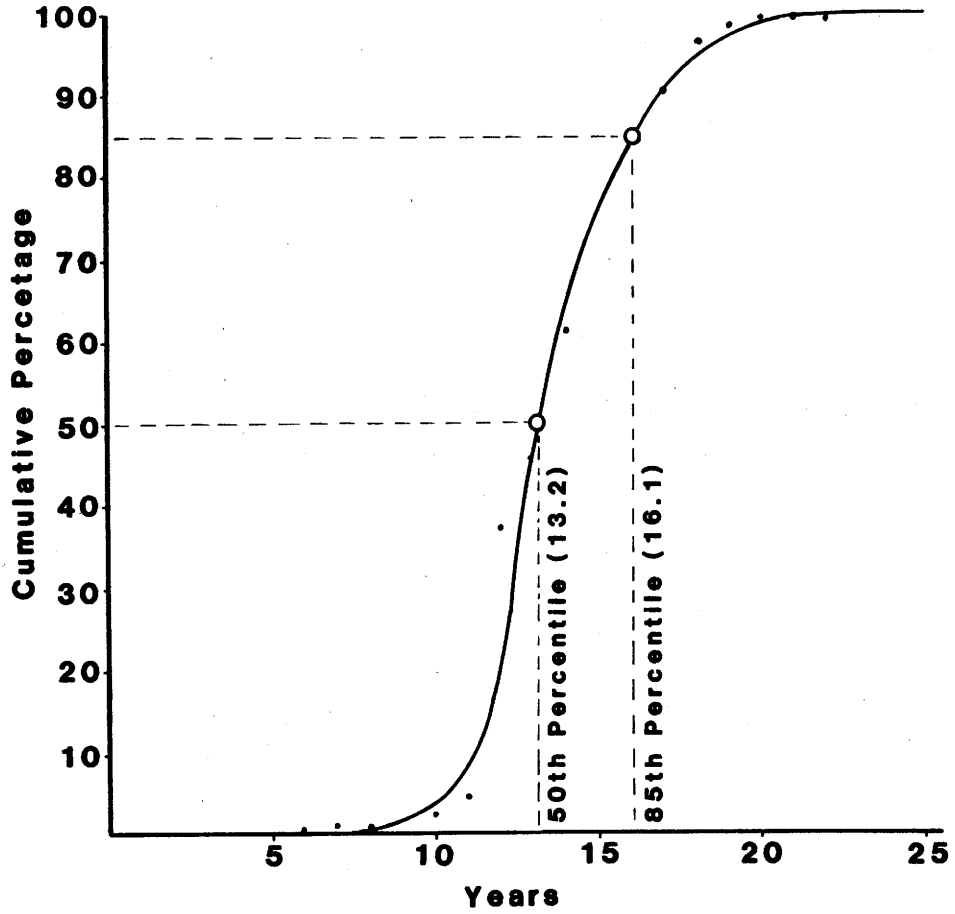


Figure 17: Cumulative Frequency Distribution Educational Profile of Carpoolers (n=721)

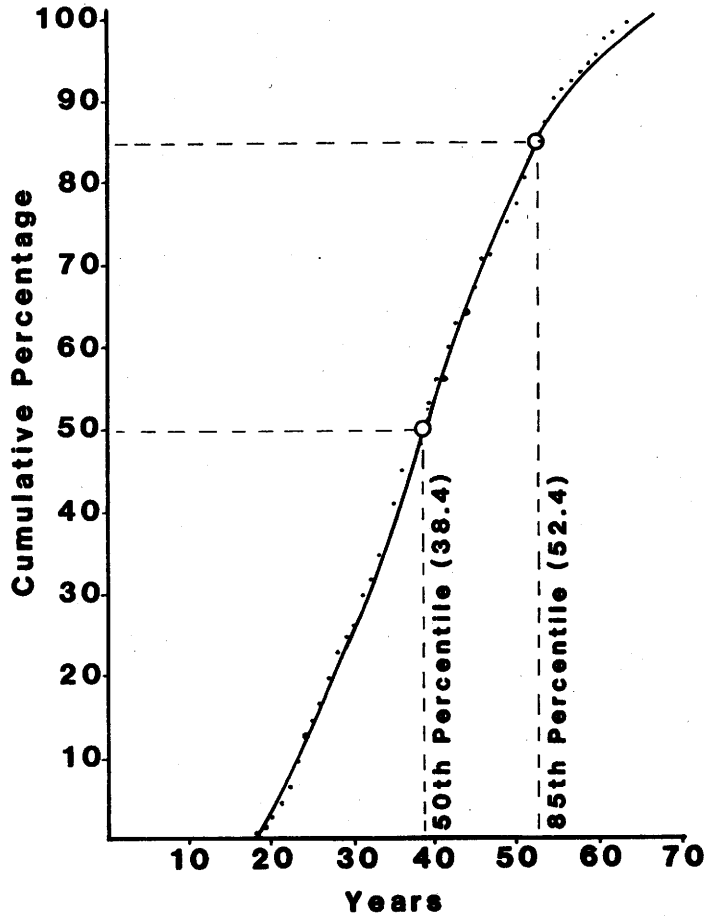


Figure 18: Cumulative Frequency Distribution, Age Profile of Vanpoolers (n=341)

18 to 67 years and are an average of 39.5 years old. Based upon the aggregated data, it appears that the typical vanpool commuter from a rural Park-and-Pool lot is 5 to 10 years older than a vanpooler from an urban fringe or urban lot; median (50th percentile) age of a rural vanpooler is 44 years while an urban or urban fringe vanpooler is about 35 to 37 years old.

Table 73. Age Profile of Vanpoolers, By Lot Location

Age:	Rural Vanpoolers (n=114)	Urban Fringe Vanpoolers (n=110)	Urban Vanpoolers (n=117)	All Vanpoolers (n=341)
Average (mean)	42.7	38.8	37.0	39.5
50th Percentile	44.0	37.0	34.6	38.4
85th Percentile	55.0	50.2	51.4	52.4
Range:				
Low	18 years	20 years	19 years	18 years
High	66 years	61 years	67 years	67 years

Figure 18 presents the cumulative frequency distribution of all participating vanpoolers along with the notation of their 50th and 85th percentile ages. Market efforts to encourage vanpooling by commuters should be directed at the 35 to 45 year old age group. Vanpooling is frequently the result of employer sponsored programs with the employers often viewing such programs as fringe benefits for their employees. Given a situation where demand exceeds the supply or the availability of vans, it is natural to believe that employers would first offer vanpooling to those employees having the most seniority. Therefore, the age distribution observed from the survey data may be skewed to the high side and not necessarily representative of actual demand of the total work force. Marketing efforts should consider the role of the employer in encouraging commuters to vanpool.

Sex

Table 74 shows the gender of vanpoolers by Park-and-Pool lot location. It is interesting to note that more females (52.5%) are engaged in vanpooling from urban lots than are males (47.5%). Generally speaking, however, slightly more male commuters are participating in vanpool ridesharing than are females (55.6% versus 44.4%). Marketing efforts should have a balanced approach toward the two genders of commuters.

Table 74. Sex Profile of Vanpoolers, By Lot Location

Sex:	Rural Vanpoolers (n-117)	Urban Fringe Vanpoolers (n=112)	Urban Vanpoolers (n=120)	All Vanpoolers (n=349)
Male	54.7%	65.2%	47.5%	55.6%
Female	45.3%	34.8%	52.5%	44.4%

Occupation

The occupation of vanpool participants is shown in Table 75. Almost 80% of vanpoolers from urban lots are engaged in professional, clerical or managerial work. Some 90% to 95% of all rural and urban fringe vanpoolers are employed in one of the following four categories: 1) professional; 2) craftsman; 3) clerical; or, 4) managerial. The marketing person should consider these types of occupations as being the prime target for potential vanpoolers when developing a promotional program.

Table 75. Occupation Profile of Vanpoolers, By Lot Location

Occupation	Rural Vanpoolers (n=115)	Urban Fringe Vanpoolers (n=112)	Urban Vanpoolers (n=116)	All Vanpoolers (n=343)
Professional	36.5%	48.2%	37.1%	40.5%
Craftsman	17.4%	15.2%	9.5%	14.0%
Clerical	24.4%	19.6%	28.4%	24.2%
Managerial	11.3%	11.6%	13.8%	12.3%
Laborer	3.5%	.9%	1.7%	2.0%
Sales	.9%	.9%	8.6%	3.5%
Student	2.6%	----	----	.9%
Service Worker	1.7%	----	----	.6%
Operative	1.7%	3.6%	.9%	2.0%
Unemployed	-----	----	----	----

Education

The educational profile of vanpoolers, by lot location, is summarized in Table 76. Vanpool data indicates a range of education from 3 to 22 years with an overall average of 13.9 years. The typical or median education of a rural vanpooler is 12 years or the high school level where as the urban and urban fringe vanpooler has between 13 and 14 years of school or at least some college.

Table 76. Education Profile of Vanpoolers, By Lot Location

Years of Education:	Rural Vanpoolers (n=114)	Urban Fringe Vanpoolers (n=108)	Urban Vanpoolers (n=118)	All Vanpoolers (n=340)
Average (mean)	13.3	14.2	14.3	13.9
50th Percentile	12.0	13.7	13.5	13.1
85th Percentile	15.6	16.1	16.1	15.9
Range:				
Low	6 years	3 years	8 years	3 years
High	20 years	21 years	22 years	22 years

Figure 19 presents the cumulative frequency distribution of education observed for all vanpool participants. As in other pooling modes marketing strategies should be directed at the commuter with at least a high school degree and preferably some college.

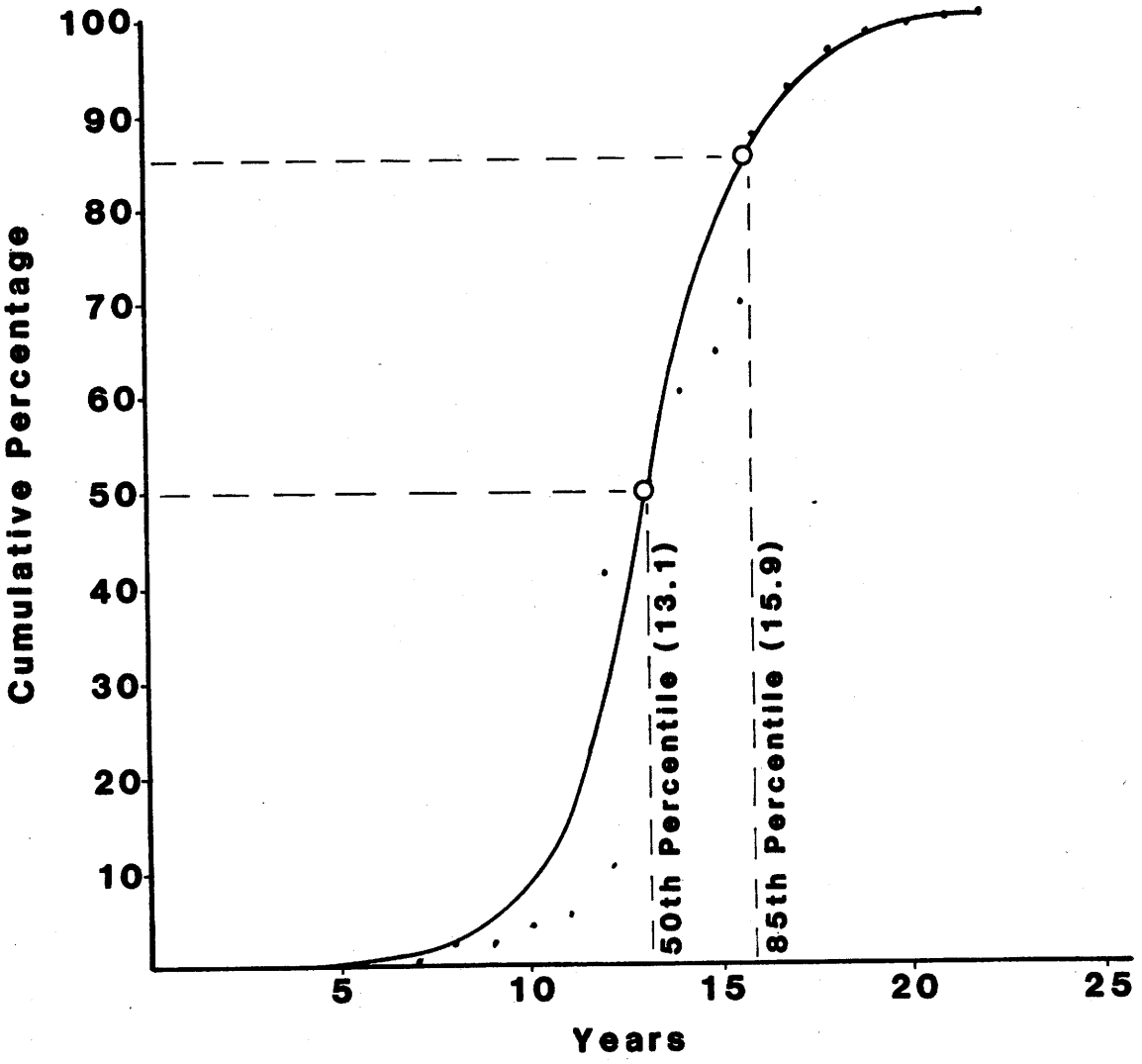


Figure 19: Cummulative Frequency Distribution, Educational Profile of Vanpoolers (n=340)

Geographic Considerations

The previous section (User Group Consideration) presents a summary profile of personal characteristics associated with commuters engaged in buspooling, carpooling and vanpooling. This section of the report considers the travel patterns or characterisitics associated with pooling commuters to suggest the most effective geographic boundaries for promotional marketing efforts. The various travel indicators are presented by Park-and-Pool lots in rural, urban fringe and urban locations.

Pooling Characteristics

Modal Split

Table 77 presents the pooling mode used by commuters from both Park-and-Pool and Park-and-Go lots located in rural, urban fringe and urban areas. As shown in the table, some 56% to 67% of all participating commuters travel from the Park-and-Pool site to their final destination in a carpool. The modal split is calculated only from the returned surveys which were distributed to commuters parking at the various study sites; data obtained from the onboard bus patron survey of Park-and-Go users (3) was excluded from the data base. As was pointed out in Research Report 205-21 (4), a survey of parked commuter vehicles at a Park-and-Go facility (one served by local transit) in an urban area tends to underestimate actual transit patronage by 25% to 35% due to those users which walk, are dropped off, or arrive at the location in some way other than a parked vehicle.

Table 77. Overview of Modal Split for Pooling Commuters, By Lot Location

Pooling Mode for Lot-to-Destination Journey:	Poolers from Rural Lots (n=456)	Poolers from Urban Fringe Lots (n=343)	Poolers from Urban Lots (n=422)	All Poolers (n=1221)
Carpool	66.7%	61.55	56.6%	61.8%
Vanpool	26.5%	33.2%	29.6%	29.5%
Buspool	6.4%	5.3%	13.5%	8.5%
Other Mode	.4%	----	.3%	.2%

The mode split for the urban Park-and-Go lots in Fort Worth, based only upon parked vehicles, is:

Carpool - 52.6%
Vanpool - 7.0%
Buspool - 40.4%

The mode split for all poolers excluding those parked at a Park-and-Go facility is (n=1107):

Carpool - 62.7%
Vanpool - 31.8%
Buspool - 5.2%
Other Mode - .3%

Likewise, the mode split for poolers from urban lots excluding the Park-and-Go facilities is (n=308):

Carpool - 58.1%
Vanpool - 38.0%
Buspool - 3.6%
Other Mode - .3%

The above mode split discussion points to the importance of knowing what type of transit service (if any) is provided at any specific site. The percentage of buspoolers originating from an urban parking area varies considerably and may constitute over 40% of the parked commuter vehicles.

Vanpoolers traveling from the parking area amount to some 26% to 38% of the ridesharing commuters depending upon lot location. Higher usage of vanpools is noted in urban and urban fringe areas.

Pool Size

Table 78 shows the pool occupancies in persons per vehicle (ppv) for rural, urban fringe and urban lot locations. Small differences exist in the sizes of carpools and vanpools between the three types of lot locations. The average carpool engaged in Park-and-Pool activity is 3.34 ppv while the average vanpool is 9.32 ppv. Buspool occupancy varies from about 16 ppv to almost 27 ppv depending upon the general location of the facility. It is interesting to note that the larger buspools were recorded in the rural areas.

Table 78. Overview of Pool Size in Persons Per Vehicle (PPU), By Lot Location

Type of Pool:	Pools from Rural Lots	Pools from Urban Fringe Lots	Pools from Urban Lots	All Poolers
Carpool	3.361 ppv (n=302)	3.322 ppv (n-208)	3.346 ppv (n=234)	3.345 ppv (n=744)
Vanpool	9.068 ppv (n=117)	9.239 ppv (n=113)	9.626 ppv (n=123)	9.317 ppv (n=353)
Buspool	26.773 ppv (n=22)	25.500 ppv (n=14)	15.969 ppv (n=32)	21.426 ppv (n=68)

Travel Characteristics

When considering the travel demand associated with Park-and-Pool activity, both the home-to-lot and the lot-to-destination distances should be considered. In determining the optimum location for a mode change facility, the distance from the employment or activity center of a site is a prime consideration. Once a site has been identified or selected, the distance between the lot and the potential pooling users becomes important in terms of marketing or promoting the facility to candidate commuters. A more detailed examination of locating Park-and-Pool lots is contained in a subsequent section of this report entitled "Planning Guidelines". This section of the report presents a summary of commuter travel data and its association or relationship to marketing of ridesharing to the potential users.

Travel Supply/Demand

Table 79 presents an overview of the travel characteristics and distances associated with Park-and-Poolers by pooling mode. The average annual travel distance shown in the table considers home-to-lot and lot-to-destination, mileage, mean weekly travel, and assumes 50 weeks of commuting per year. As shown, the annual travel indicated by the participating commuters ranges from about 13,000 miles for buspoolers to almost 17,500 miles for vanpoolers. Travel demand is frequently related in terms of person miles of travel (pmt) when considering high occupancy vehicle (HOV) improvements such as Park-and-Pool facilities. The measure of "pmt" takes into account not only travel distances and frequencies but also vehicle occupancies of the home-to-lot and lot-to-destination journey. As presented in Table 79, the

Table 79. Overview of Commuter Travel Characteristics

Travel Characteristics:	Buspoolers (n=68)	Carpoolers (n=708)	Vanpoolers (n=340)	All Poolers (n=1152)
Vehicle Occupancy (persons/vehicle)				
Home-to-Lot Journey (mean)	1.186 ppv	1.137 ppv	1.115 ppv	1.135 ppv
Lot-to-Destination Journey (mean)	21.426 ppv	3.345 ppv	9.317 ppv	6.208 ppv
Distance Traveled				
Home-to-Lot Journey (mean)	4.010 miles	6.507 miles	5.185 miles	5.912 miles
Lot-to-Destination Journey (mean)	22.732 miles	28.413 miles	30.147 miles	28.459 miles
*Home-to-Destination Average (mean)	26.742 miles	34.920 miles	35.332 miles	34.371 miles
Frequency of Travel (mean)	4.864 days/wk	4.893days/wk	4.938days/wk	4.904 days/wk
*Average Weekly Travel Distance	260.1 miles	341.7 miles	348.9 miles	337.1 miles
*Average Annual Travel Distance	13,007.3 miles	17,086.4 miles	17,446.9 miles	16,855.5 miles
*Average Annual Person Miles of Travel	239,217.2 pmt	50,123.9 pmt	141,553.1 pmt	89,931.3 pmt

*Note: These values computed from survey data furnished by commuters.

calculated pmt's associated with pooling commuters range from about 50,000 to almost 240,000 per year. Travel demand associated with a vanpooler, based upon the pmt measure, is approximtely 2.8 times the demand of a carpooler while a buspooler has approximately 4.8 times the demand of a carpooler. The annual person miles of travel is a useful indicator of where marketing efforts can achieve the greatest benefit in terms of improving the transportation system through reducing the transportation vehicle demand.

Table 80 summarizes the travel characteristics and the computed travel demand for poolers using lots located in rural, urban fringe and urban areas. As shown in the table, vehicle travel per pooler ranges from about 13,000 miles per year for an urban lot to approximately 20,000 miles per year for a rural lot. Similarly, the person miles of travel (pmt) associated with a commuter using an urban lot is slightly more than 70,000 pmt while a commuter from a rural lot has almost 106,000 pmt demand (about 1.5 times the amount of an urban lot user).

Comparing the two tables (numbers 79 and 80), the travel supplied by pooling mode provides a ranking of the most effective types of pools to satisfy the demand in different locations. The most effective supply mode is a buspool, followed by a vanpool and then a carpool. The greatest travel demand to be accommodated by the pooling modes is found in rural areas, urban fringe areas and urban areas, respectively. Therefore, marketing programs should be designed to achieve the greatest benefit in terms of matching supply (pooling mode) with travel demand (geographic area).

Travel Distances/Times

As mentioned in the previous section on supply and demand, the distances commuters travel from home-to-lot are important considerations in determining the most effective area in which to direct marketing efforts. In addition,

Table 80. Overview of Commuter Travel Characteristics, By Lot Location

Travel Characteristics:	Poolers from Rural Lots	Poolers from Urban Fringe	Poolers from Urban Lots	All Poolers
Vehicle Occupancy (person/vehicle):				
Home-to-Lot Journey (mean)	1.148 ppv	1.056 ppv	1.181 ppv	1.135 ppv
Lot-to-Destination Journey (mean)	6.043 ppv	6.245 ppv	6.364 ppv	6.208 ppv
Distance Traveled:				
Home-to-Lot Journey (mean)	6.522 miles	6.021 miles	5.017 miles	5.912 miles
Lot-to-Destination Journey (mean)	34.436 miles	29.048 miles	21.474 miles	28.459 miles
*Home-to-Destination Average (mean)	40.958 miles	35.249 miles	26.491 miles	34.371 miles
Frequency of Travel (mean)	4.896 days/wk	4.891 days/wk	4.924 days/wk	4.904 da/wk
*Average Weekly Travel Distance	401.1 miles	344.8 miles	260.9 miles	337.1 miles
*Average Annual Travel Distance	20,053.0 miles	17,240.3 miles	13,044.2 miles	16,855.5 mi.
*Average Annual Miles of Travel	105,549.9 pmt	91,927.8 pmt	70,209.2 pmt	89,931.3pmt

*Note; These values computed from survey data furnished by commuter.

the lot to destination travel distances provide an indication of how to structure the marketing program to achieve the greatest benefit from expended resources.

Figures 20, 21 and 22 present the cumulative frequency distributions observed for the home-to-lot travel distances for poolers from rural, urban fringe and urban areas, respectively. Table 81 summarizes the relevant travel indicators necessary for defining representative catchment zones or marketing area boundaries.

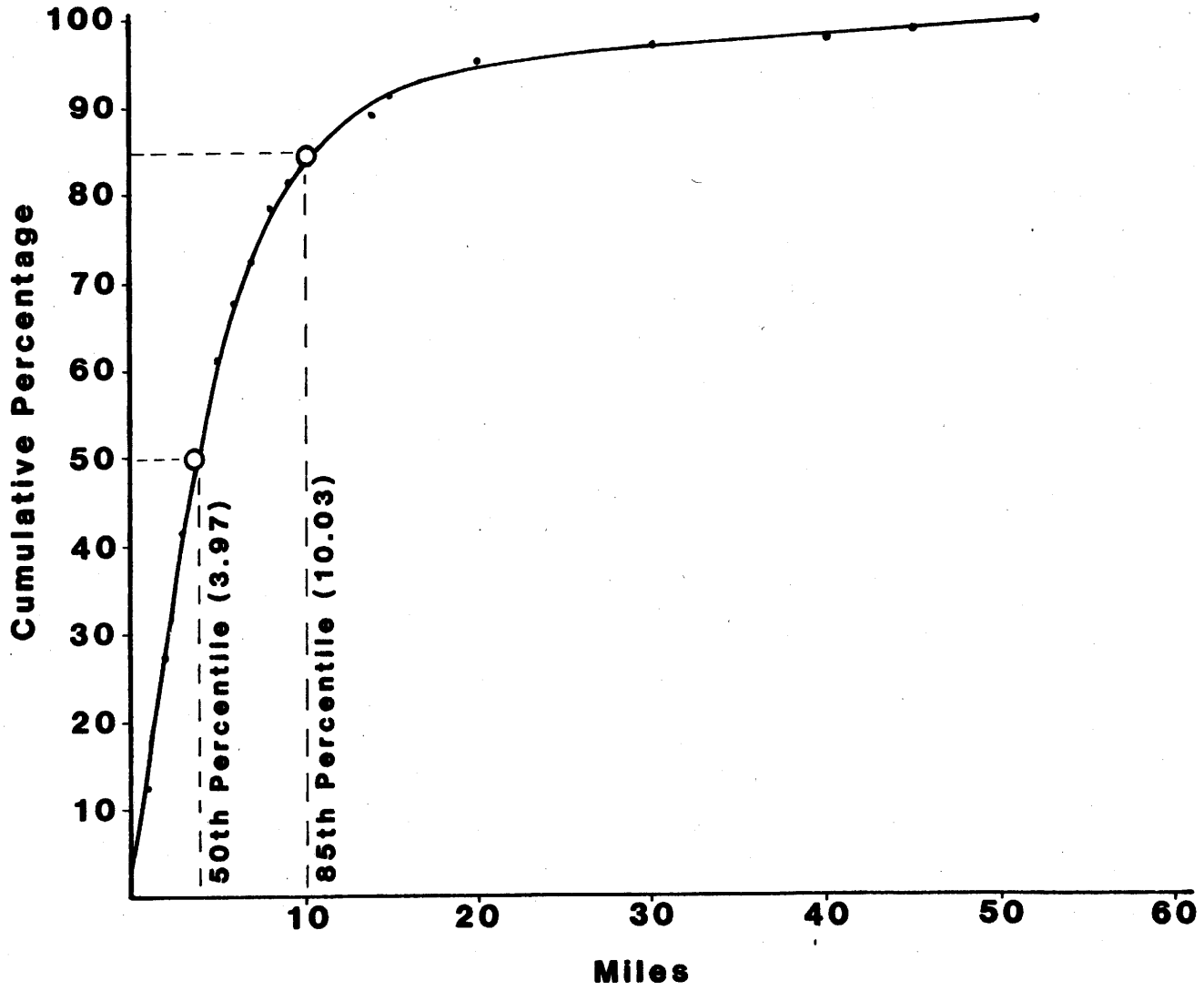


Figure 20: Cumulative Frequency Distribution, Home-to-Lot Travel Distance for Rural Lots (n=446)

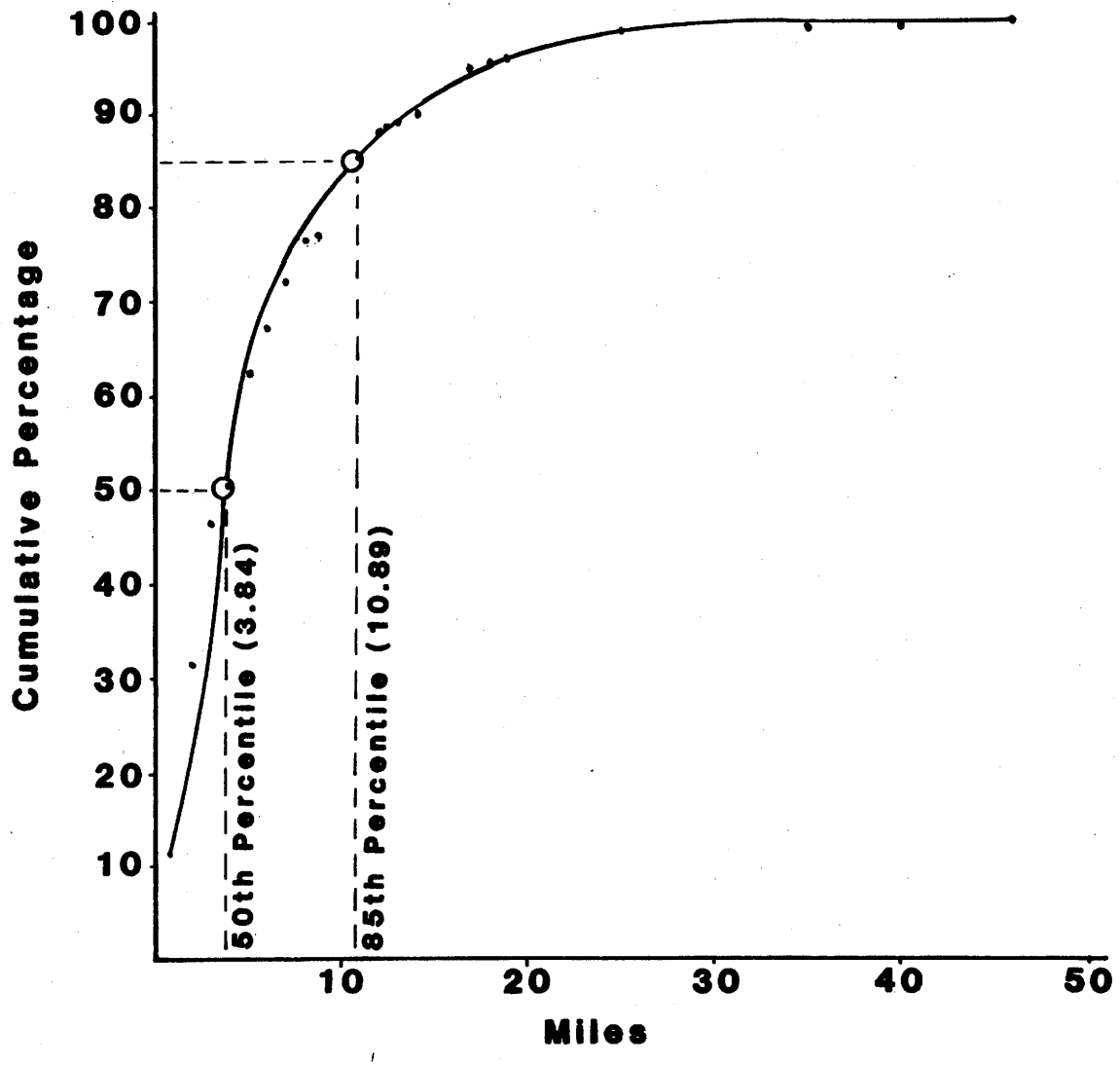


Figure 21: Cumulative Frequency Distribution, Home-to-Lot Travel Distance For Urban Fringe Lots (n=343)

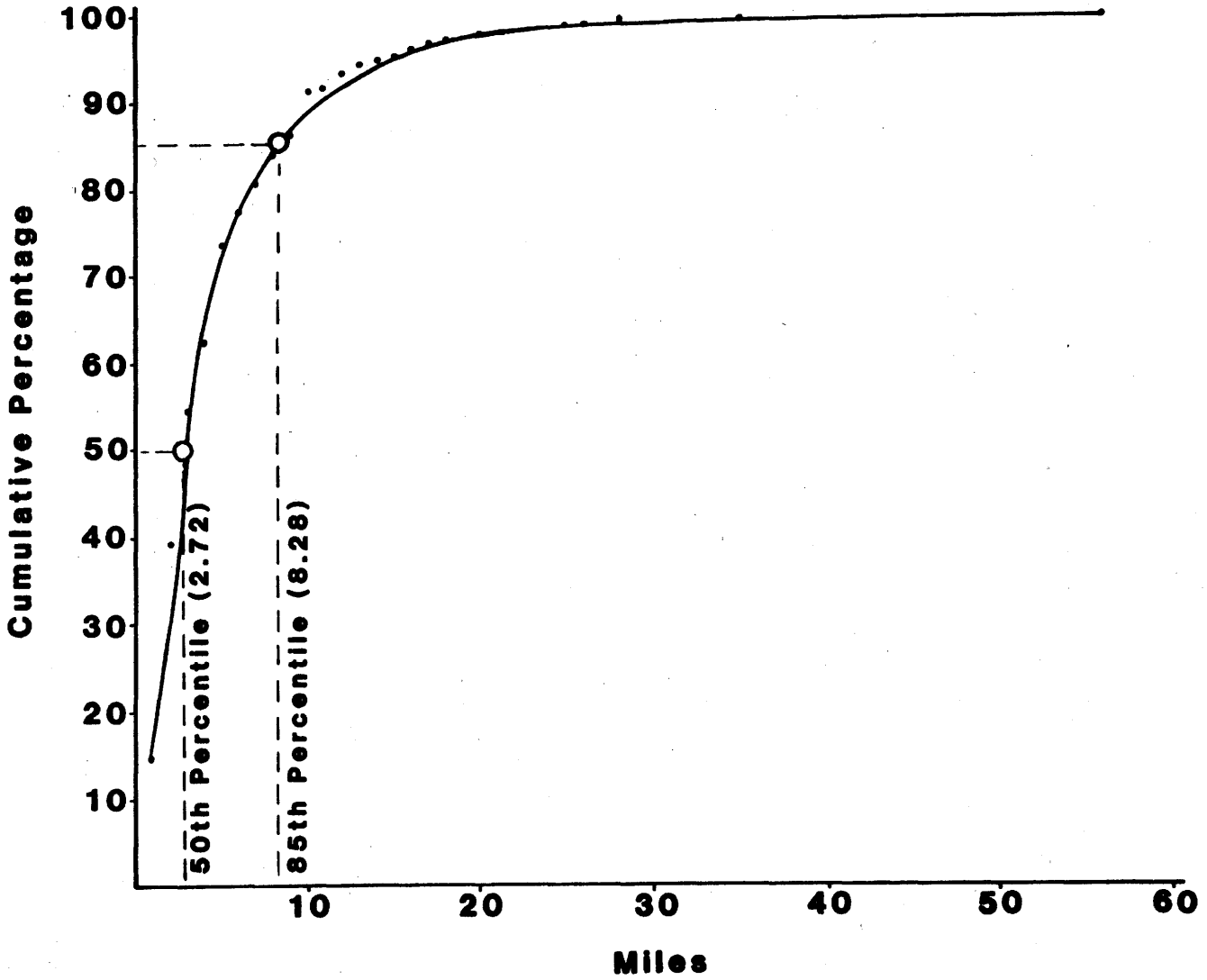


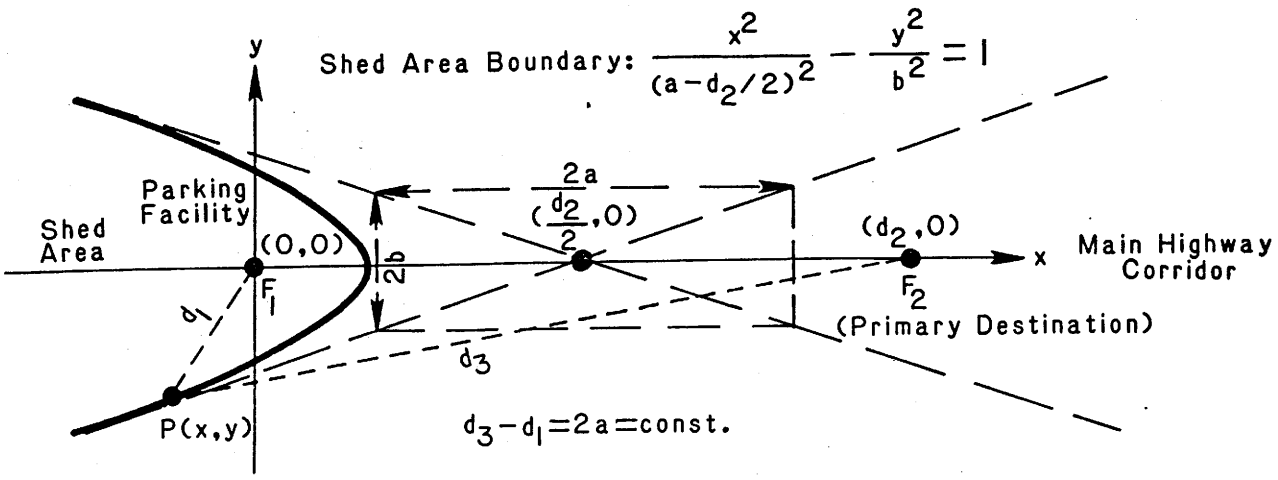
Figure 22: Cumulative Frequency Distribution, Home-to-Lot Travel Distance for Urban Lots (n=415)

Table 81. Home-to-Lot Travel Distances Associated with Market Area Definition, By Lot Location.

Measure of Home to Lot Distance:	Poolers from Rural Lots (n=446)	Poolers from Urban Fringe Lots (n=343)	Poolers from Urban Lots (n=415)	All Poolers (n=1204)
Average (mean) Miles	6.52	6.20	5.02	5.91
Modal (most frequent) Miles	2.00	2.00	2.00	2.00
Median (50th percentile) Miles	3.97	3.84	2.72	3.37
75th Percentile Miles	7.40	7.60	5.39	6.88
85th Percentile Miles	10.03	10.89	8.28	9.60
90th Percentile Miles	14.28	13.17	9.75	11.96

As shown in the table, and related figures, minor differences exist in the home-to-lot travel characteristics for rural poolers versus urban fringe poolers. However, the commuters using urban parking areas tend to live some one to two miles closer to the mode change facility. Fifty percent of all poolers live within 3.4 miles of the facility while 85% live within 9.6 miles.

As determined in the 1981-82 study of pooling activity along the I-30 freeway corridor in Dallas/Fort Worth (2), the catchment zone size varies by lot location, geographic features, access to and from the facility, plus other factors specific to the location. Previous work to define market areas for Park-and-Pool users was performed by Voorhees in 1981 (5). The results of their investigation revealed a hyperbolic commutershed which is shown in Figure 23. This commutershed ranged in size from 20 to 170 square miles and was found to vary as a function of facility size, distance from destination, regional setting and home-to-lot distance (5).



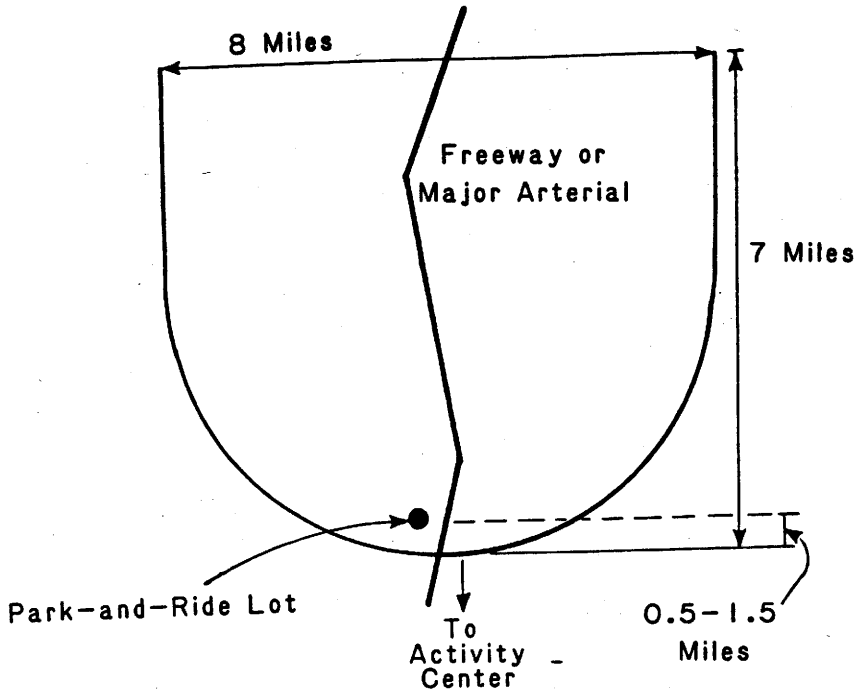
d_1=Home to Lot Distance

d_2=Lot to Destination Distance

Source: Voorhees, 1981; Reference (5)

Figure 23: Commuter Shed Area Boundary for Park-and-Pool Defined as a Hyperbola

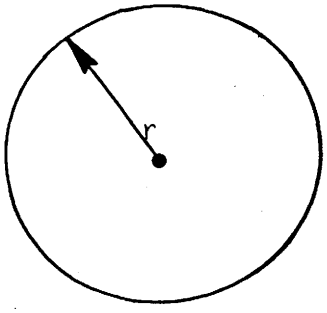
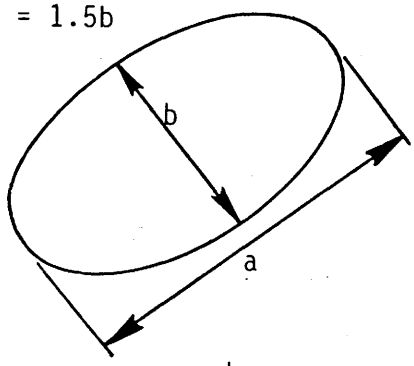
Christiansen investigated catchment zones for Park-and-Ride (transit) users in 1981 and suggested a parabolic market area shown in Figure 24 (6). Both the parabolic and hyperbolic configurations are oriented in a common manner to the major travel corridor or highway leading to the final destination.



Source: Christiansen, 1981; Reference (6)

Figure 24: General Parabolic Shape of the Typical Park-and-Ride Market Area

A 1982-83 study of Park-and-Pool facilities within the Fort Worth area determined that 80% of urban and urban fringe lot users originated from within 7.0 miles of the Park-and-Pool facility (4). Figure 24A shows the suggested primary and secondary market zones for Park-and-Pool users in urban or urban fringe areas as determined by Research Report 205-21 (4). As shown, the computed area of the primary and the secondary zones ranged from 28 square miles to 154 square miles, respectively.

*Market Zone	Computed Area (sq.mi.)	Circular Market Area  Area = πr^2	Ellipitical Market Area a = 1.5b  Area = $\frac{\pi\ a\ b}{4}$	
		r =	a =	b =
Primary	28	3.0 miles	7.3 miles	4.9 miles
Secondary	154	7.0 miles	17.1 miles	11.4 miles

*Note: Primary Market Zone represents approximately 50% of Users; Secondary Market Zone represents approximately 80% of Users.

Source: Reference (4)

Figure 24A. Generalized Market Areas for Urban/Urban Fringe Park-and-Pool Lots

Based upon the aggregated data base and the travel characteristics previously presented in Table 81 for Park-and-Pool participants, the market areas suggested in Research Report 205-21 (4) (shown above in Figure 24A) are not representative of an urban fringe location. However, the previously suggested configuration and areas are in close agreement with the aggregated data for urban lots. Figures 25 and 26 show the revised marketing boundaries for urban lots and urban fringe lots respecitvely based upon this research effort.

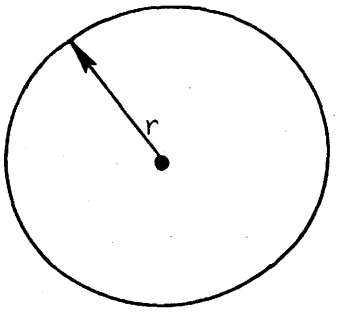
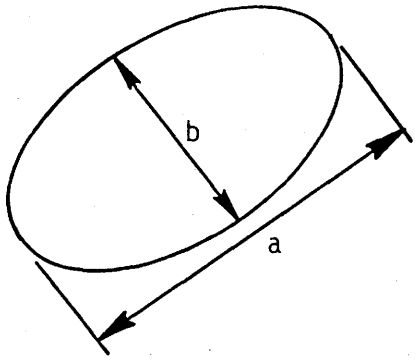
Market Zone	Computed Area (sq.mi.)	Circular Market Area	Ellipitical Market Area	
		 Area = πr^2	 Area = $\frac{\pi a b}{4}$	
		r =	a =	b =
Primary (50% of users)	23	2.72 miles	6.66 miles	4.44 miles
Secondary (80% of users)	142	6.73 miles	16.48 miles	10.99 miles

Figure 25. Market Areas for "Urban" Park-and-Pool Lots (n=415)

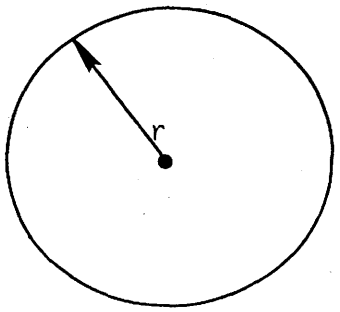
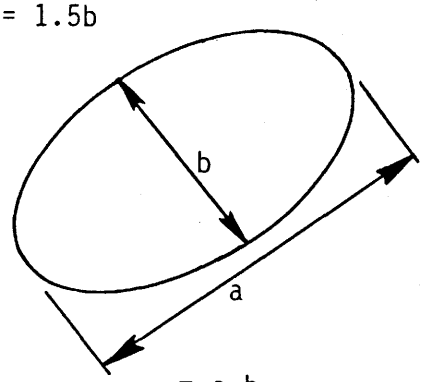
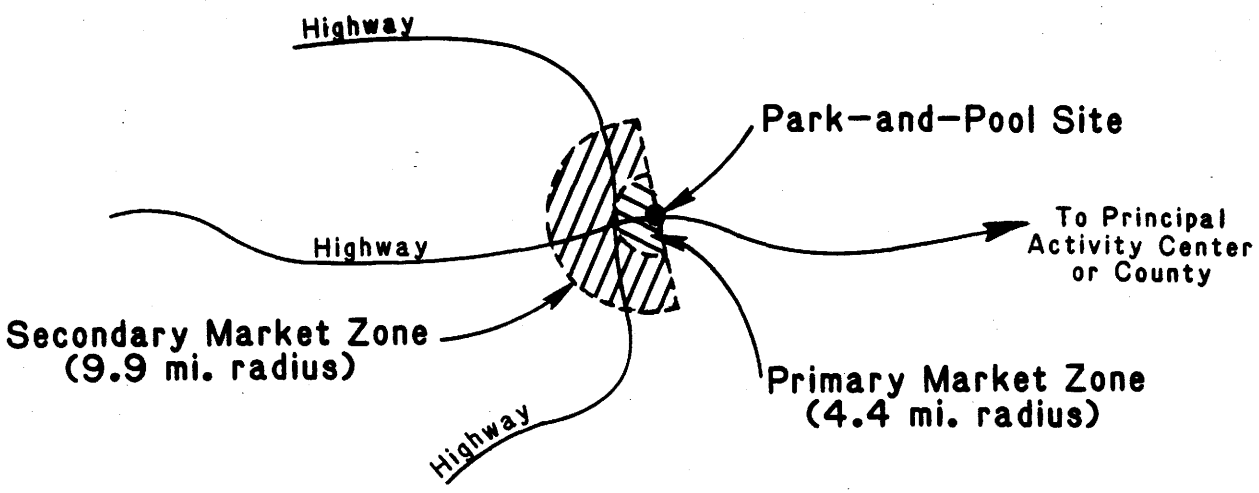
Market Zone	Computed Area (sq.mi.)	Circular Market Area  Area = πr^2	Ellipitical Market Area a = 1.5b  Area = $\frac{\pi a b}{4}$	
		r =	a =	b =
Primary (50% of users)	46	3.84 miles	9.41 miles	6.27 miles
Secondary (80% of users)	275	9.35 miles	22.90 miles	15.27 miles

Figure 26. Market Areas for "Urban Fringe" Park-and-Pool Lots (n=343)

Primary marketing efforts for urban Park-and-Pool lots should be directed within a 23 square mile area about the facility or within a circle having a radius of approximately 2.7 miles. With adequate resources, marketing of the urban rideshare facilities may be extended some 6.7 miles out from the lot (142 square miles) to reach approximately 80% of the potential users.

For urban fringe lots located in somewhat well developed residential areas, primary marketing should occur within 3.8 miles (46 square miles) of the facility. Secondary efforts to reach 80% of the potential users may be extended out from the lot some 9.4 miles or within an area of 275 square miles.

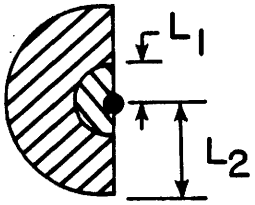
Research Report 205-21 (4) suggested a simplified concept of primary and secondary market zones as presented in Figure 27, for rural Park-and-Pool facilities. Both the primary and secondary zones were approximated by semi-circles oriented about the parking site. Figure 28 presents the suggested dimensions for the simplified market areas as determined in the 1982-83 study (4). The revised dimensions shown in Figure 29 are based upon the aggregated survey data used in this study. Actual marketing efforts for promoting a rural Park-and-Pool site should always be tailored to the specific characteristics of the location and knowledge of the local area and/or commuter travel patterns. From the aggregated data on rural travel characteristics, the most intensive marketing efforts should be directed within a zone some 4 miles upstream of the facility and, if resources permit, extended out to about 8.5 miles to reach 80% of the potential users.



Source: Reference (4)

Figure 27: Conceptual Market Zones for Rural Park-and-Pool Sites

SEMI-CIRCULAR MARKET ZONES



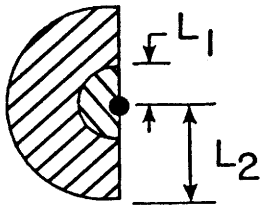
L_1 = Primary
L_2 = Secondary

Market Zone	L =	Area =	Approximate Percentage of Users
Primary	4.4 miles	30 sq.mi.	50%
Secondary	9.9 miles	154 sq.mi.	80%

Source: Reference (4)

Figure 28: Generalized Market Areas for Rural Park-and-Pool Lots

SEMI-CIRCULAR MARKET ZONES



L_1 = Primary
L_2 = Secondary

Area = $\frac{\pi L^2}{2}$

Market Zone	L =	Area =	Approximate Percentage of Users
Primary	3.97 miles	25 sq.mi.	50%
Secondary	8.49 miles	113 sq.mi.	80%

Figure 29. Market Areas for "Rural" Park-and-Ride Lots (n=446)

The previous discussion of market zones for Park-and-Pool lots considered the home-to-lot travel distances. A similar approach to defining catchment areas for poolers can be applied by using travel times between the commuters' origin and the lot. The primary advantage of using travel time versus distance is the ability to take into account the general level of mobility surrounding a particular site or the travel speed on the roadway facilities serving a particular location. When the mobility consideration is applied to a particular site, the market area configuration might resemble that shown in Figure 30 for urban/urban fringe lots and in Figure 31 for rural Park-and-Pool lots. However, as in all transportation improvements, site specific studies should be undertaken to determine the roadway access and levels-of-mobility surrounding any given parking facility.

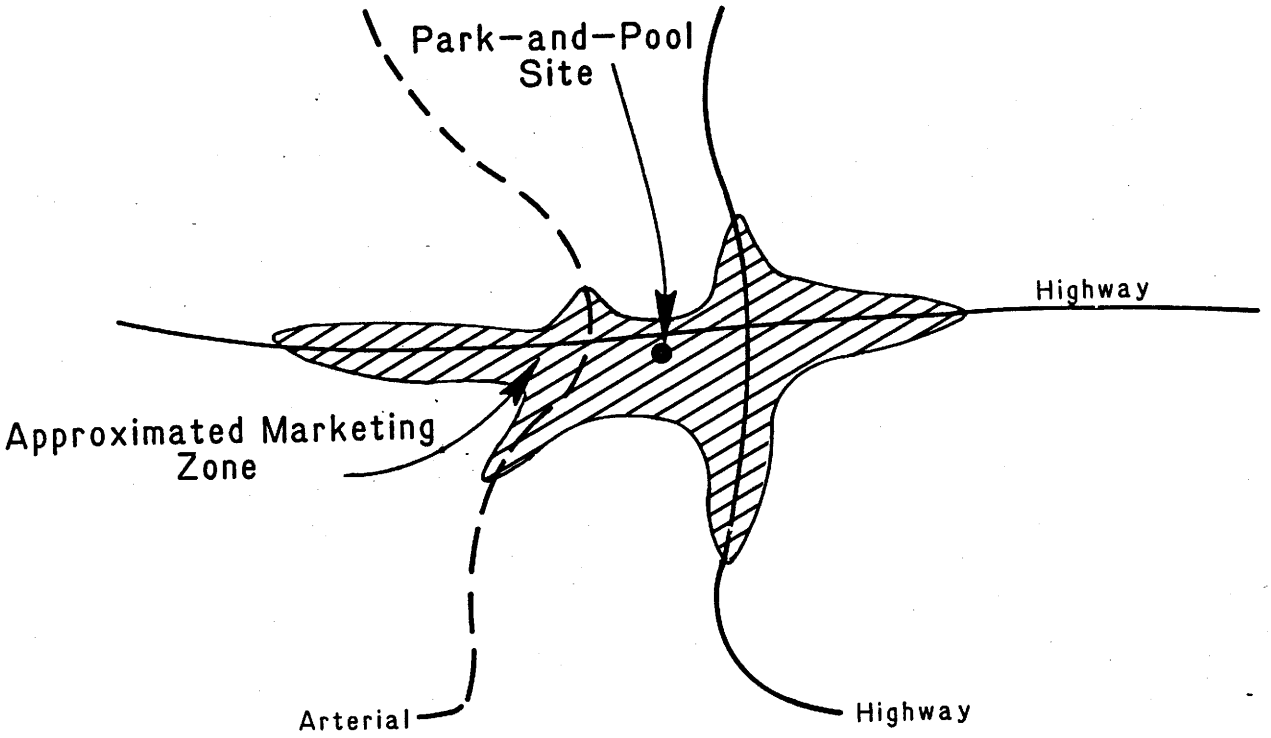


Figure 30. Urban/Urban Fringe Marketing Zones Based Upon Travel Time and Mobility (Conceptual Only)

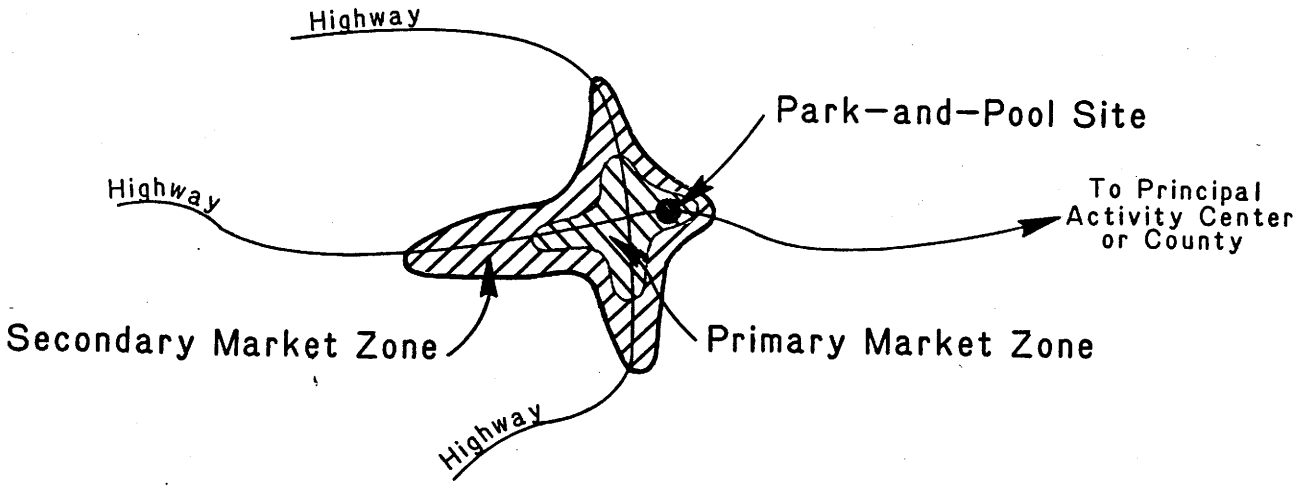


Figure 31. Rural Marketing Zone Based Upon Travel Time and Mobility (Conceptual Only)

Figures 32, 33 and 34 present the cumulative frequency distributions of travel time between home and lot for rural, urban fringe, and urban locations, respectively. The major travel time parameters for each of the three lot settings are summarized in Table 82.

Table 82. Home-to-Lot Travel Times Associated With Market Area Definition, By Lot Location

Measure of Home-to-Lot Time:	Poolers from Rural Lots (n=341)	Poolers from Urban Fringe Lots (n=190)	Poolers from Urban Lots (n=381)	All Poolers (n=912)
Average (mean) Minutes	11.29	10.34	9.76	10.45
Modal (most frequent) Min.	5.00	5.00	5.00	5.00
Median (50th percentile) Min.	9.38	8.53	7.75	9.17
75th Percentile Minutes	13.75	14.10	11.08	14.12
85th Percentile Minutes	14.84	14.83	14.16	14.78
90th Percentile Minutes	19.04	18.50	14.95	18.38

Generally speaking, the primary marketing zone, with 50% of the potential users, extends some 10 minutes away from the Park-and-Pool facility. Secondary marketing efforts may be extended out to 15 minutes in travel times from the lot to encompass some 85% of the candidate poolers.

Although the lot-to-destination travel is not of direct concern in reaching the target audience of potential Park-and-Poolers, it is an important consideration in designing the marketing program and promotional materials. Figures 35, 36 and 37 present the cumulative frequency distributions for lot-to-destination travel distances for commuters using rural, urban fringe, and urban lots. Figures 38, 39 and 40 show the distribution of travel time for the three types of lot locations. Tables 83 and 84 summarize

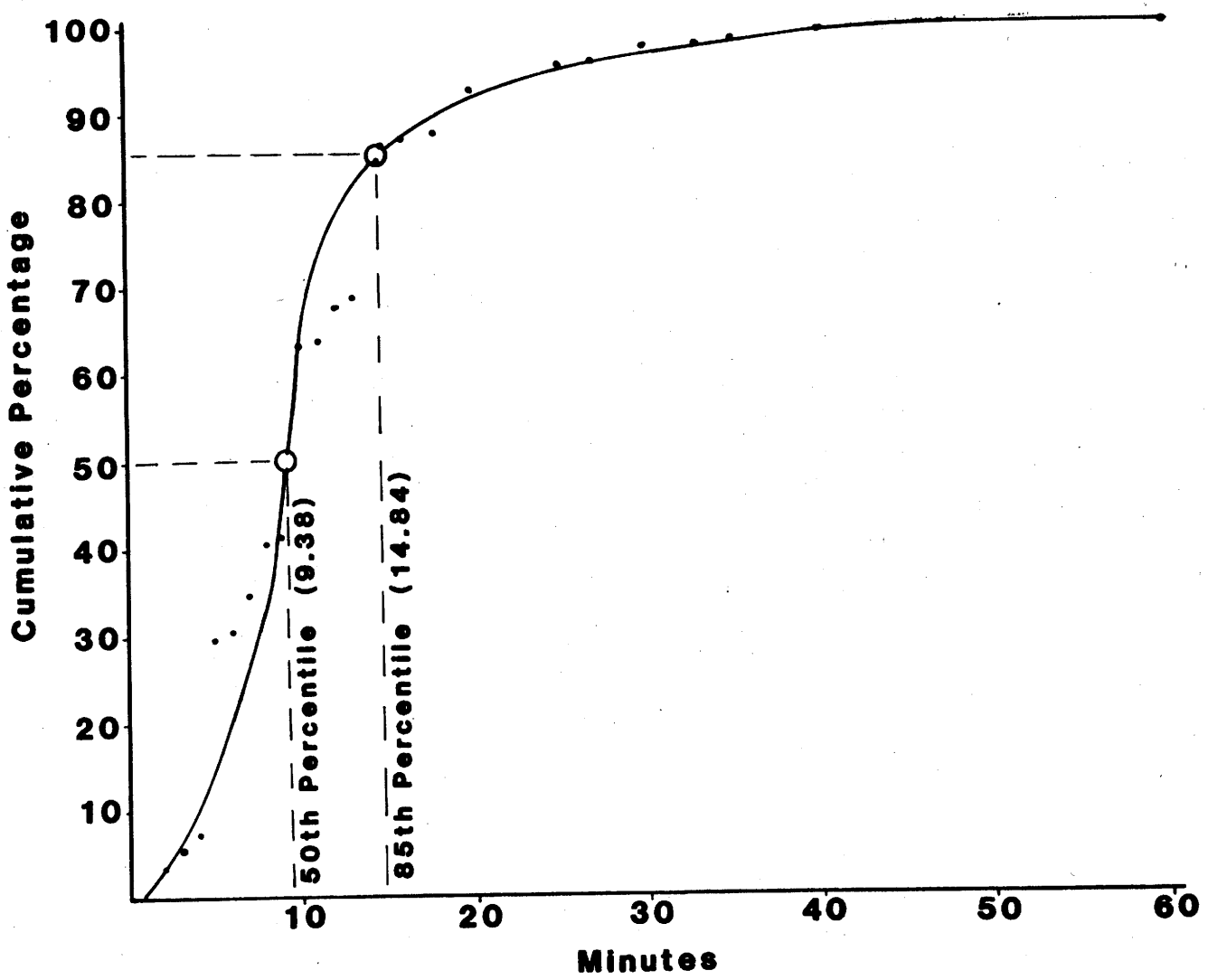


Figure 32: Cumulative Frequency Distribution, Home-to-Lot Travel Time for Rural Lots (n=341)

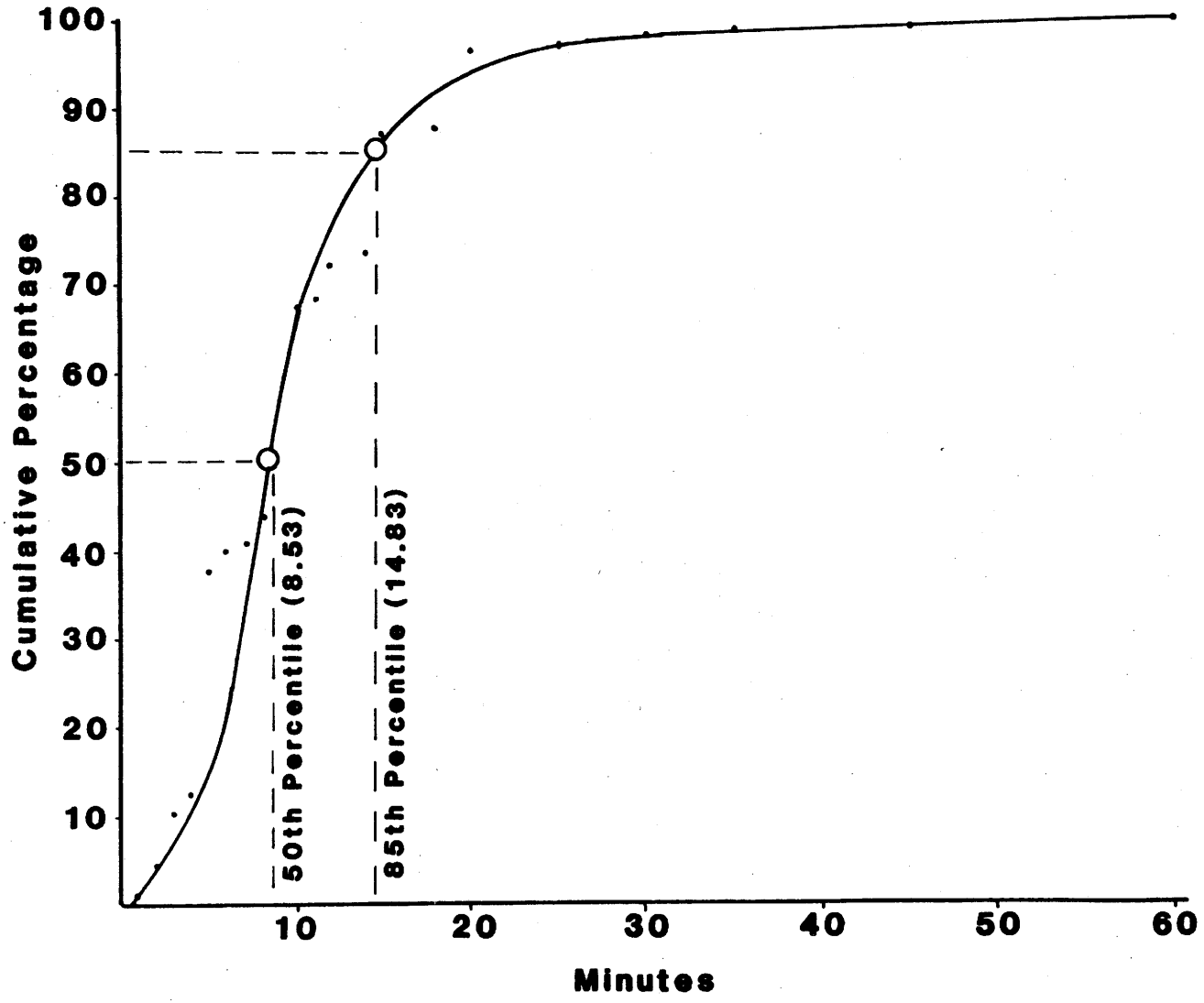


Figure 33: Cumulative Frequency Distribution, Home-to-Lot Travel Time for Urban Fringe Lots (n=190)

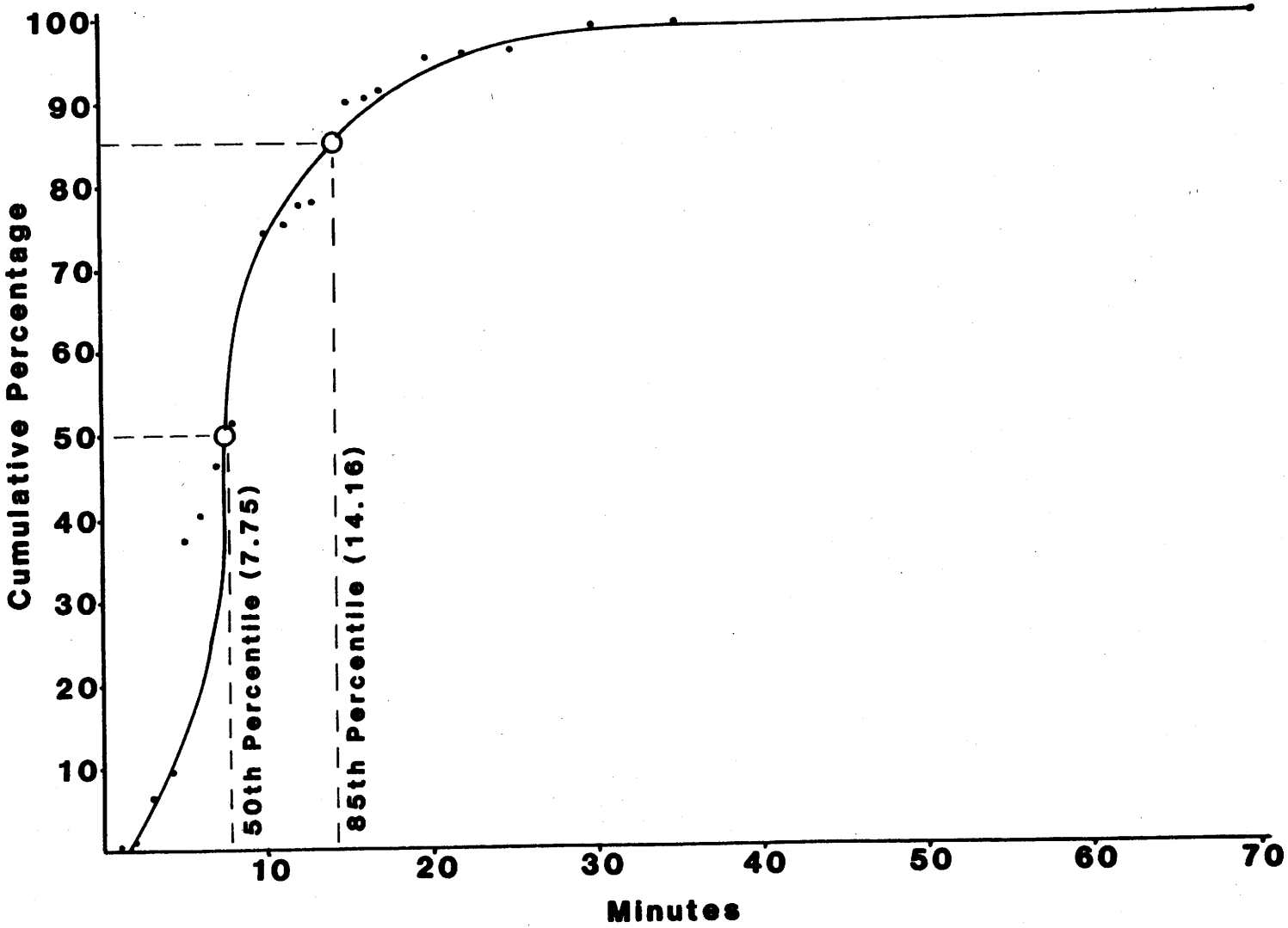


Figure 34: Cumulative Frequency Distribution, Home-to-Lot Travel Time for Urban Lots (n=381)

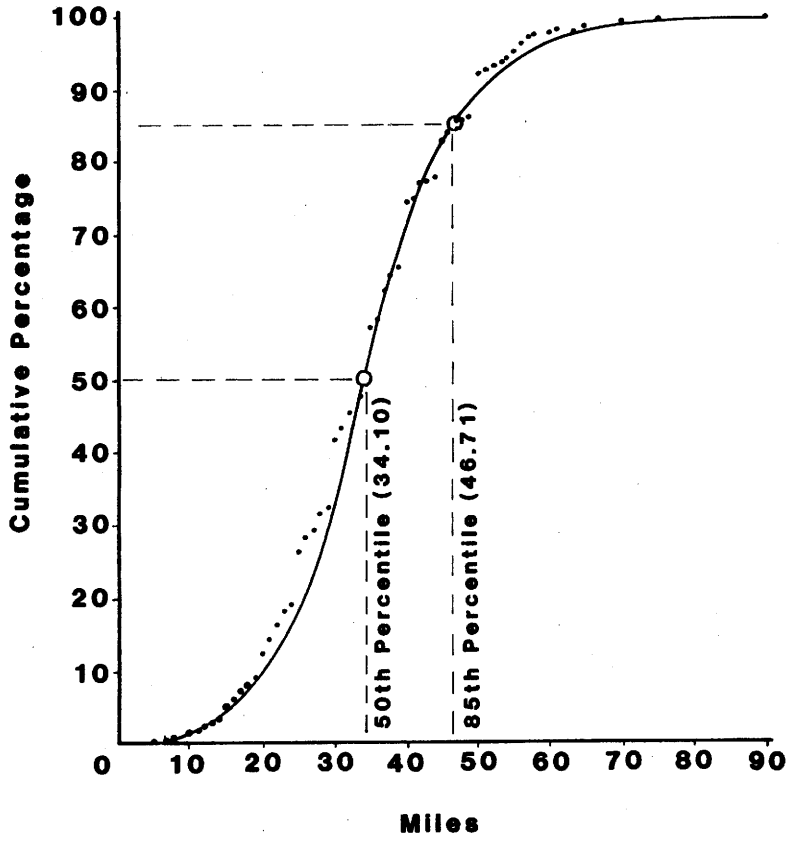


Figure 35: Cumulative Frequency Distribution, Lot-to-Destination Travel Distance for Rural Lots (n=443)

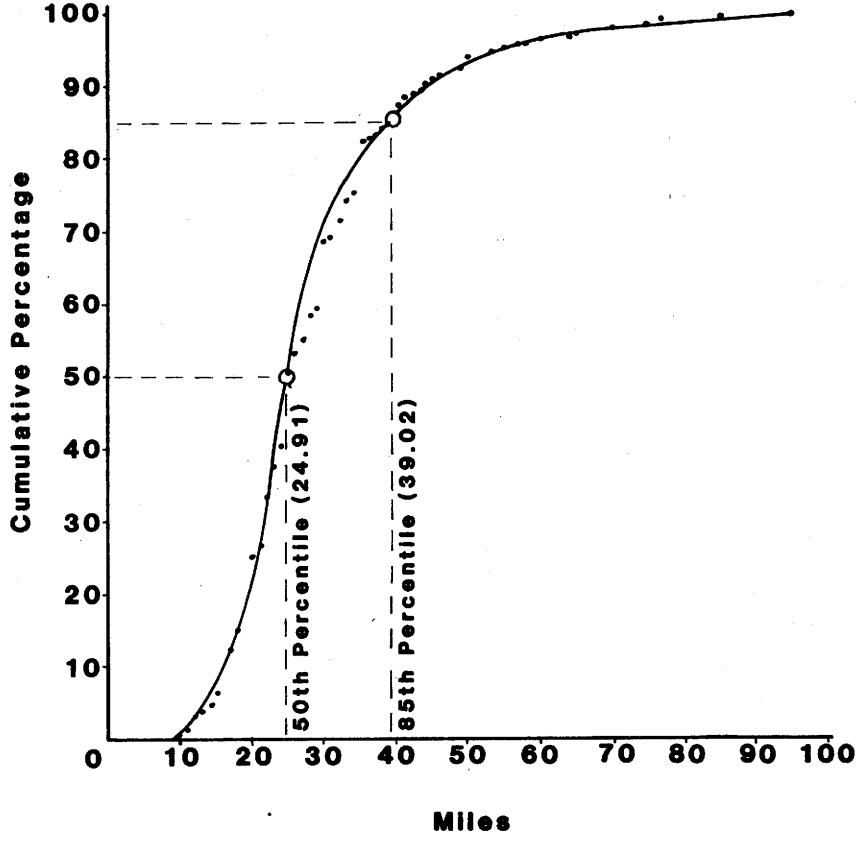


Figure 36: Cumulative Frequency Distribution, Lot-to-Destination Travel Distance for Urban Fringe Lots (n=337)

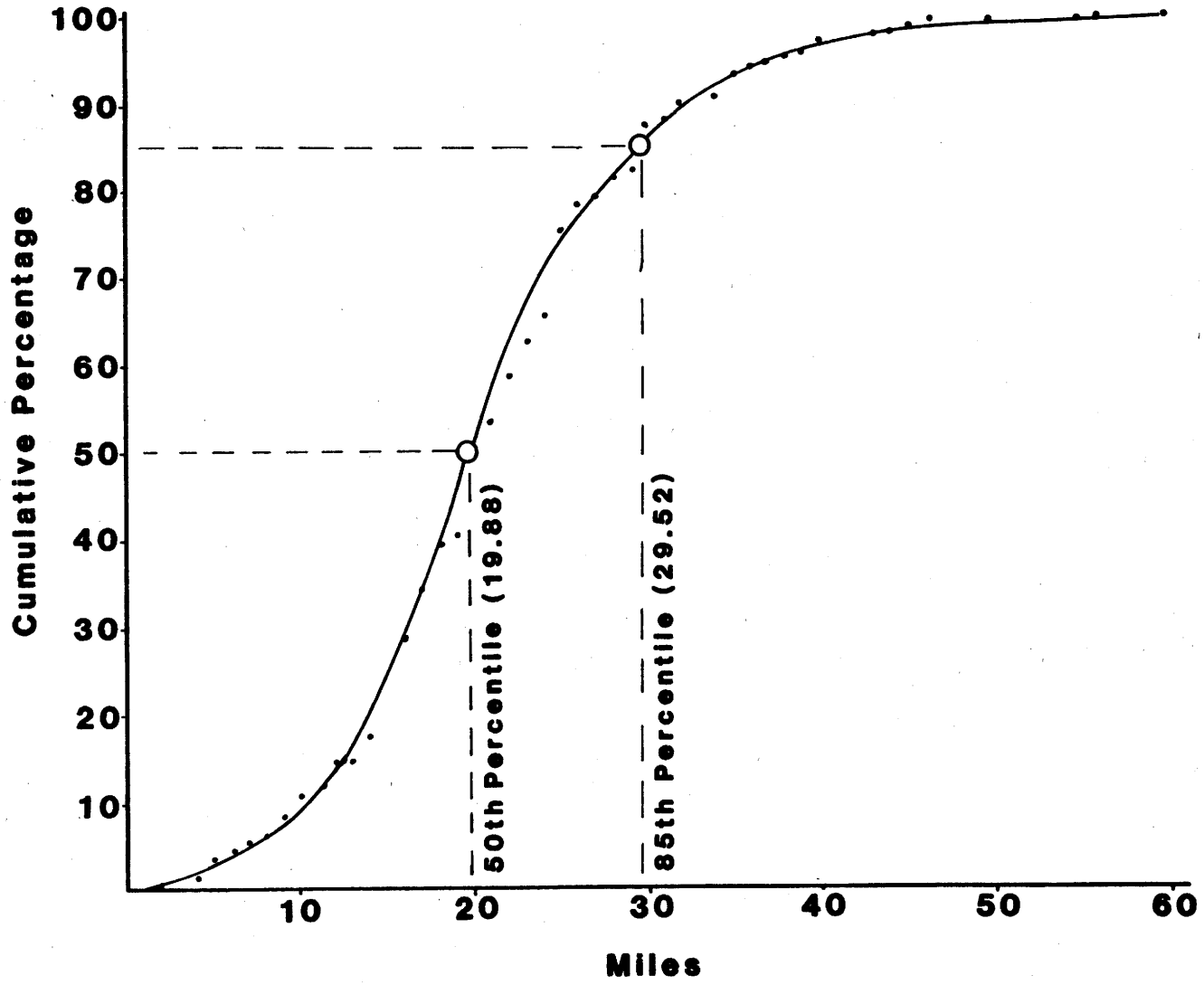


Figure 37: Cumulative Frequency Distribution, Lot-to-Destination Travel Distance For Urban Lots (n=407)

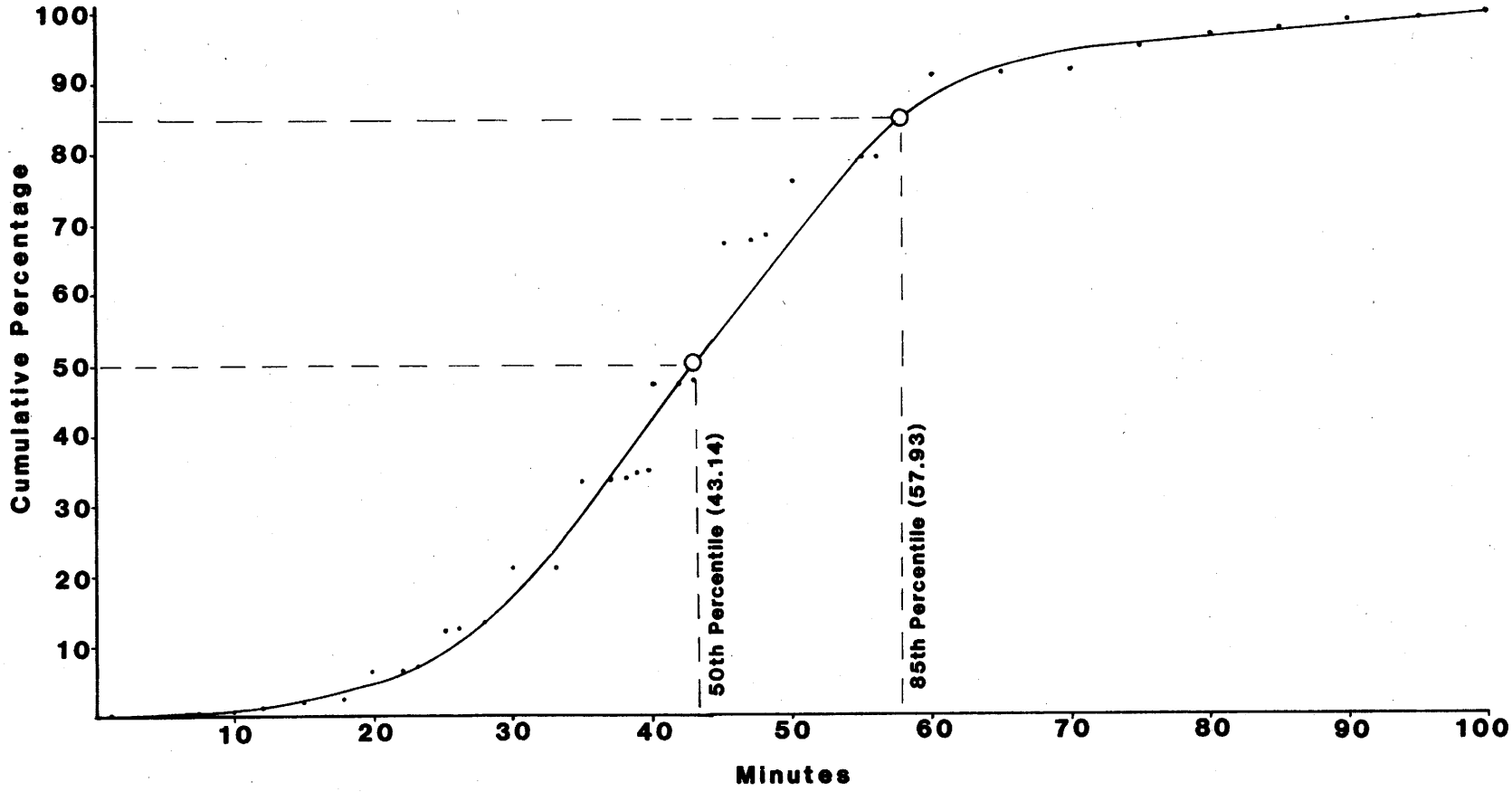


Figure 38: Cumulative Frequency Distribution, Lot-to-Destination Travel Time for Rural Lots (n=345)

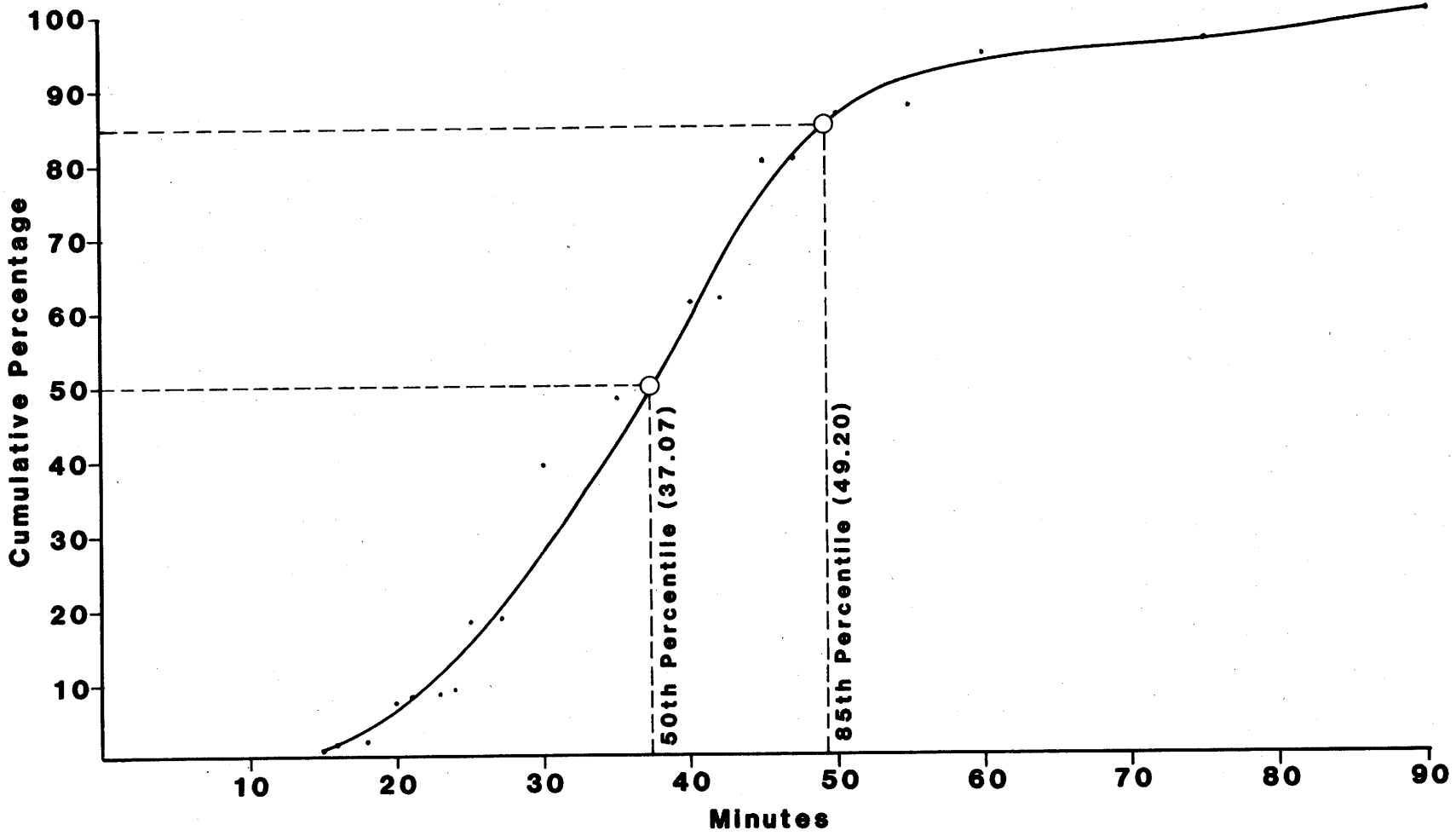


Figure 39: Cumulative Frequency Distribution, Lot-to-Destination Travel Time for Urban Fringe Lots (n=193)

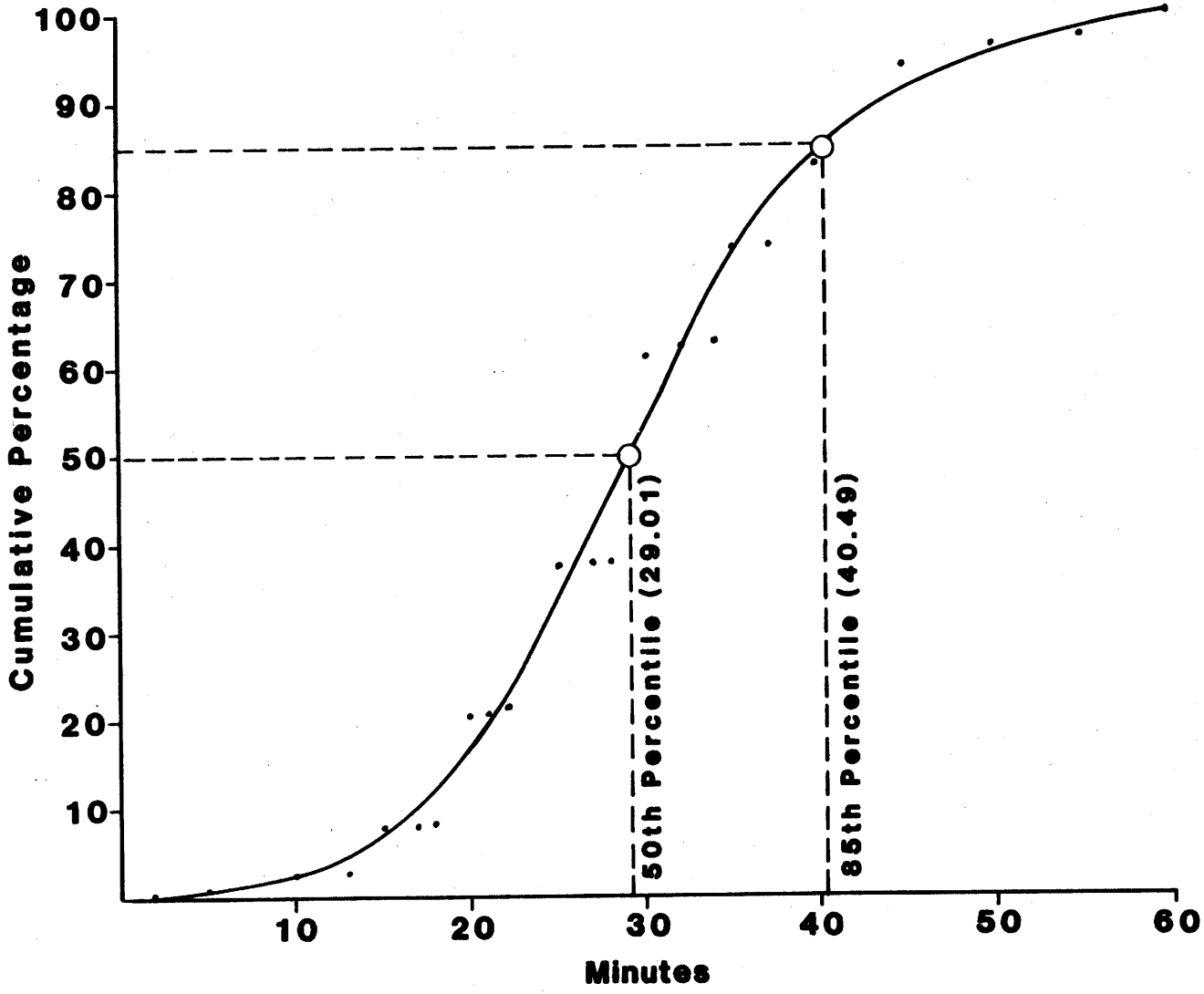


Figure 40: Cumulative Frequency Distribution, Lot-to-Destination Travel Time For Urban Lots (n=380)

a few of the travel distance and travel time characteristics observed for Park-and-Pool users.

Table 83. Lot-to-Destination Travel Distances Associated With Park-and-Pool Facilities, By Lot Location

Measure of Lot to Destination Distance:	Poolers from Rural Lots (n=443)	Poolers from Urban Fringe Lot (n=332)	Poolers from Urban Lots (n=407)	All Poolers (n=1182)
Average (mean) Miles	34.44	29.05	21.47	28.46
Modal (most frequent) Miles	30.00	25.00	20.00	25.00
Median (50th percentile) Miles	34.10	24.91	19.88	24.95
85th Percentile Miles	46.17	39.02	29.52	39.74

Table 84. Lot-to-Destination Travel Times Associated With Park-and-Pool Facilities, By Lot Location

Measure of Lot to Destination Time:	Poolers from Rural Lots (n=345)	Poolers from Urban Fringe Lots (n=193)	Poolers from Urban Lots (n=380)	All Poolers (n=918)
Average (mean) Minutes	44.14	39.72	31.07	37.80
Modal (most frequent) Minutes	45.00	30.00	30.00	30.00
Median (50th percentile) Minutes	43.14	37.07	29.01	34.71
85th Percentile Minutes	57.93	49.20	40.49	49.18

On the average, commuters using rural Park-and-Pool facilities travel approximately 34.4 miles from the lot to their final destination or some 60% farther than do commuters using urban lots. Comparing average travel distances and travel times provides an indication of the relative mobility, expressed in mile per hour (mph) associated with the three lot locations:

Rural Lots - 46.8 mph from lot to destination;
Urban Fringe Lots - 43.9 mph from lot to destination; and,
Urban Lots - 41.5 mph from lot to destination.

The above type of information can be used by the creative marketer is promoting the use of Park-and-Pool facilities to the commuting public. Societal benefits resulting from pooling activity can also be incorporating in the promotional efforts; benefits of Park-and-Pool lots are presented in a subsequent section of this report.

Money and Time Considerations

The Park-and-Pool participants were asked if they saved money and if they saved time by using the rideshare facility. Table 85 summarizes the responses received by pooling mode while Table 86 presents the responses by lot location for the money savings inquiry.

Table 85. Do Park-and-Poolers Save Money, By Pooling Mode

Response:	Buspoolers (n=101)	Carpoolers (n=734)	Vanpoolers (n=349)	All Poolers (n=1190)
Yes	71.3%	78.9%	73.1%	76.5%
No	4.0%	2.0%	2.3%	2.3%
Not Sure	12.9%	8.6%	11.7%	9.8%
No Difference	11.8%	10.5%	12.9%	11.4%

Table 86. Do Park-and-Poolers Save Money, By Lot Location

Responses:	Rural Lot Users (n=444)	Urban Fringe Lot Users (n=332)	Urban Lot Users (n=414)	All Users (n=1190)
Yes	68.5%	82.5%	80.2%	76.5%
No	3.6%	1.8%	1.2%	2.3%
Not Sure	11.2%	7.5%	10.1%	9.8%
No Difference	16.7%	8.2%	8.5%	11.4%

Over 80% of the poolers from urban and urban fringe lots thought that they saved money by using the facility. Sixty-eight percent of the rural users felt they saved money by using the lot. Figure 41 presents the cumulative frequency distribution of all poolers indicating a money savings. The 50th percentile of responding commuters indicating money saved was about $49 per month while the overall average savings amounted to $59.83 (n=881) per month.

Tables 87 and 88 present the responses to the time savings inquiry for pooling mode and lot location, respectively.

Table 87. Do Park-and-Poolers Save Time, By Pooling Mode

Response:	Buspoolers (n=101)	Carpoolers (n=709)	Vanpoolers (n=341)	All Poolers (n=1156)
Yes	34.7%	23.1%	32.6%	26.9%
No	34.7%	35.3%	23.5%	31.7%
Not Sure	11.8%	14.2%	18.2%	15.1%
No Difference	18.8%	27.4%	25.7%	26.3%

Table 88. Do Park-and-Poolers Save time, By Lot Location

Response:	Rural Lot Users (n=430)	Urban Fringe Lot Users (n=317)	Urban Lot Users (n=409)	All Users (n=1156)
Yes	27.9%	24.6%	27.6%	26.9%
No	24.0%	37.2%	35.5%	31.7%
Not Sure	17.0%	17.0%	11.7%	15.1%
No Difference	31.1%	21.2%	25.2%	26.3%

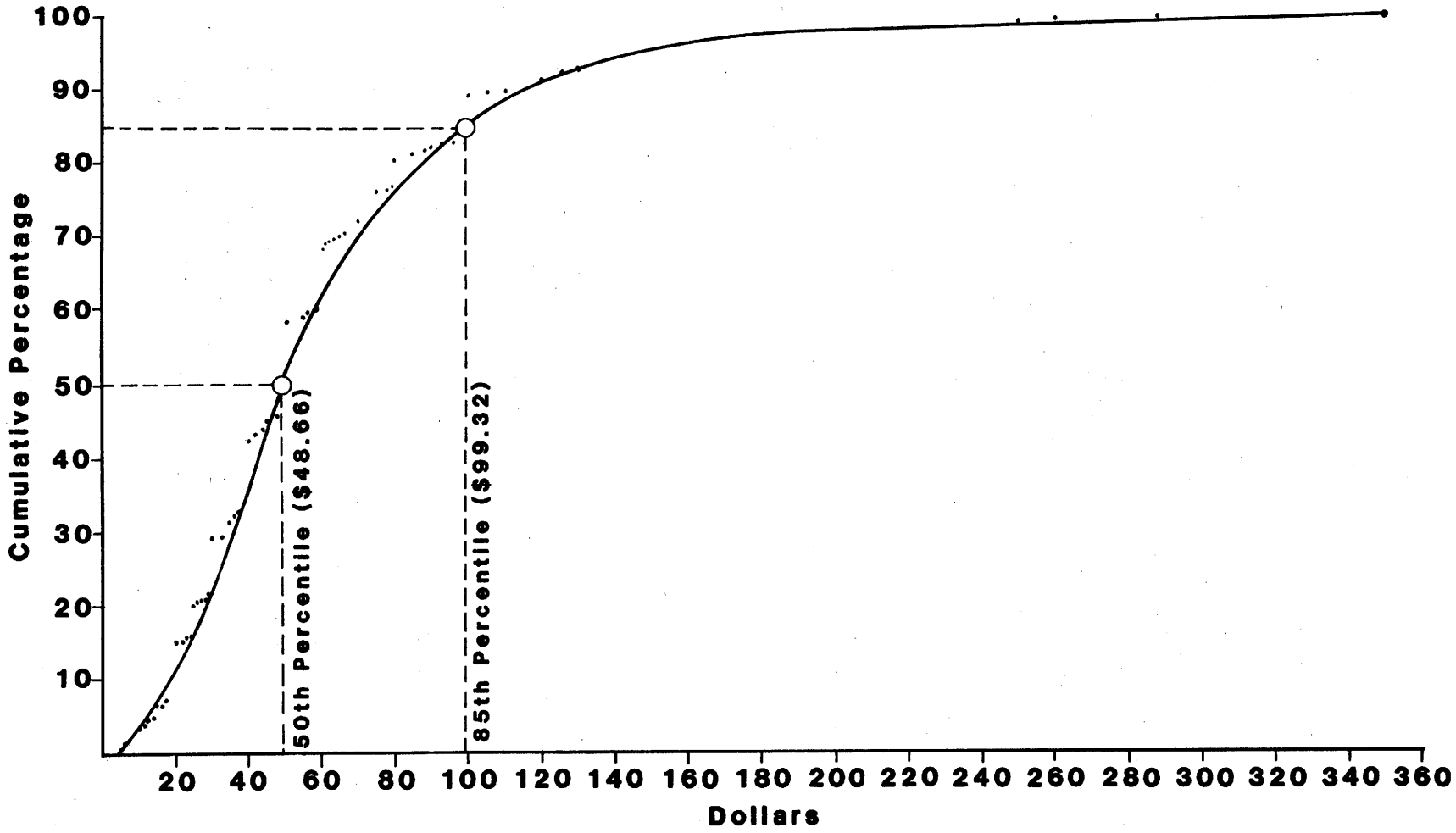


Figure 41: Cumulative Frequency Distribution, Summary of Money Savings per Month by Poolers (n=881)

Commuters are split on their option regarding a time savings by using the Park-and-Pool facility. Some 27% believe they do save time while 32% believe they do not save time.

Table 89 presents a summary of various commuter characteristics for the respondents that save money, lose money, save time and lose time. As shown, small differences exist between the four groups of Park-and-Poolers. Marketing efforts should concentrate on the potential of saving money by ride-sharing. It should be noted, however, that existing poolers are only estimating their daily savings at approximately $2.82 per day or about 5 cents per pooling mile.

Table 89. Summary Comparison of Commuter Characteristics for the Money/Time Savings Inquiries

Commuter Characteristics (means):	For Commuters Indicating That They:			
	Save Money	Lose Money	Save Time	Lose Time
Years of Education	14.2	13.5	14.1	14.4
Age (years)	37.8	39.5	38.1	38.1
Months Using the Lot	19.0	19.6	20.7	18.1
Months In Present Pool	25.2	26.8	27.7	23.9
Miles from Home to Lot	5.9	5.5	5.3	6.4
Miles from Lot to Destination	28.1	30.4	30.3	27.8
Dollars Saved/Lost per Month	59.8	20.2	59.7	57.2
Minutes Saved/Lost per Day	27.9	24.9	28.2	26.1
Number of Persons in Pool	6.08	7.89	7.72	5.55
Number of Commuters Arriving at Lot	1.11	1.21	1.17	1.10
Days per Week of Pooling	4.89	4.82	4.91	4.86

POOLING BENEFITS

Previous Benefit Calculations

The annual benefits to accrue as a result of Park-and-Pool activity are usually expressed as a reduction in cost to the traveling commuter and to the public in general. The following are some of the potential benefits of ridesharing (2).

1. The reduction in commuters' cost of owning and operating a vehicle (e.g., fuel, oil, tires, maintenance, insurance, depreciation, interest, taxes, fees, etc.)
2. The reduction in a commuter's cost of parking at the final destination.
3. Non-quantifiable commuter considerations (e.g., increased safety, reduced stress, companionship, etc.).
4. Reduced vehicle-miles of travel (VMT) on public roads.
5. Reduced energy consumption for transportation purposes.
6. Reduced parking demand at final destination.
7. Possible reduction in vehicular emmissions.
8. Possible reduction in traffic congestion with resulting improved mobility improvement.

Project 205-18 investigated benefits and costs of Park-and-Pool facilties along the I-30 freeway corridor in Dallas/Fort Worth. Only out-of-the-pocket vehicle operating cost considerations were used in calculating the potential net benefits resulting from the ridesharing facilities. The operating cost considerations used in Project 205-18 are summarized in Table 90 (2).

Table 90. Out-of-the-Pocket Vehicle Operating Considerations

Consideration:	Vehicle Type	
	Subcompact	Standard
Operating Cost	$ .093 per mile	$ .141 per mile
Fuel Consumption	.04 gal per VMT	.07 gal per VMT

Source: Reference No. (2)

Based upon the travel characteristics of the surveyed commuters at 8 urban Park-and-Pool locations along I-30, the annual VMT reduction per commuter ranged from 2,828 miles to 8,233 miles and averaged 6,117 fewer miles per pooling commuter. The fuel saving ranged from 176 gallons to 512 gallons per commuter per year with an overall average annual reduction of 380 gallons per commuter. These reductions in VMT and fuel consumption were calculated from the following base condition (2).

- Typical peak period vehicle occupancy of 1.38 person per vehicle;
- Average of 50 work weeks per year;
- Vehicle mix of 26% subcompact and 74% standard size automobiles.

Project 205-21 examined the travel characteristics of commuters using Park-and-Go and Park-and-Pool facilities within and surrounding the Fort Worth urbanized area. Attempts to estimate the net benefits accrued by the pooling participants took into account several additional factors associated with ridesharing: (4)

1. Type of pool (i.e., buspool, carpool, vanpool);
2. Travel frequency (days per week);
3. Home to lot vehicle occupancy;
4. Home to lot distance (miles);
5. Lot to destination vehicle occupancy;
6. Lot to destination distance (miles);

7. Vehicle mix (fuel efficient versus others); and

8. Basis for benefit calculations.

All of the above factors are fairly self-explanatory except the "Basis for Benefit Calculation." Two questions, relevant to the base condition of travel, were posed to the commuters: 1) the commuters' prior mode of travel; and, 2) the effect of the parking area on the commuter's present pooling activity. Another consideration in determining the benefits of ridesharing facilities is the average peak hour vehicle occupancies in the study area. By comparing the travel demand of pooling participants to the typical demand required with the vehicle occupancy of the typical peak period, one can arrive at a relative effectiveness of Park-and-Go and/or Park-and-Pool facilities. Table 91 shows the average vehicle occupancy rates (VOR's) for Dallas and Tarrant Counties plus the Fort Worth and Dallas central business districts (CBD's) (7).

Table 91. Average VOR's for Fort Worth/Dallas Area

Year:	Fort Worth CBD	Tarrant County	Dallas CBD	Dallas County
1981	1.26 ppv	1.24 ppv	1.38 ppv	1.25 ppv
1982	1.25 ppv	1.23 ppv	1.33 ppv	1.20 ppv

Source: Reference No. 7.

The 1982 areawide average vehicle occupancy rate (VOR) for the Dallas/Fort Worth area was 1.21 persons per vehicle (7). However, a base VOR for computing net benefits of 1.21 versus a base of 1.25 persons per vehicle (ppv) would have resulted in greater savings of fuel and vehicle miles of travel. To be conservative, calculations performed in project 205-21 used a typical peak period demand rate of 1.25 ppv. (4)

Project 205-21 investigated the benefits which are derived from both Park-and-Go facilities and Park-and-Pool facilities. Based upon a comparitive condition of 1.25 ppv within the study area, the average annual VMT reduction per Park-and-Go user ranged from 4,375 for bus patrons to 7,504 for vanpoolers, with an overall average reduction of 5,647 vehicle miles per commuter per year. The VMT reduction estimated for Park-and-Go facilities represented a net fuel savings of some 340 gallons per year per commuter. (4)

Based upon the survey data available in the Fort Worth/Dallas area, annual VMT reduction per commuter at Park-and-Pool lots ranged from 6,203 for a carpooler to 9,333 for a vanpooler with an overall average of 7,443 VMT per user. The mean reduction in fuel consumption was some 476 gallons per year per commuter. The annual VMT and fuel reduction estimates for Park-and-Pool users based upon the geographic location of the parking facility (i.e., urban, urban fringe, or rural setting) was also estimated in Project 205-21.

Table 92 summarizes the calculated annual VMT reduction and fuel reduction estimates per pooling commuter from each of the geographic settings. It was observed in the study that the most dramatic VMT and fuel savings potential existed in rural areas where the average benefits per commuter totaled almost 11,000 VMT per year or some 59% more than poolers originating in urban areas. (4)

Table 92. Annual VMT and Fuel Reduction Estimates per Park-and-Pool Commuter From Dallas/Fort Worth Studies

Geographic Setting of Lot	Average Annual VMT Reduction	Average Annual Fuel Reduction
Urban	6,877 per commuter	440 per commuter
Urban Fringe	7,531 per commuter	482 per commuter
Rural	10,944 per commuter	700 per commuter

Source: Reference No. (4)

Methodology and Assumptions

Benefit/Cost Analyses

Following the identification of potential sites and the estimation or determination of Park-and-Pool demand, the transportation engineer can analyze the cost-effectiveness of a proposed project. This analysis involves the development of cost estimates for constructing and operating a given facility and comparing those costs to the potential benefits anticipated to be derived over time. The benefit/cost analysis is one of the more common techniques used in investigating alternative projects. The benefit/cost (B/C) ratio expresses the net benefits to the net costs computed on an annualized basis and provides an indication of which alternative has the biggest bang for the buck.

The B/C ratio can be expressed mathematically by the following equation:

$$B/C = \frac{B - M}{C(R) - S(F)}$$

where:

B = Annual net benefits accruable

M = Annual maintenance and operating cost

C = Capital cost or initial investment

R = Capital recovery factor for a given interest rate and time period

S = Salvage value at end of time period

F = Sinking fund factor for a given interest rate and time period

The numerator of the equation represents the repetitive annual cash flows while the denominator represents the capital cost or investment necessary to construct the facility.

The annual benefits to accrue as a result of a Park-and-Pool project are usually expressed as a reduction in costs to the traveling commuter and to the public in general. Following the estimate of net vehicle miles of travel (VMT) saved as a result of ridesharing activity, one can readily compute the dollar value of benefits based upon vehicle operating cost and/or fuel savings based upon vehicle economy standards. Other benefits should also be included in site specific B/C analyses during the actual planning and design phase of a project. For example, the reduction in destination parking demand could be a very significant benefit that could easily be included in the calculation of the B/C ratio. Some 42% of the Park-and-Pool survey participants in Project 205-18 indicated the Dallas central business district as their primary destination. A parking deficiency of some 12,000 to 18,000 spaces was estimated for the Dallas CBD by 1985 which amounted to an estimated capital cost of some $60 to $90 million. (2) If mode-change facilities were located to intercept CBD bound vehicles, the resulting decrease in parking space requirements, and related cost of constructing those spaces, could and should be included in the determination of Park-and-Pool benefits.

The costs to be considered in computing the B/C ratio include both capital investment costs and annual maintenance and operating costs. The estimated annual cost of maintaining and operating a Park-and-Pool facility (represented by "M" in the B/C equation) reduces the net annual benefits derived from a given project. The capital investment costs appear in the denominator of the B/C equation and take into account the initial cost of construction, the project life, any salvage value at the end of a project's useful life, and the time value of money or interest rate. When analyzing a corridor parking facility, a relative short time period (i.e., 5 to 10 years) is normally used in developing the B/C ratio. Forecasting Park-and-Pool

utilization beyond this period of time can be risky and can significantly affect the results and validity of the B/C analysis. (2) For illustrating the feasibility of Park-and-Pool in the Dallas area, the following cost estimates were used in project 205-18 (2).

1.	Capital Cost	$1000 Per Space
2.	Project Life	5 years
3.	Salvage Value	$0
4.	Interest Rate	15%
5.	Annual Operating/ Maintenance Cost	$40 per space

The estimated capital cost of $1000 per parking space was intended to include roadway lighting, signing, marking and other incidentals necessary to place the facility into full operation. In addition, the $1000 per space figure was intended to provide a facility which could accommodate transit service and the heavier loading imposed by the bus vehicles at some time in the future when the Park-and-Pool operation transitions to Park-and-Ride. Other assumptions made in calculating the B/C ratios were: (2)

1. Each of the geographic sites represented a viable Park-and-Pool project.
2. Sufficient public right-of-way existed within the geographic area to construct the desired Park-and-Pool facility.
3. The survey data obtained from the Park-and-Pool participants was representative of both existing and potential users.
4. Initial construction would accommodate existing demand plus a 50% increase.
5. Utilization of the facilities would average 80% over the useful project life.
6. Calculation of annual VMT reduction was based upon an average vehicle occupancy of 1.38 persons per vehicle and 50 weeks per year.
7. Subcompact vehicles amounted to 26% of all privately owned vehicles and related VMT contributions.

The computed B/C ratios for the 9 sites analyzed in the Dallas Park-and-Pool study ranged from 1.45 to 4.53. The computed B/C ratios were believed to be very conservative estimates of the actual effectiveness of Park-and-Pool facilities. Had the construction cost of the parking areas been estimated at $500 per space (instead of $1000 per space), the B/C ratios would have doubled, and would have ranged from 2.42 to 9.06. Likewise, if the useful life of the facility had been 10 years (instead of 5 years) for the $1000 per space investment, the B/C ratios would have increased by 50% and would have ranged from 1.82 to 6.78. (2)

Assumptions

The primary assumption made in calculating the pooling benefits derived from Park-and-Pool facilities is that the survey data supplied by the study participants is representative of present and future ridesharing commuters. As outlined in the section entitled "Marketing Considerations", a total data base of 1,344 commuter surveys was available from 128 mode change study sites throughout the State of Texas. Appendix C contains a listing of study sites included in the assessment of benefits and the computation of B/C ratios for the various Park-and-Pool lots. Other assumptions and considerations used in determining pooling benefits are outlined herein.

Benefit Assumptions

Numerious benefits can and should be considered in the analysis of a particular Park-and-Pool facility. However, several types of benefits (i.e., decreased parking demand at destination) which may be included in computing a B/C ratio are highly dependent upon the specific location of a site and the users' travel characteristics from that site. For the purposes of assessing Park-and-Pool benefits of the mode-change facilities studied in Texas, only

the reduction in vehicle miles of travel (VMT) and related fuel savings will be considered. The following list of assumptions was used in estimating the VMT reductions associated with the Park-and-Pool lots:

1. Travel demand in person miles of travel (PMT) for each site is based upon mean travel distances, frequency of travel and number of users.

   a) Number of users for a given site is the product of the number of parked vehicles (NO) and the home-to-lot vehicle occupancy (VOR_1), or:

      $USERS = NO \times VOR_1$,

   b) Frequency of travel is the product of weekly trips (days/week), twice a day, for 50 weeks during the typical year, or:

      $FREQUENCY = (Days/Week) \times 2 \times 50$

   c) Travel distances are the mean home-to-lot ($DIST_1$) and lot-to-destination ($DIST_2$) mileage calculated from the commuter survey data.

   d) Annual travel demand considers all of the above elements plus the mean lot-to-destination pool occupancy (VOR_2) and is represented by the following mathematical relationships for home-to-lot (PMT_1) and lot-to-destination (PMT_2) demand:

      $PMT_1 = USERS \times FREQUENCY \times DIST_1$
      $PMT_2 = USERS \times FREQUENCY \times DIST_2$

      $Total\ PMT = PMT_1 + PMT_2$

2. Current travel demand <u>with pooling</u> in vehicle miles of travel (VMT_p) is a function of the home-to-lot occupancy rate (VOR_1) and distance ($DIST_1$); number of users, parked vehicles and pools; and the lot-to-destination pool occupancy rate (VOR_2) and distance ($DIST_2$).

   a) Annual vehicle miles of travel for the home-to-lot journey is:

      $VMT_{p1} = (USERS/VOR_1) \times FREQUENCY \times DIST_1$

   b) Annual vehicle miles of travel for the lot-to-destination journey is:

      $VMT_{p2} = (USERS/VOR_2) \times FREQUENCY \times DIST_2$

   c) Annual vehicle miles of travel with pooling for the Park-and-Pool Site is:

      $VMT_p = VMT_{p1} + VMT_{p2}$

3. Travel demand without pooling in annual vehicle miles of travel (VMT_b) can be calculated by assuming a "base" vehicle occupancy rate (VOR_b) in conjunction with the mean travel characteristics observed at the Park-and-Pool sites and the calculated total person miles of travel (PMT).

    a) Two base vehicle occupancy rates (VOR_b) were considered in the benefit calculations:

    VOR_b = 1.10 persons per vehicle; and,
    VOR_b = 1.35 persons per vehicle.

    b) Required VMT without pooling for the home-to-lot journey is:

    $$VMT_{b1} = (PMT_1/VOR_b)$$

    c) Required VMT without pooling for the lot-to-destination journey is:

    $$VMT_{b2} = (PMT_2/VOR_b)$$

    d) Total VMT required without pooling is:

    $$VMT_b = VMT_{b1} + VMT_{b2}$$

4. Net annual reduction in vehicle miles of travel (VMT_r) is the difference between the vehicle miles required without pooling (VMT_b) and those required with pooling (VMT_p).

    a) Annual reduction for home-to-lot journey is:

    $$VMT_{R1} = VMT_{b1} - VMT_{p1}$$

    b) Annual reduction for lot-to-destination journey is:

    $$VMT_{R2} = VMT_{b2} - VMT_{p2}$$

    c) Total annual reduction resulting from pooling activity is:

    $$VMT_R = VMT_{R1} + VMT_{R2}$$

5. Annual operating cost savings and fuel reduction benefits of Park-and-Pool lots is a function of vehicle mix (percent subcompacts), average operating cost per vehicle mile, and fuel economy in miles per gallon.

    a) Vehicle mix varies by lot location but averaged, for the entire data base, about 23.5% subcompact vehicles.

    b) A low and high estimate of vehicle operating cost was used in estimating a dollar benefit associated with reduced VMT:

Low Estimate (2)
9.3 cents per mile for subcompacts
14.1 cents per mile for standards

High Estimate - (8)
34.2 cents per mile for subcompacts
50.7 cents per mile for standards

c) Fuel economy estimates of 25 miles per gallon for subcompacts and 14.3 miles per gallon for non-subcompacts were used in estimating net fuel savings.

Maintenance Assumptions

The annual maintenance and operating cost considerations appear as "M" in the B/C equation presented in the discussion of the Benefit/Cost Analyses. These annual costs are subtracted from the annual benefits and may be considered as disbenefits associated with a given Park-and-Pool site.

Two estimates of maintenance cost were used in assessing the net benefits associated with the study sites:

$40 per parking space per year; and,

$25 per parking space per year.

The actual cost of maintaining and operating a particular facility is dependent upon policies and programs of the responsible public agency. In the case of Park-and-Go lots in Fort Worth where the parking area is on private property, the annual maintenance cost approaches zero expenditure. (4)

Capital Cost Assumptions

The capital cost of constructing a given Park-and-Pool site is highly dependent upon characteristics specific to a given location and vary considerably from one site to another. To provide a general comparative analysis of the different Park-and-Pool facilities, two cost estimates were used for initial construction:

$1000 per parking space; and,

$750 per parking space.

Similar to the maintenance/operating cost considerations, the capital cost of placing a given facility into public service could be close to nothing. Such a situation exists with the designation of Park-and-Go lots on church parking areas where the capital cost required is merely a street sign designating the mode-change facility. (3) (4)

Capital Recovery Assumptions

To annualize the capital cost invested in the construction of a Park-and-Pool facility, one must consider the following:

1. Life expectance of the facility; and,
2. Time value of money, interest rate, or opportunity costs.

For the purpose of this investigation, a useful life of 5 years was assumed for each of the lots. The opportunity costs or time value of the required investment was placed at 15% per year. The capital recovery factor, represented by "R" in the B/C equation, is .29832 based upon these assumptions.

Salvage Value Assumptions

For simplicity, the salvage value of the improvements to the Park-and-Pool lots was assumed to be zero at the end of the facilities useful life. This is considered to be a very conservative estimate; particularly given the short life expectance (5 years) and the relatively high capital investment ($750 to $1000 per space) used in the analyses.

Other Assumptions

As previously mentioned, the prime assumption used in calculating pooling benefits is that the survey data is representative of current and

future Park-and-Poolers. The key values necessary for analyzing individual lots are:

1. Number of users (parked vehicles times the mean arrival occupancies); and,
2. Average (mean) travel distances between home and lot, and between lot and destination.

In all, 128 mode-change facilities were investigated in this and other Park-and-Pool studies (1) (2) (3) (4). Five of the lots included for study did not have sufficient survey data for analysis of benefits. The remaining 123 parking areas had varying degrees of complete survey information necessary for calculating B/C ratios. Missing values of key data elements for survey respondents were set equal to the calculated mean value for that element as determined from the entire data base.

The number of lot users over the expected life of the facility was assumed to be 80% of the lot capacity. The design capacity of the lot was assumed to be 150% of the existing number of parked commuter vehicles. Therefore, the following relationships were used in calculating the estimated Park-and-Pool benefits:

Existing Users = (Number of Parked Vehicles) X (Mean Arrival Occupancies)
Design Size = (Number of Parked Vehicles) X 1.50
Expected Users = (Design Size) X (Mean Arrival Occupancies) X .80

With the exception of mean travel distances and lot utilization of the specific Park-and-Pool sites, three approaches were used in the computation of benefits based upon average travel characteristics. The following travel variables were included in the benefit calculations:

- Percent Subcompact Vehicles (% Sub)
- Number of Parked Vehicles at Lot (NO)
- Vehicle Occupancy Rate from Home-to-Lot (VOR_1)
- Distance from Home-to-Lot ($DIST_1$)

- Vehicle Occupancy Rate from Lot-to-Destination (VOR_2)
- Distance from Lot-to-Destination ($DIST_2$)
- Frequency of Travel in Days per Week (Days/Week)

The number of vehicles parked at a given site (NO), the mean travel distance from home-to-lot ($DIST_1$), and the mean travel distance from lot-to-destination ($DIST_2$) were derived from the user surveys supplied from each of the Park-and-Pool facilities. The other four variables (% SUB, VOR_1, VOR_2, Days/Week) were averaged and used in the calculation of benefits by one of the following three groupings:

1. Means by SDHPT District;
2. Means by Lot Setting or Location; or,
3. Means for Entire Data Base.

Tables 93, 94 and 95 summarize the calulated mean values for each of the four variables by District, Lot Location and All Data, respectively. In addition, the tables present the computed means for each data grouping of the following variables:

- Computed Base VOR; and,
- Lots' Effect on Current Pooling Habits.

The "Computed Base VOR" considers the prior mode of travel indicated by the Park-and-Pool participant. If the commuter drove alone, his/her Base VOR was set equal to 1.00. Similarly, if the commuter carpooled or vanpooled in their previous travel method to their destination, the Base VOR was set equal to the mean carpool or vanpool occupancy rate. As shown for all data (Table 95), the Computed Base VOR was 3.93 persons per vehicle.

The "Lot's Effect" on Current Pooling Habits (Lot's Effect) shown in the tables takes into account the survey participant's response to the question: "How did the availability of this parking area effect the formation of your

Table 93. Computed Mean Values By SDHPT District

SDHPT District:		Mean Value of Variable:					
Number	Office	VOR_1	VOR_2	Days/Week	% Sub	Computed Base VOR	Lot's Effect
2	Fort Worth (n=463)	1.16	7.70	4.94	25.3%	3.15	0.39
9	Waco (n=3)	1.67	14.67	4.67	12.0%	3.43	0.33
10	Tyler (n=21)	1.06	3.19	4.90	15.4%	1.60	0.40
12	Houston (n=312)	1.05	8.04	4.89	23.1%	5.15	0.42
13	Yoakum (n=55)	1.19	5.67	4.71	19.1%	2.40	0.34
15	San Antonio (n=154)	1.08	4.33	4.82	24.6%	6.31	0.29
17	Bryan (n=7)	1.06	3.68	4.98	15.5%	3.15	0.34
18	Dallas (n=163)	1.19	5.58	4.94	25.4%	2.93	0.31
20	Beaumont (n=53)	1.32	3.86	4.98	12.0%	2.27	0.37

Table 94. Computed Mean Values By Lot Location

Lot Location:	Mean Value of Variable:					
	VOR_1	VOR_2	Days/Week	% Sub	Computed Base VOR	Lot's Effect
Rural Setting (n=459)	1.15	6.31	4.90	20.2%	4.10	0.32
Urban Fringe Setting (n=344)	1.06	6.43	4.89	22.1%	4.25	0.40
Urban Setting (n=428)	1.18	7.47	4.92	28.2%	3.48	0.40

Table 95. Computed Mean Values For All Data

Variable:	Mean Value:
VOR_1 (n=1152)	1.13 persons per vehicle
VOR_2 (n=1197)	6.74 persons per vehicle
Days/Week (n=1214)	4.90 days per week
% Sub (n=964)	23.5%
Computed Base VOR (n-1183)	3.93 persons per vehicle
Lot's Effect (n=1190)	0.37

carpool/vanpool or using the bus?" If the commuter said the lot had no effect, then a value of 0.00 was assigned to the variable of "Lot's Effect". If the lot was indicated as being a factor in commuter's pooling habits, a value of 0.50 was assigned the variable. However, if the survey participant would not be pooling if the lot where unavailable, the variable was assigned a 1.00 value. As shown in the table for all data (#95), the computed value for the Lot's Effect variable was 0.37; simply stated, 37% of the benefits determined for Park-and-Pool facilities can be directly attributed to the availability of the parking area.

The mean values for "Computed Base VOR" and "Lot's Effect" are presented for informational purposes. These variables should be taken into consideration in evaluating specific Park-and-Pool benefits derived from particular facilities. However, to be consistant with previous studies (2) (4), these additional variables will only be discussed in brief terms in the analyses of pooling benefits presented in this report.

Estimated Benefits

This section of the report examines and presents the estimated benefits resulting from Park-and-Pool activity throughout Texas based upon the aforementioned assumptions. The data used in performing these analyses was derived from the commuter surveys returned from Park-and-Pool lots outlined in Appendix C.

Case Scenarios

In all, 48 different analyses were performed on the 123 Park-and-Pool facilities. These analyses considered different base vehicle occupancies, total home-to-destination travel versus only lot-to-destination travel, varying construction and maintenance costs, and both a low and high estimate of vehicle operating costs. Twelve sets of VMT reductions and fuel savings estimates were developed for each of the study sites: 6 sets for the home-to-destination travel and 6 sets for only the lot-to-destination travel. These 6 sets or methods of estimated VMT and fuel benefits are:

1. Using District Means for Lot and a Base VOR of 1.35
2. Using Lot Setting Means and a Base VOR of 1.35
3. Using Means of All Data and a Base VOR of 1.35
4. Using District Means for Lot and a Base VOR of 1.10
5. Using Lot Setting Means and a Base VOR of 1.10
6. Using Means of All Data and a Base VOR of 1.10

Eight different scenarios for computing B/C ratios where used in conjunction with the above 6 methods of calculating VMT and fuel savings. The 8 scenarios considered in this investigation of pooling benefits are:

Scenario A - Home to Lot to Destination travel;
$1000 per space capital cost;
$40 per space per year maintenance cost;
9.3 cents per mile for subcompacts; and,
14.1 cents per mile for non-subcompacts.

Scenario B - Only Lot to Destination Travel with cost estimates shown for Scenario A.

Secnario C - Home to Lot to Destination Travel;
$1000 per space capital cost;
$40 per space per year maintenance cost;
34.2 cents per mile for subcompacts; and,
50.7 cents per mile for non-subcompacts.

Scenario D - Only Lot to Destination Travel with cost estimates shown for Scenario C.

Scenario E - Home to Lot to Destination Travel;
$750 per space capital cost;
$25 per space per year maintenance cost;
9.3 cents per mile for subcompacts; and,
14.1 cents per mile for non-subcompacts.

Scenario F - Only Lot to Destination Travel with cost estimates shown for Scenario E.

Scenario G - Home to Lot to Destination Travel;
$750 per space capital cost;
$25 per space per year maintenance cost;
34.2 cents per mile for subcompacts; and,
50.7 cents per mile for non-subcompacts.

Scenario H - Only Lot to Destination Travel with cost estimates shown for Scenario G.

Therefore, by using the above descriptions of benefit calculation methods (means and Base VOR's) and one of the given scenario, the notation of A-1 would correspond to Scenario A using the SDHPT District means with a Base VOR of 1.35 persons per vehicle. Similarly, the notation B-5 would designate the Scenario B with benefit calculations using means by lot location or setting with a Base VOR of 1.10 person per vehicle.

VMT and Fuel Savings

This section of the report presents the estimated Park-and-Pool benefits calculated by the 6 methods described in the preceding section entitled "Case

Scenarios." Annual VMT reductions per pooling commuter at the 123 facilities along with annual fuel saving per commuter are summarized herein. Methods 1 through 6 present the estimated benefits for the entire trip (home-to-destination) whereas Methods 1A through 6A consider only the pooling portion of the trip (lot-to-destination only).

Method 1

The SDHPT District means for the Park-and-Pool lots with an assumed base VOR of 1.35 persons per vehicle were used in estimating annual VMT reductions and fuel savings. The annual VMT reduction per commuter at the 123 Park-and-Pool sites ranged from 2,077 miles to 23,670 miles and averaged 8,055 vehicle miles per year. Fuel savings varied from 130 gallons per year to 1,571 gallons per year per commuter and average 511 gallons. Table 96 provides a summary of estimated VMT reduction per Park-and-Pool user for the 123 lot locations. Figure 42 presents the cumulative frequency distribution of annual VMT savings for the study sites. Table 97 and Figure 43 present the annual fuel savings per pooler as estimated for the 123 change-of-mode parking facilities.

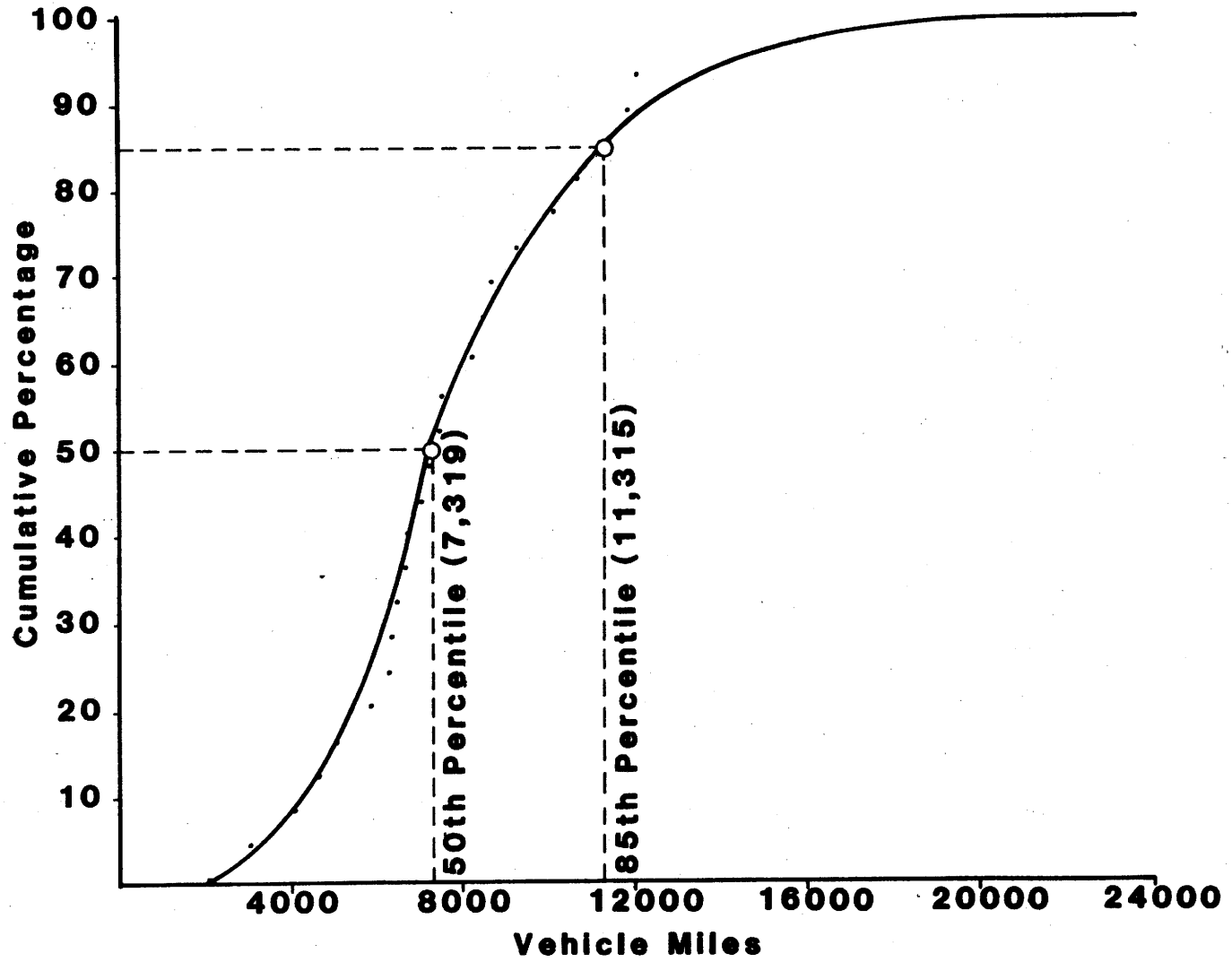


Figure 42: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #1 (n=123)

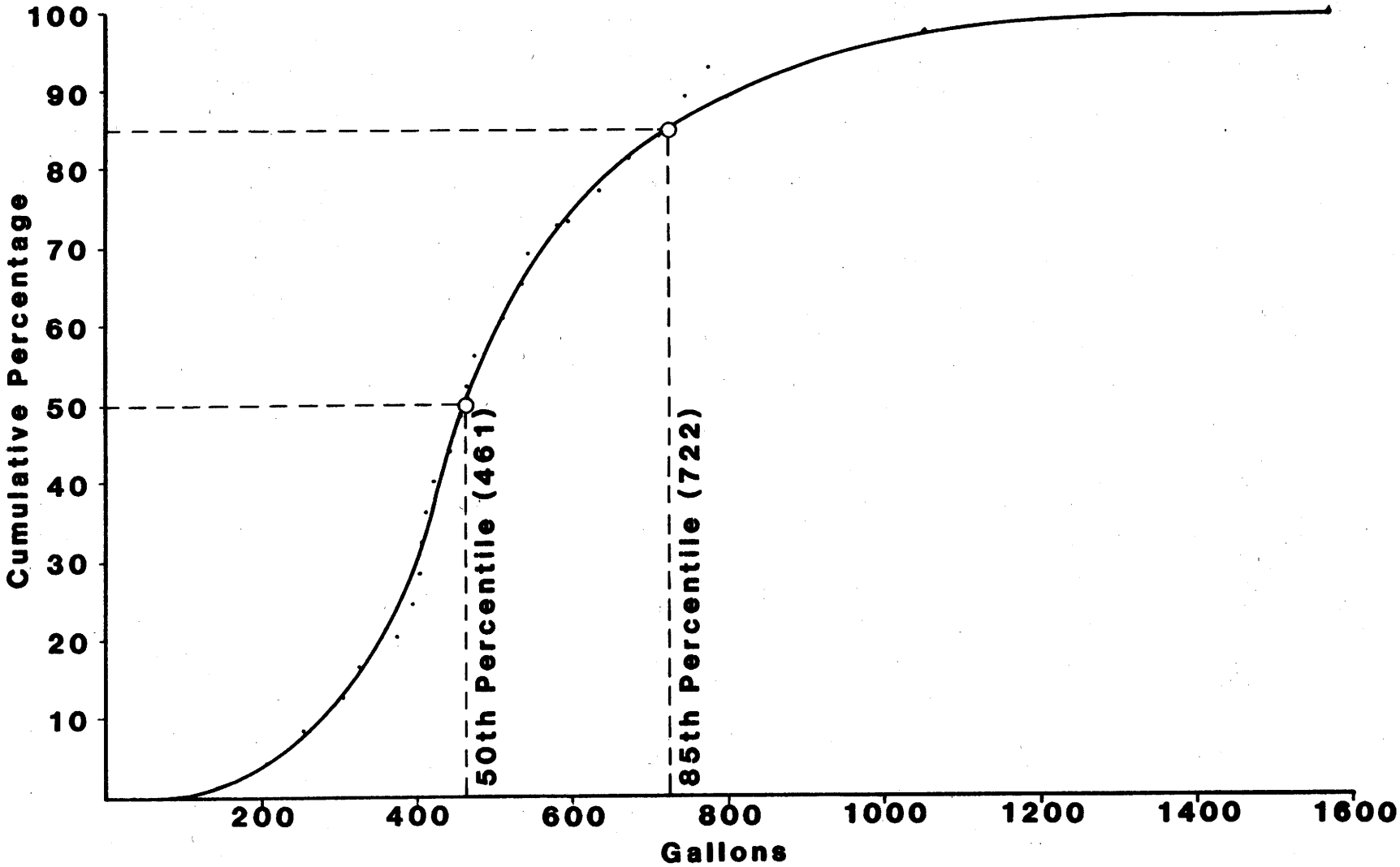


Figure 43: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #1 (n=123)

Table 96. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #1

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,055
15th Percentile	4,969
Median (50th percentile)	7,319
75th Percentile	9,627
85th Percentile	11,315

Note: Uses SDHPT District Means, a 1.35 base VOR, and total Home-to-Destination Travel.

Table 97. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #1

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	511
15th Percentile	324
Median (50th percentile)	461
75th Percentile	626
85th Percentile	722

Note: Uses SDHPT District Means, a 1.35 base VOR, and total Home-to-Destination Travel.

Method 2

Reduced VMT and fuel consumption estimates were calculated by using travel means of the lot location and a base VOR of 1.35 persons per vehicle. Average VMT savings per user was 8,322 miles while the average fuel savings was 528 gallons per year per commuter. Table 98 and Figure 44 show the VMT benefits per Park-and-Pool user which ranged from 2,071 to 24,882 vehicle

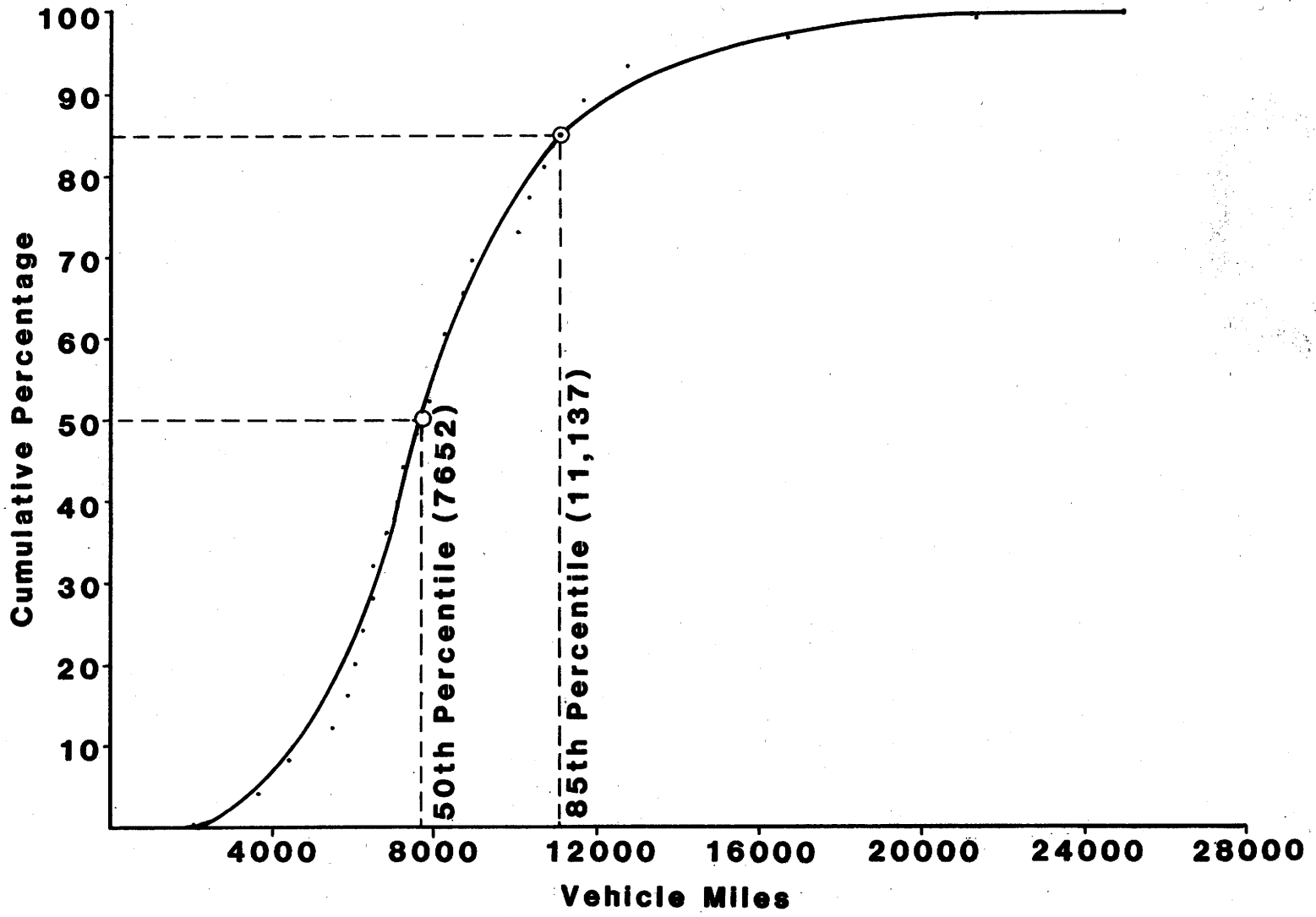


Figure 44: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #2 (n=123)

miles per year. Table 99 and Figure 45 present to calculated fuel savings estimates which ranged from 127 to 1,591 gallons per commuter per year.

Table 98. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #2

Measure of Benefit:	Annual Reduction of Vehicle Miles of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,322
15th Percentile	5,744
Median (50th percentile)	7,652
75th Percentile	10,110
85th Percentile	11,137

Note: Uses Lot Location Means, a 1.35 base VOR, and Total Home-to-Destination Travel.

Table 99. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #2

Measure of Benefit:	Annual Reduction of Fuel Consumption (Gallons) Per Park-and-Pool User
Average (mean)	528
15th Percentile	359
Median (50th percentile)	481
75th Percentile	645
85th Percentile	712

Note: Uses Lot Location Means, a 1.35 base VOR, and Total Home-to-Destination Travel.

Method 3

This method of benefit calculation used the mean travel values for the entire data base in conjunction with a base VOR of 1.35 persons per vehicle. The annual estimate of VMT reduction per user ranged from 1,962 to 25,324 miles and averaged 8,412 vehicle miles, as summarized in Table 100 and Figure 46, for the 123 study sites. Annual fuel savings varied from 123 gallons to

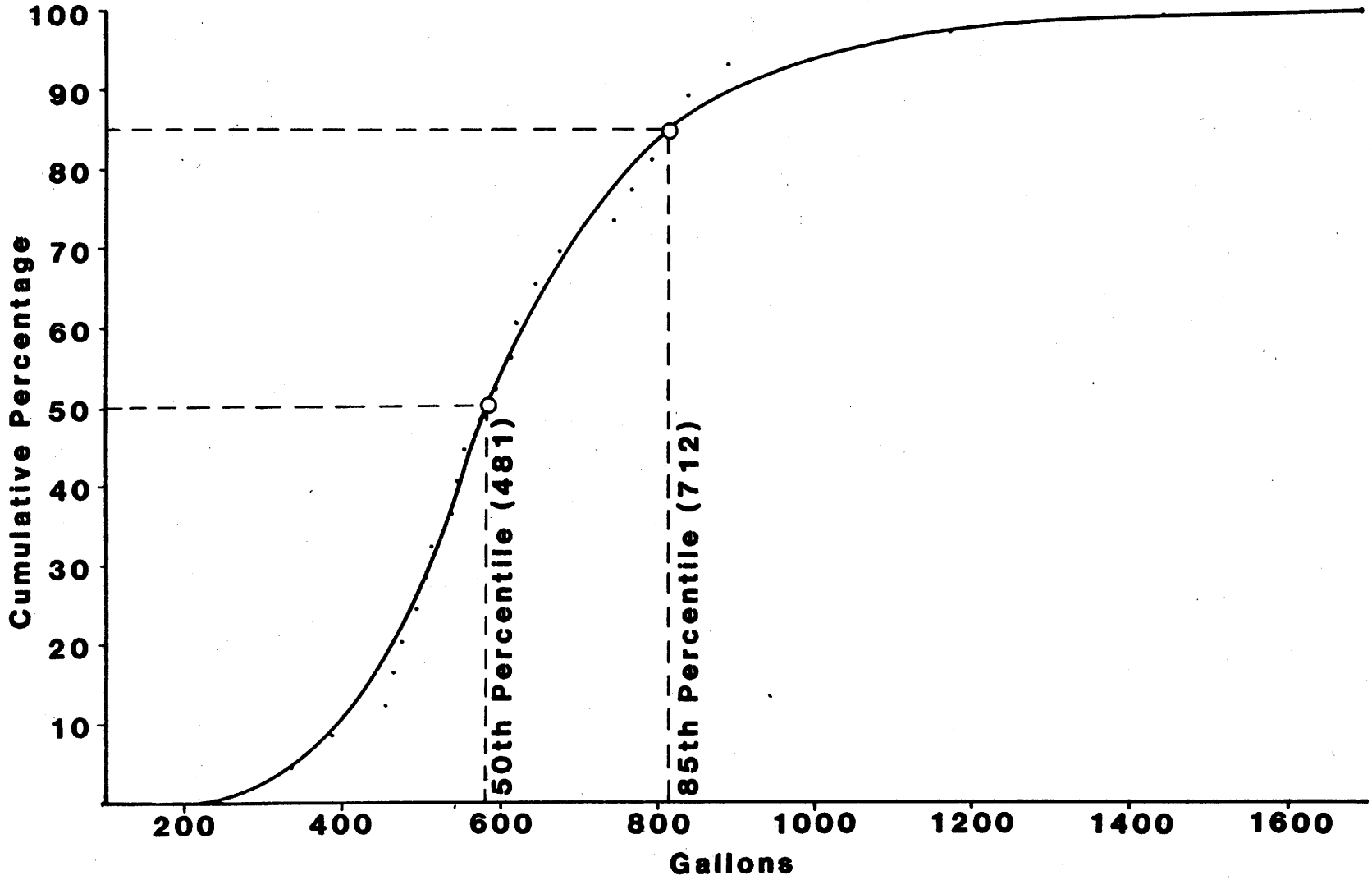


Figure 45: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #2 (n=123)

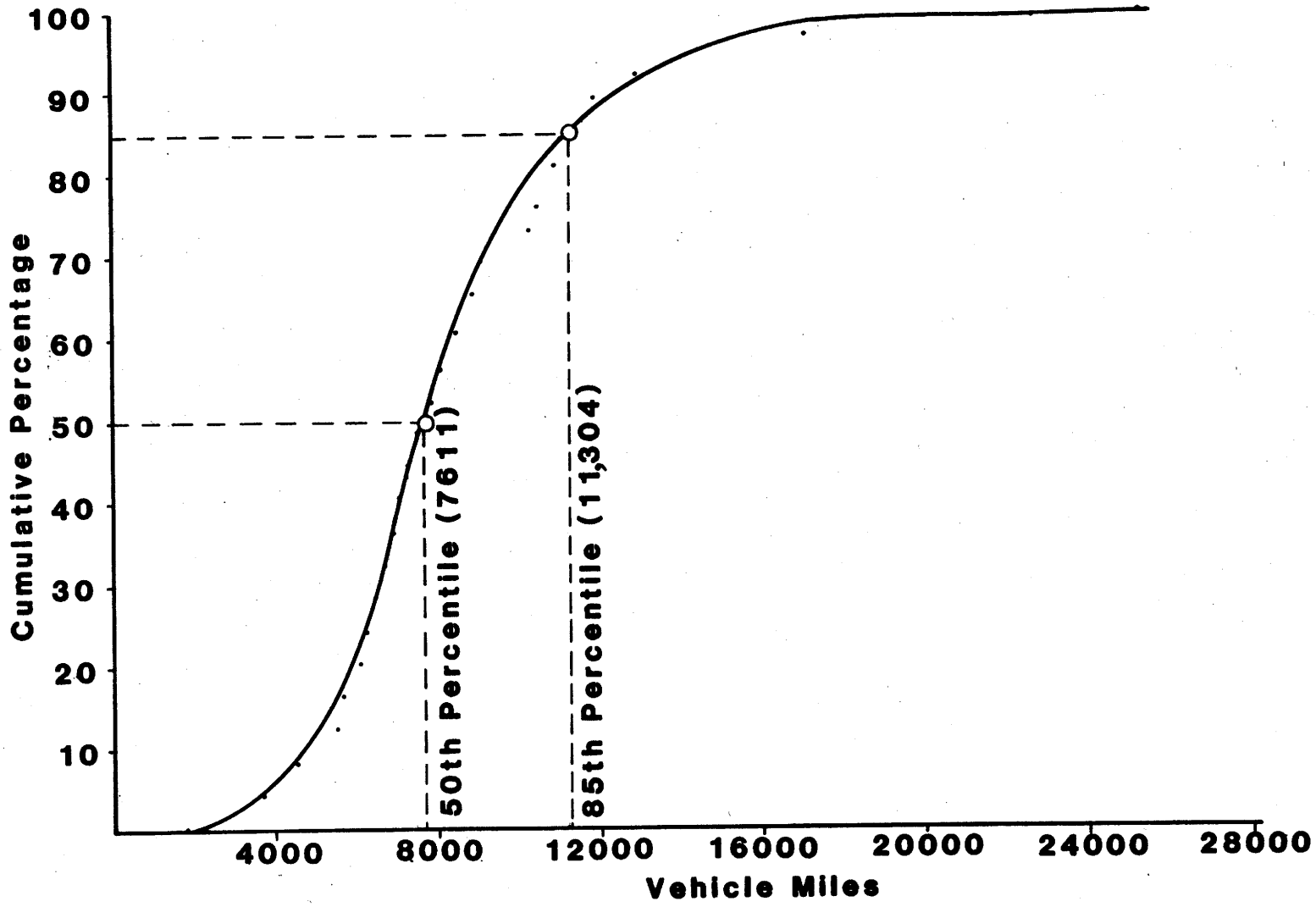


Figure 46: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #3 (n=123)

1,594 gallons per commuter and averaged 529 gallons as shown in Table 101 and Figure 47.

Table 100. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #3

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,412
15th Percentile	5,646
Median (50th percentile)	7,611
75th Percentile	10,477
85th Percentile	11,304

Note: Uses Means from Entire Data Base, a Base VOR of 1.35, and Total Home-to-Destination Travel.

Table 101. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #3

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	529
15th Percentile	355
Median (50th Percentile)	479
75th Percentile	659
85th Percentile	711

Note: Uses Means from Entire Data Base, a Base VOR of 1.35, and Total Home-to-Destination Travel.

Method 4

Pooling benefits were calculated using SDHPT District travel means for the mode-change facility and an assumed base VOR of 1.10 persons per vehicle. Table 102 and Figure 48 show the estimated VMT savings per commuter while Table 103 and Figure 49 summarize the annual fuel savings estimates for the Park-and-Pool users.

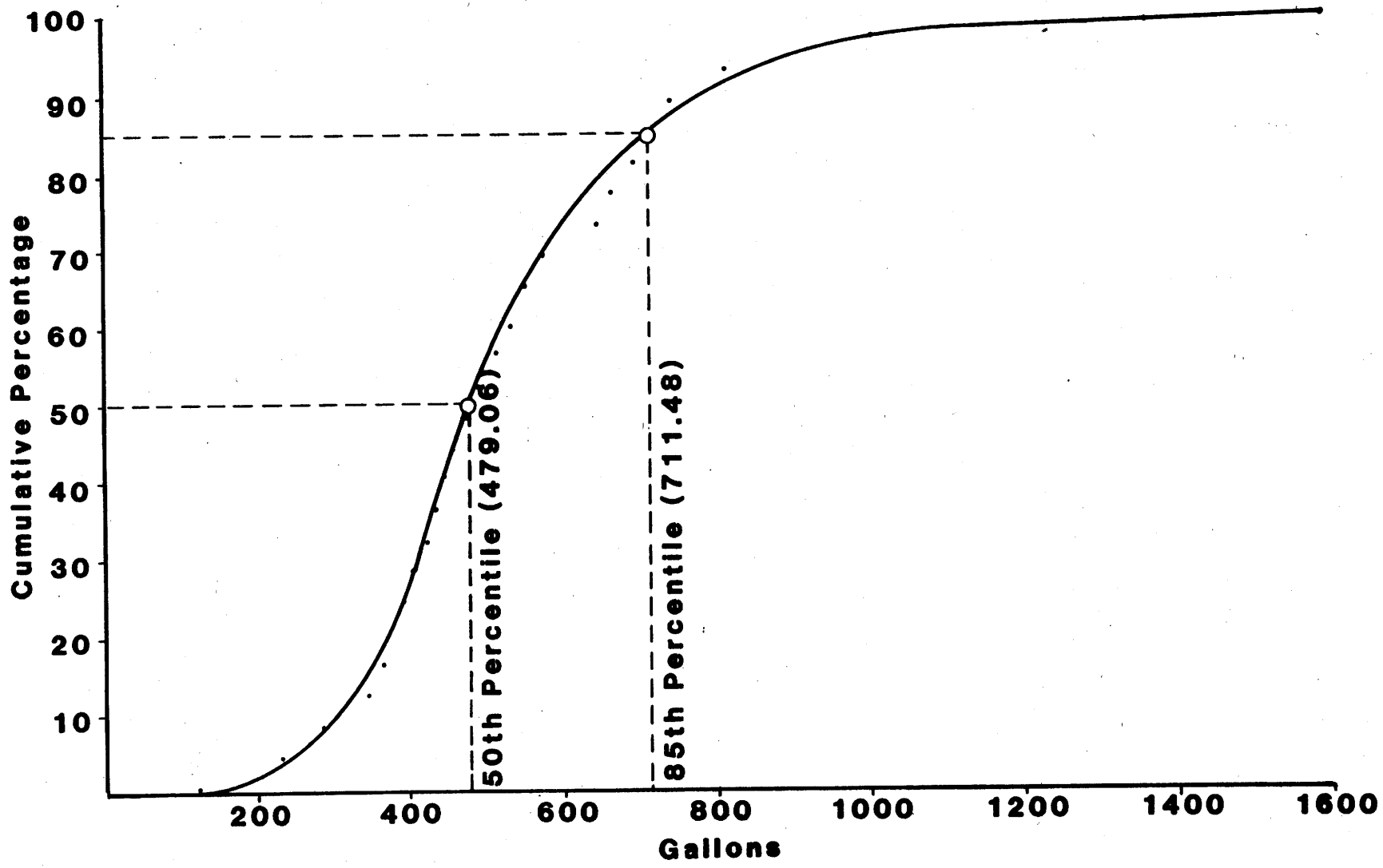


Figure 47: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #3 (n=123)

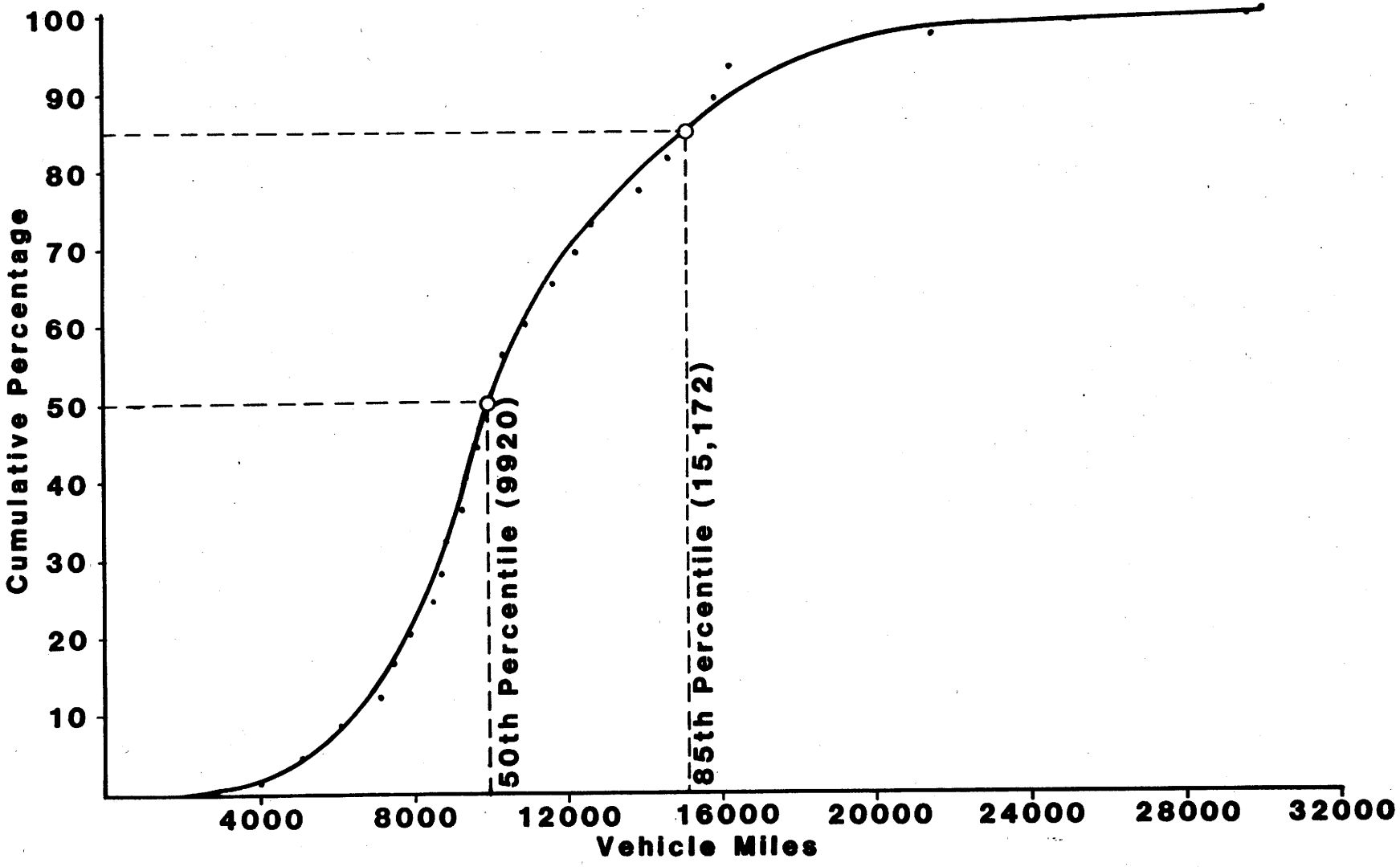


Figure 48: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #4 (n=123)

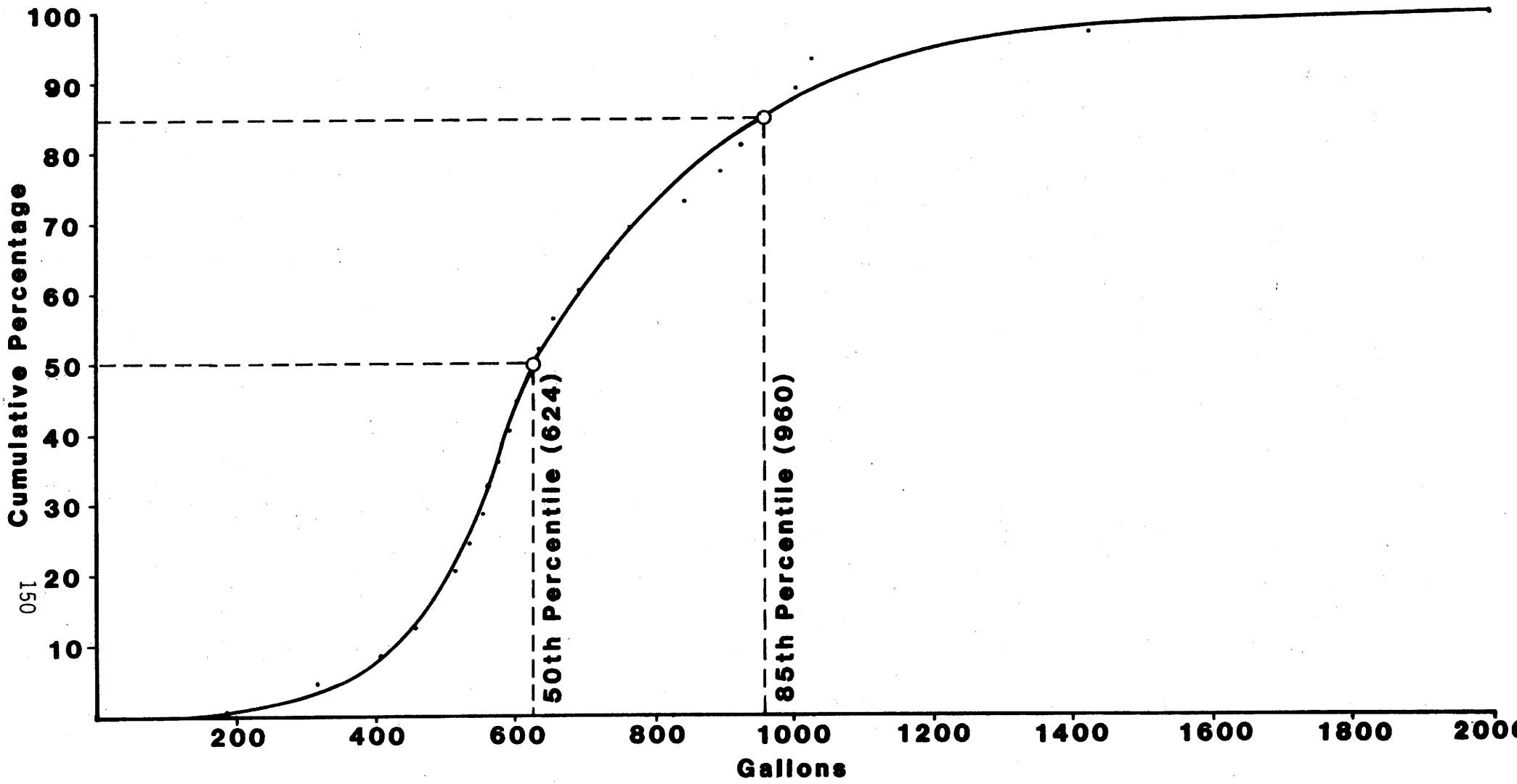


Figure 49: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #4 (n=123)

Table 102. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #4

Measure of Benefit	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	11,047
15th Percentile	7,294
Median (50th Percentile)	9,920
75th Percentile	13,630
85th Percentile	15,172

Note: Uses SDHPT District Means, a Base VOR of 1.10, and Total Home-to-Destination Travel.

Table 103. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #4

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	701
15th Percentile	471
Median (50th percentile)	624
75th Percentile	860
85th Percentile	960

Note: Uses SDHPT District Means a Base VOR of 1.10, and Total Home-to-Destination Travel.

The annual VMT reduction per commuter ranged from 2,942 miles to 30,046 miles and averaged 11,047 vehicle miles for the 123 study sites. Fuel savings varied from 184 to 1,995 gallons and averaged 701 gallons per commuter per year.

Method 5

This method of calculating pooling benefits utilized travel means by lot location (i.e., rural, urban fringe, urban) and a base VOR of 1.10 persons per vehicle. Annual VMT savings ranged from 2,933 to 33,289 and averaged

11,318 vehicle miles per commuter as shown in Table 104 and Figure 50. The estimated fuel reduction ranged from 180 to 2,128 gallons and averaged 718 gallons per year per Park-and-Pool user as shown in Table 105 and Figure 51.

Table 104. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #5

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool Users
Average (mean)	11,318
15th Percentile	7,889
Median (50th percentile)	10,388
75th Percentile	13,840
85th Percentile	14,967

Note: Uses Lot Location Means, a Base VOR of 1.10, and Total Home-to-Destination Travel.

Table 105. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #5

Measure of Benefits:	Annual Reduction of Fuel Consumption (gallons) Travel (VMT) Per Park-and-Pool Users
Average (mean)	718
15th Percentile	496
Median (50th percentile)	663
75th Percentile	885
85th Percentile	957

Note: Uses Lot Location Means, a Base VOR of 1.10, and Total Home-to-Destination Travel.

Method 6

The sixth method used in computing Park-and-Pool benefits considered the mean travel characteristics for all data and a base VOR of 1.10 persons per vehicle. The annual VMT reduction per traveling commuter ranged from 2,820 to 33,750 miles and averaged 11,410 vehicle miles as shown in Table 106 and Figure 52. Fuel reductions ranged from 177 to 2,124 gallons per commuter per

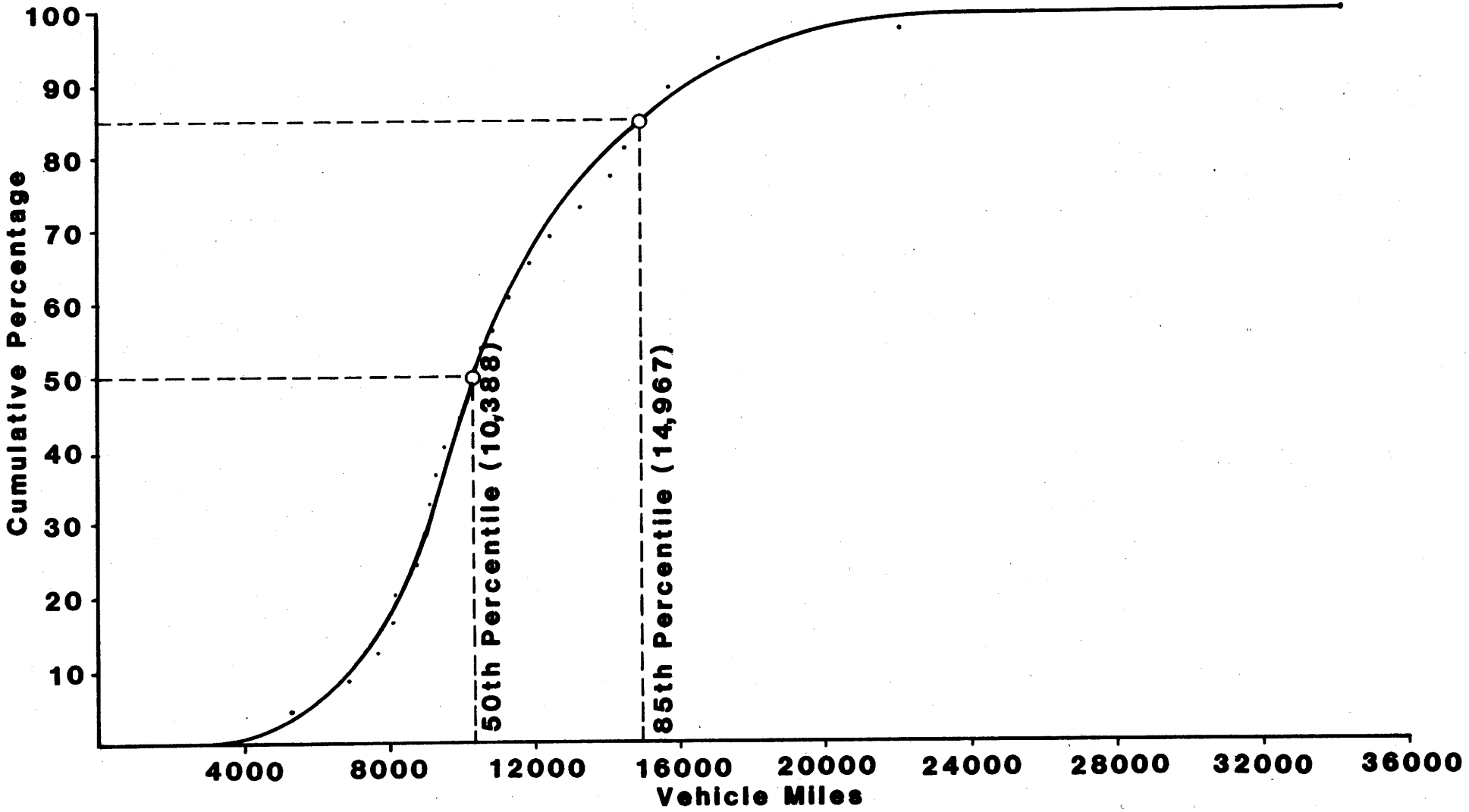


Figure 50: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #5 (n=123)

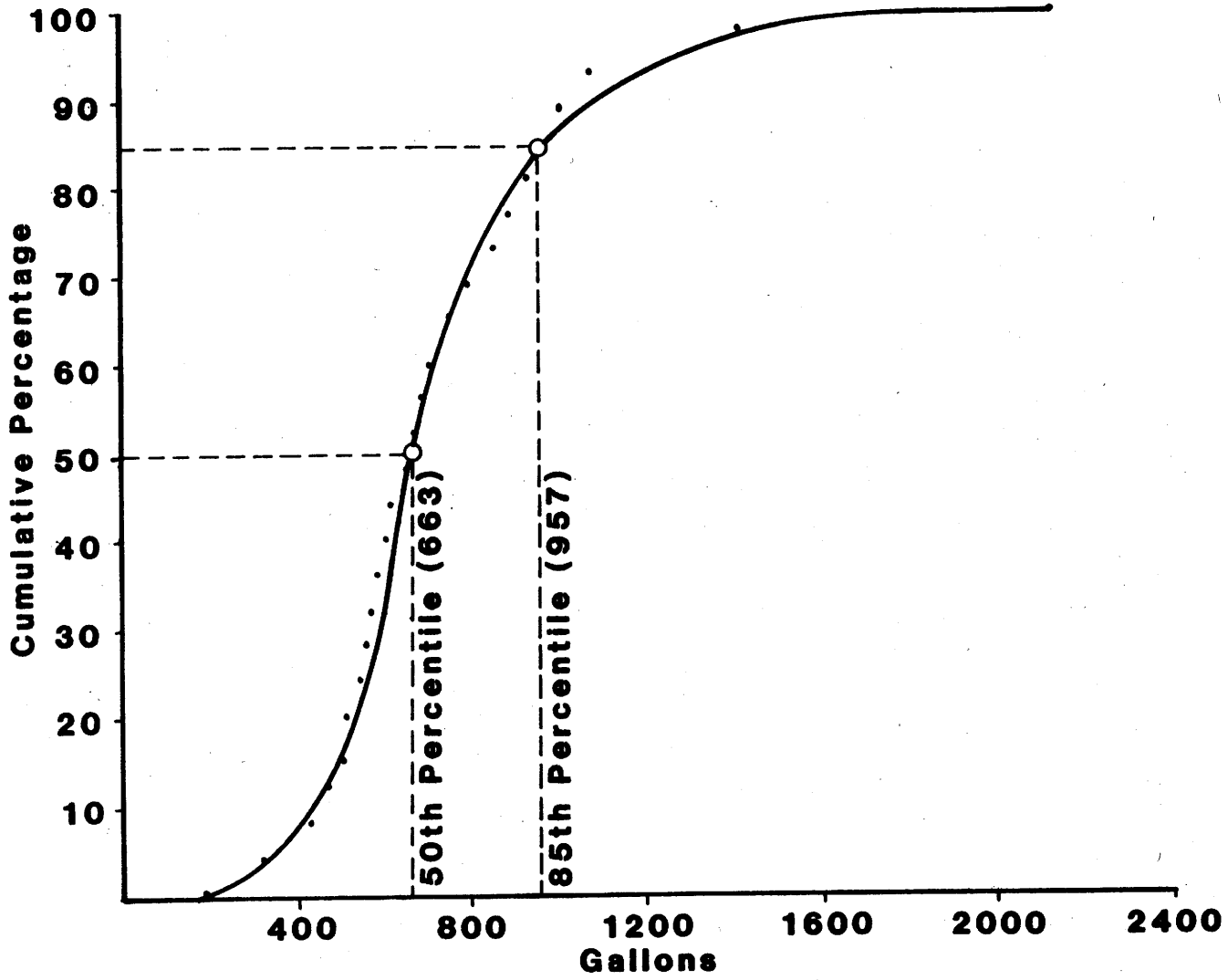


Figure 51: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #5 (n=123)

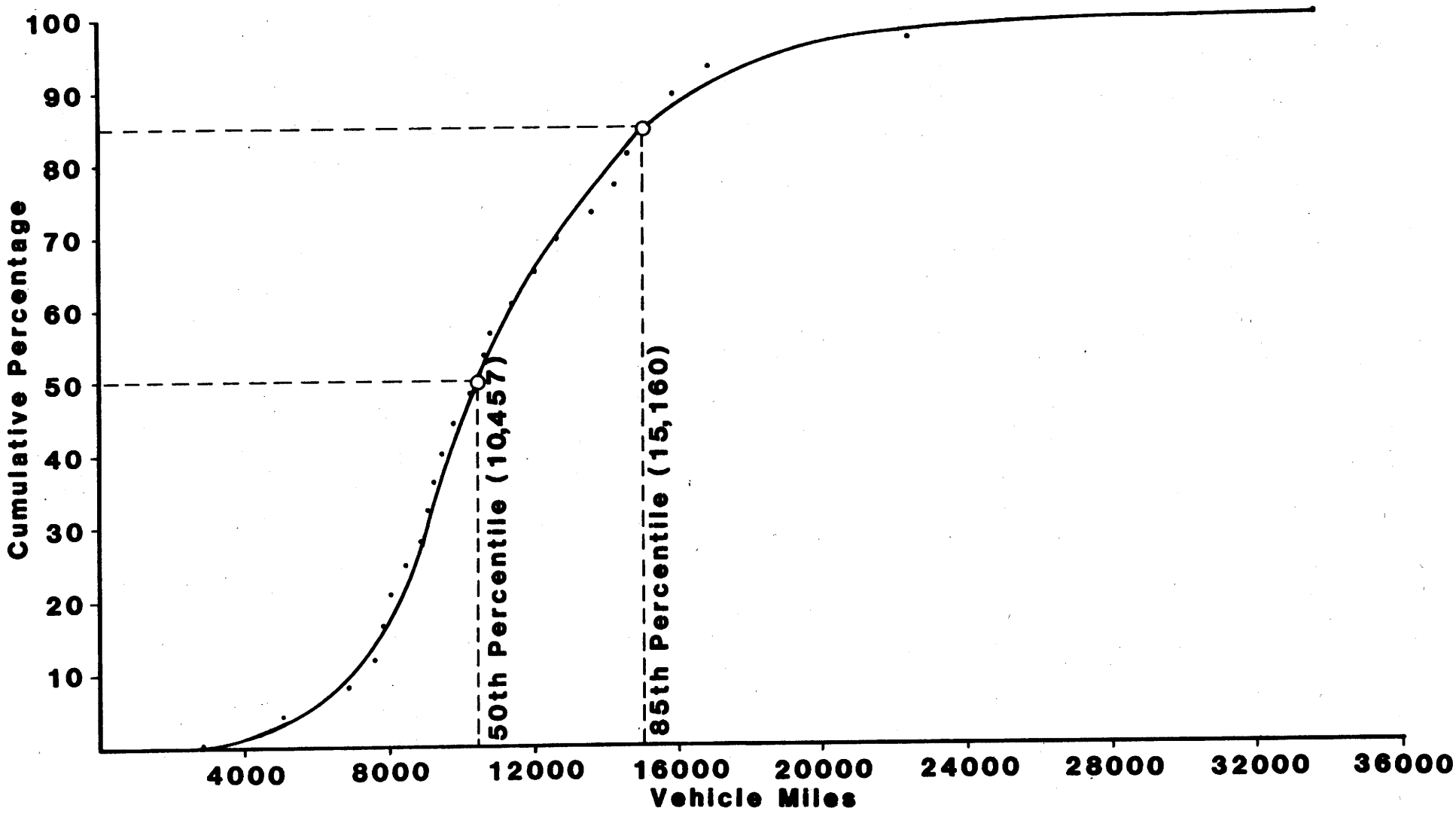


Figure 52: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #6 (n=123)

year and averaged 718 gallons for the 123 study sites. Fuel savings is illustrated in Table 107 and Figure 53 for the Park-and-Pool lots included in this investigation.

Table 106. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #6

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	11,410
15th Percentile	7,837
Median (50th percentile)	10,457
75th Percentile	14,076
85th Percentile	15,160

Note: Uses Means from Entire Data Base, a Base VOR of 1.10, and Total Home-to-Destination Travel.

Table 107. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #6

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) (gallons) Per Park-and-Pool User
Average (mean)	718
15th Percentile	493
Median (50th percentile)	658
75th Percentile	886
85th Percentile	954

Note: Uses Means from Entire Data Base, a Base VOR of 1.10, and Total Home-to-Destination Travel.

Method 1A

Considering only the Lot-to-Destination travel in conjunction with SDHPT District means for the facility and a base VOR of 1.35 persons per vehicle, the estimated annual reduction in VMT per commuter ranged from 2,250 to 23,540 miles and averaged 8,427 vehicle miles per year. The calculated fuel

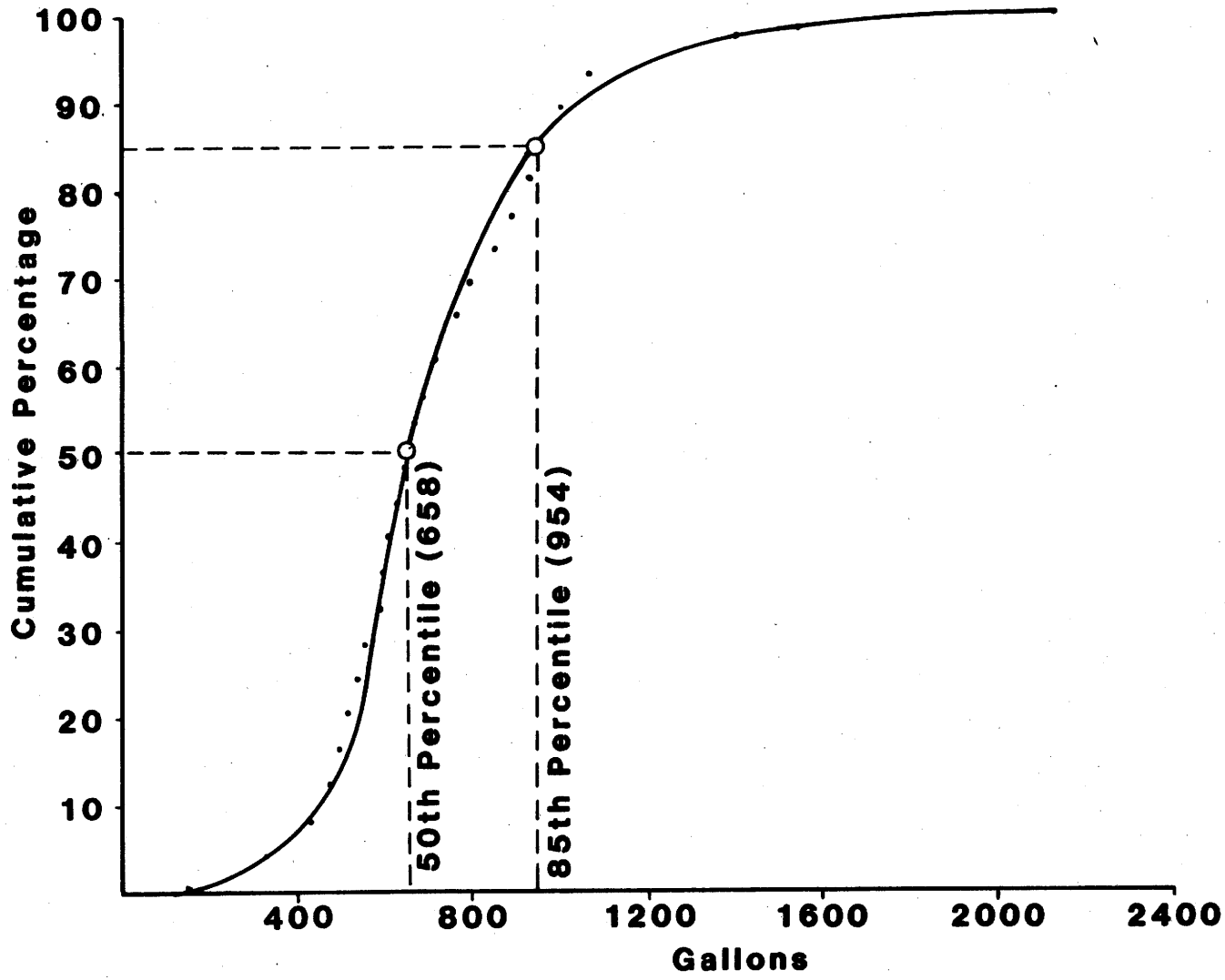


Figure 53: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methoddology #6 (n=123)

savings ranged from 140 gallons to 1,563 gallons and averaged 534 gallons per commuter per year for the 123 study sites. The estimated VMT reductions are summarized in Table 108 and Figure 54 while fuel savings estimates per commuter are shown in Table 109 and Figure 55.

Table 108. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #1A

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,427
15th Percentile	5,439
Median (50th percentile)	7,654
75th Percentile	10,036
85th Percentile	11,851

Note: Uses SDHPT District Means, a Base VOR of 1.35, and Lot-to-Destination Travel.

Table 109. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #1A

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	534
15th Percentile	346
Median (50th percentile)	481
75th Percentile	646
85th Percentile	744

Note: Uses SDHPT District Means, a Base VOR of 1.35, and Lot-to-Destination Travel.

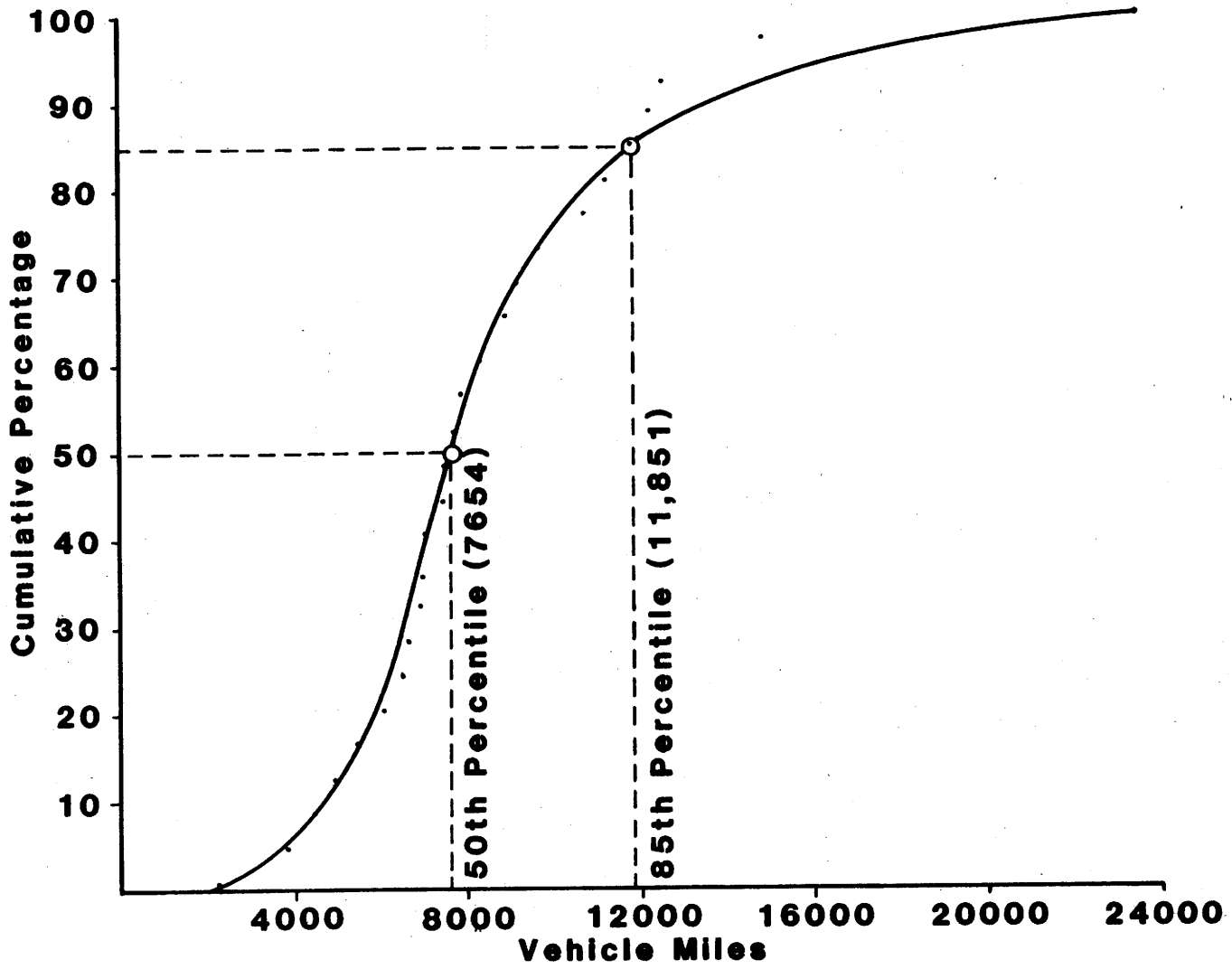


Figure 54: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #1A (n=123)

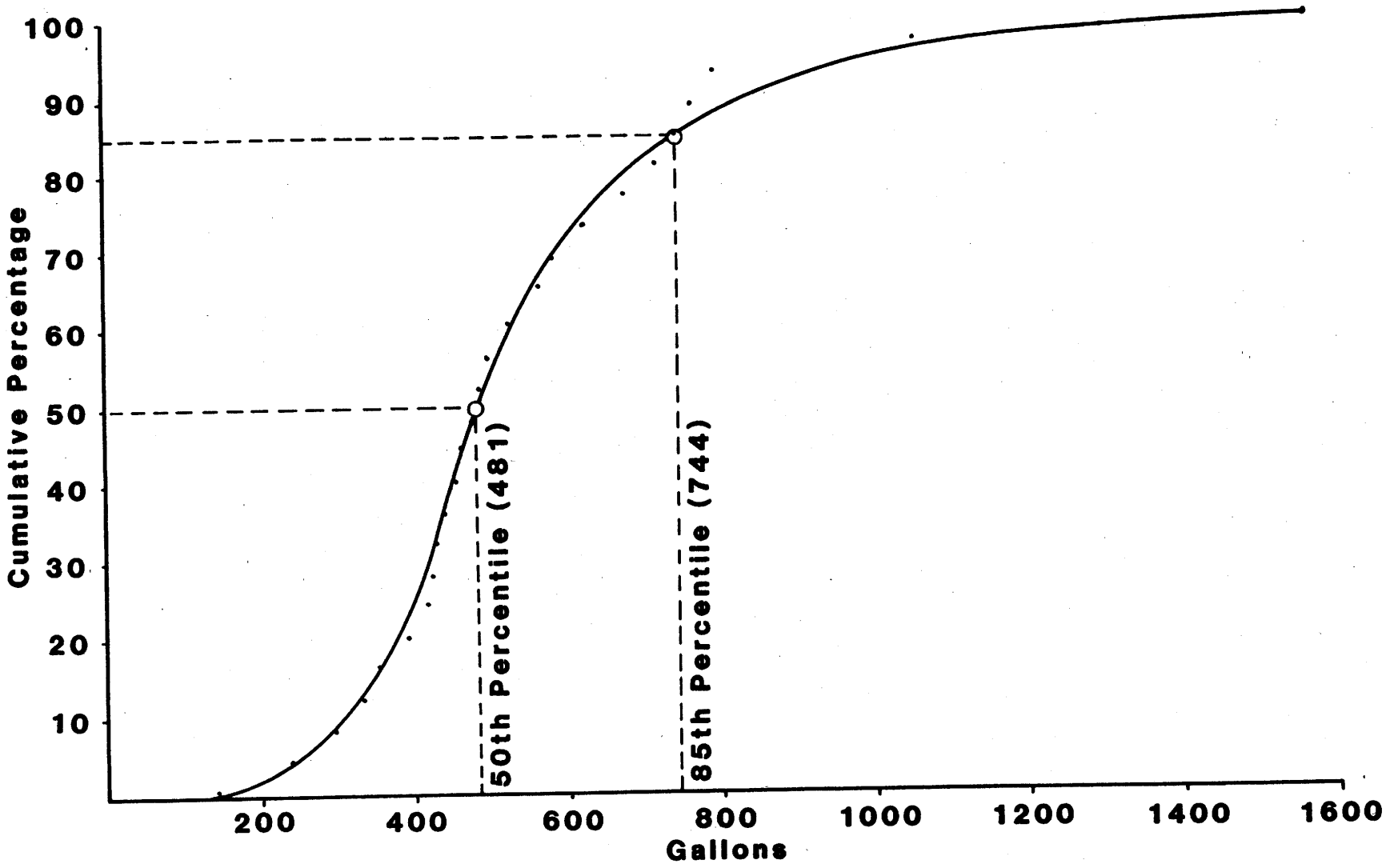


Figure 55: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #1A (n=123)

Considering only Lot-to-Destination travel with a 1.35 base VOR and means of the lot setting, the estimated annual VMT saved per rideshare participant varied from a low of 2,226 miles to a high of 25,655 miles and averaged 8,727 vehicle miles as shown in Table 110 and Figure 56. Estimated fuel savings, shown in Table 111 and Figure 57, range from 137 to 1,640 gallons and average 554 gallons per Park-and-Pooler at all 123 study locations.

Table 110. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #2A

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,727
15th Percentile	6,082
Median (50th percentile)	7,973
75th Percentile	10,721
85th Percentile	11,499

Note: Uses Lot Location Means, a Base VOR of 1.35, and Lot-to-Destination Travel.

Table 111. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #2A

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	554
15th Percentile	381
Median (50th percentile)	509
75th Percentile	681
85th Percentile	735

Note: Uses Lot Location Means, A Base VOR of 1.35, and Lot-to-Destination Travel.

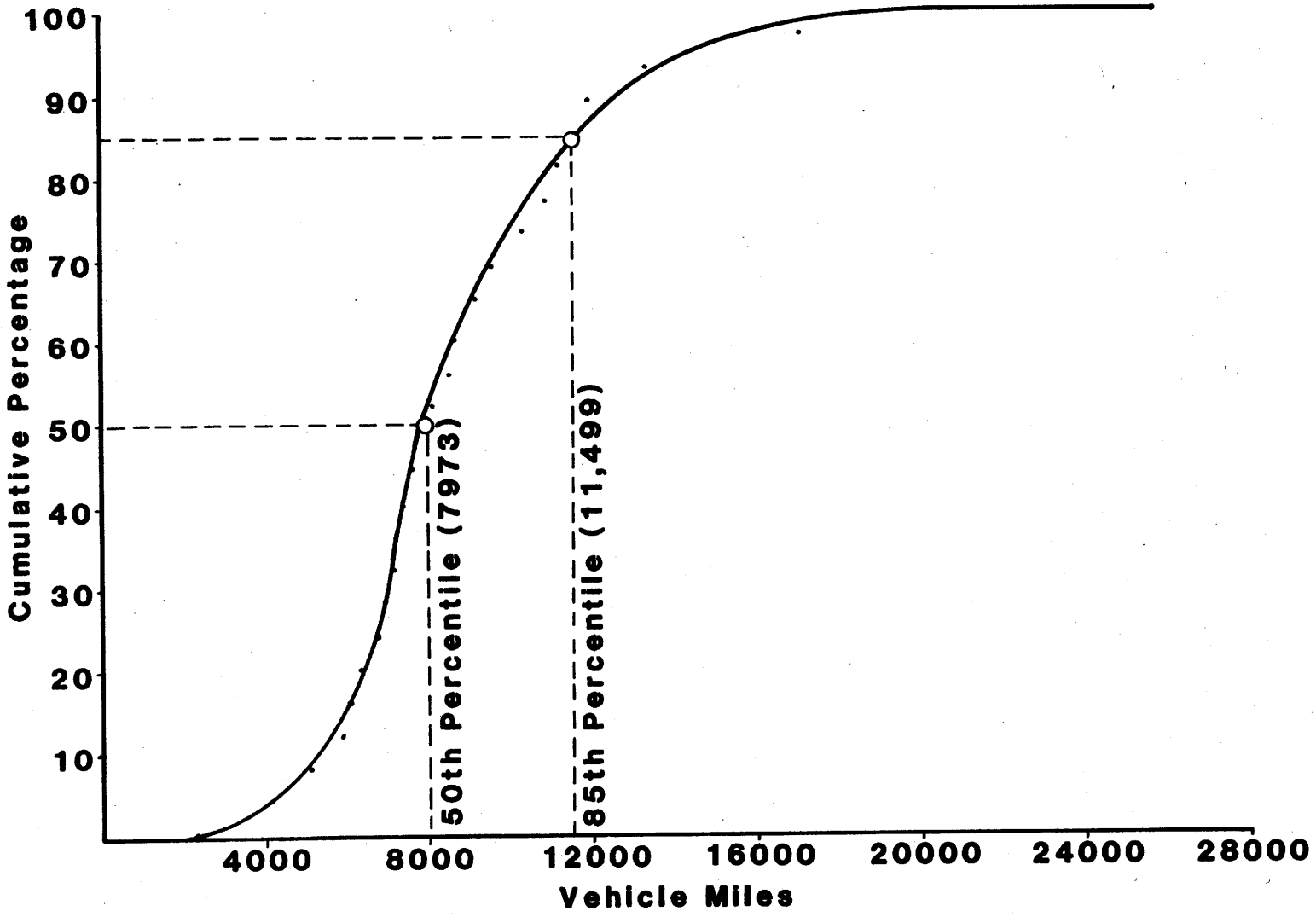


Figure 56: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #2A (n=123)

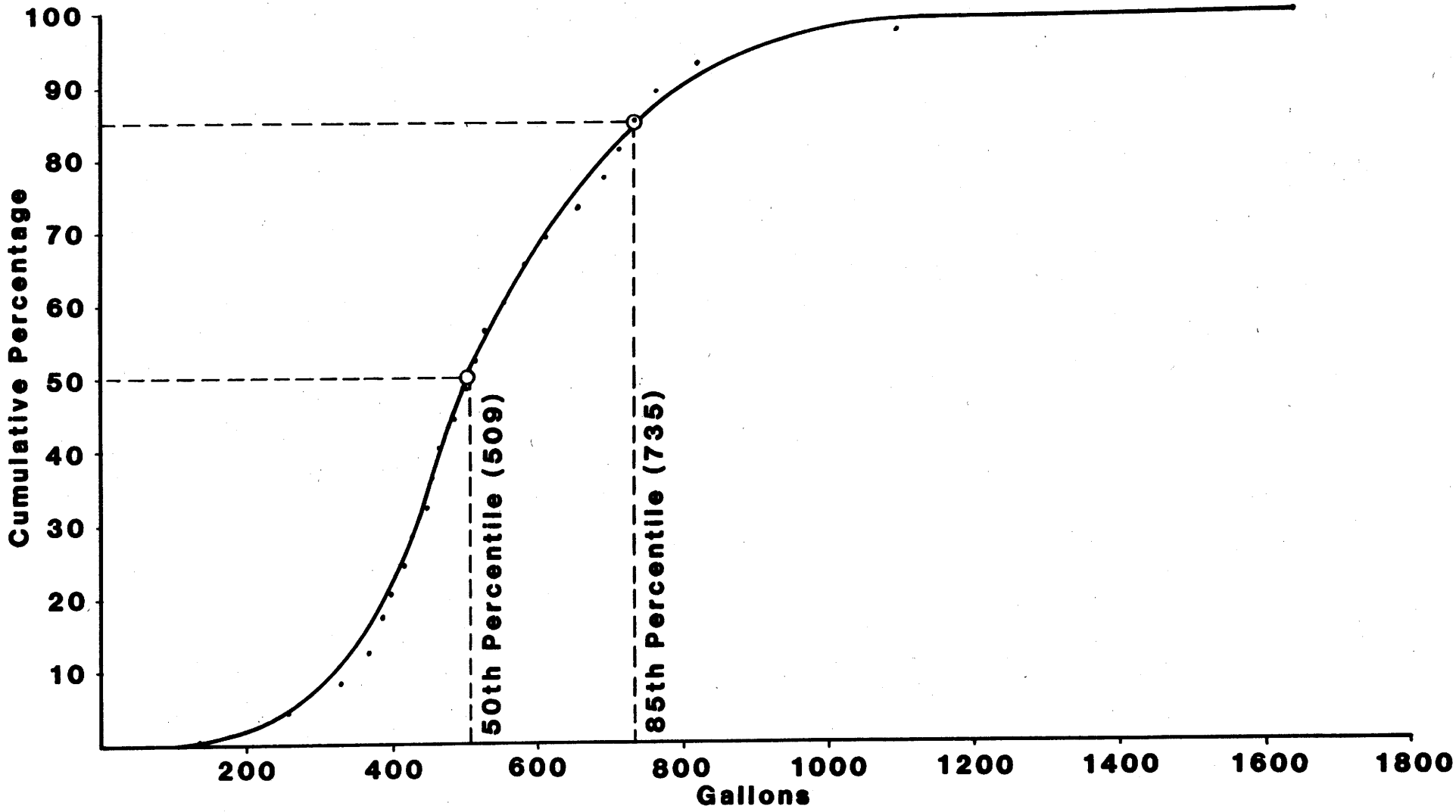


Figure 57: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #2A (n=123)

Method 3A

Using just the Lot-to-Destination travel plus a base VOR of 1.35 and means from the whole data base, annual VMT reductions per pooler ranged from 2,165 to 26,152 miles and averaged 8,822 vehicle miles for all 123 Park-and-Pool sites. The annual fuel savings averaged 555 gallons per commuter and varied from 136 gallons to 1,646 gallons per year. VMT estimates are presented in Table 112 and Figure 58 while the fuel savings estimations are summarized in Table 113 and Figure 59.

Table 112. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #3A

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	8,822
15th Percentile	6,049
Median (50th percentile)	8,084
75th Percentile	10,903
85th Percentile	11,721

Note: Uses Means from Entire Data Base, a Base VOR of 1.35, and Lot-to-Destination Travel.

Table 113. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #3A

Measure of Benefit	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	555
15th Percentile	381
Median (50th percentile)	509
75th Percentile	686
85th Percentile	738

Note: Uses Means from Entire Data Base, a Base VOR of 1.35, and Lot-to-Destination Travel.

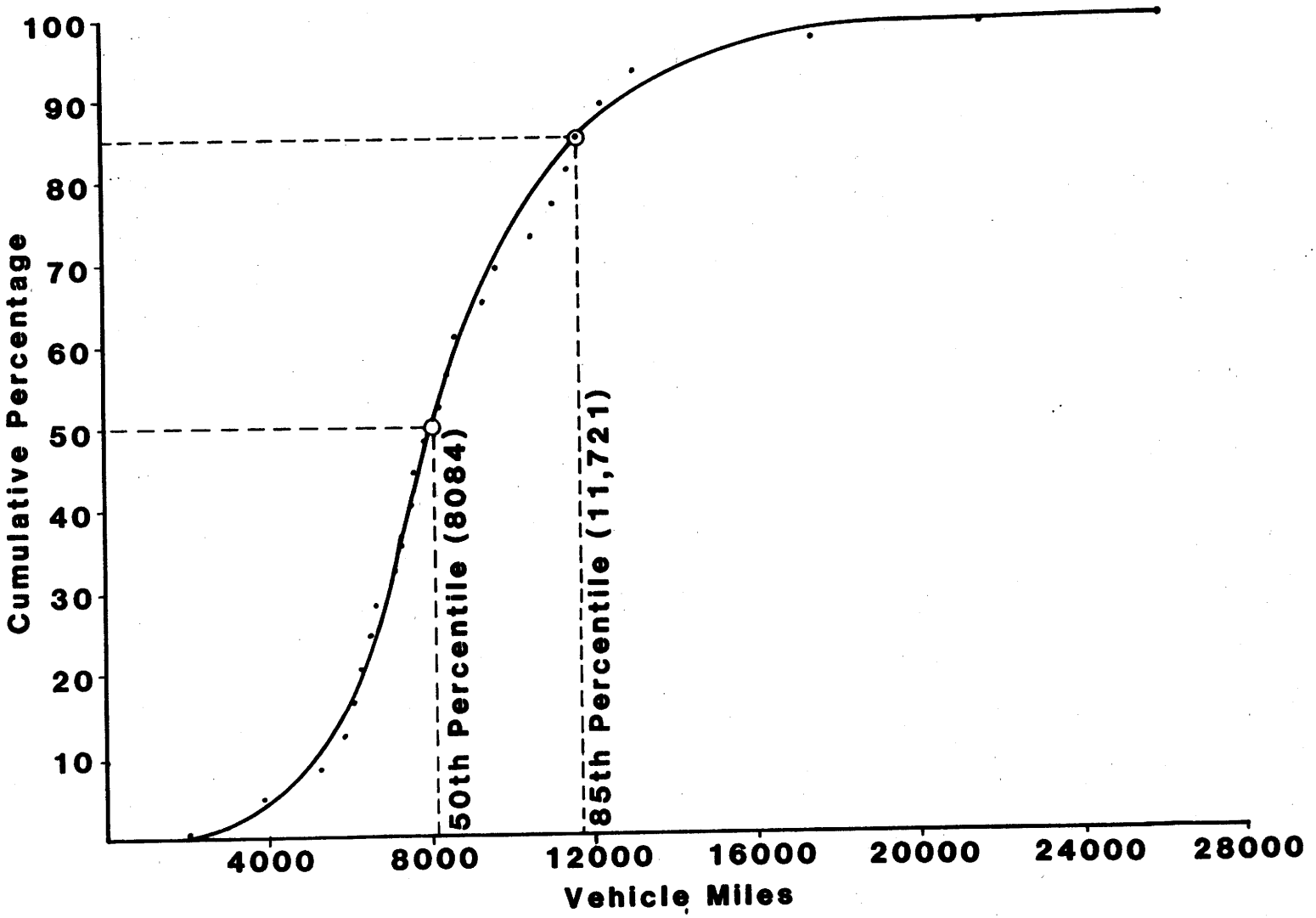


Figure 58: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #3A (n=123)

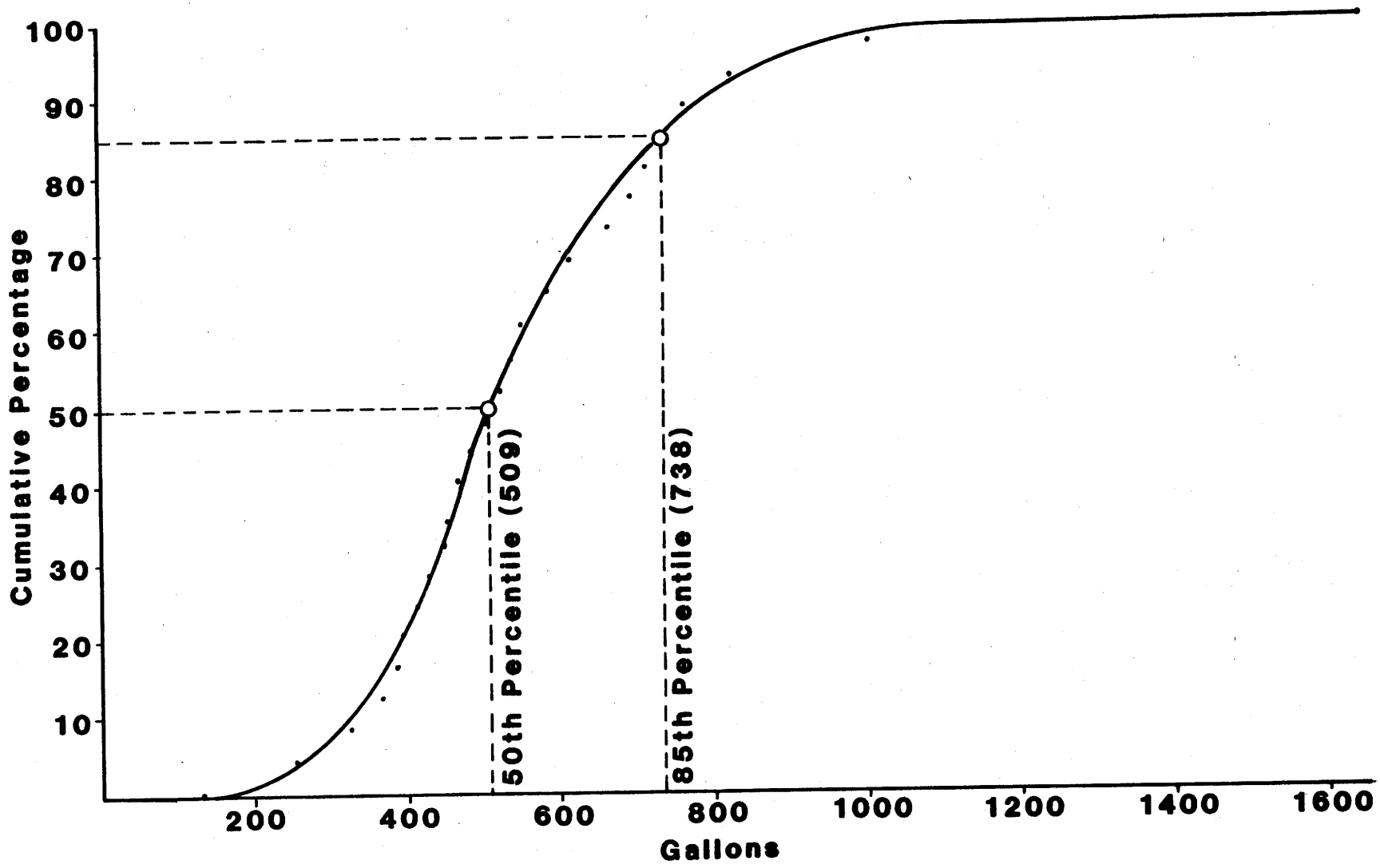


Figure 59: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #3A (n=123)

Method 4A

For a base VOR of 1.10, means calculated for the lots' SDHPT District and considering just the Lot-to-Destination travel, VMT reductions per ride-sharing participant ranged from 2,870 to 29,432 miles per year and averaged 10,928 vehicle miles. Fuel savings varied from 179 gallons to 1,954 gallons per commuter per year and averaged 693 gallons. The VMT estimates for the 123 Park-and-Pool lot users are summarized in Table 114 and Figure 60. Fuel savings estimates are presented for this methodology in Table 115 and Figure 61.

Table 114. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #4

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	10,928
15th Percentile	7,206
Median (50th percentile)	9,915
75th Percentile	13,150
85th Percentile	15,151

Note: Uses SDHPT District Means, a Base VOR of 1.10, and Lot-to-Destination Travel.

Table 115. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #4A

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	693
15th Percentile	465
Median (50th percentile)	621
75th Percentile	849
85th Percentile	954

Note: Uses SDHPT District Means, a Base VOR of 1.10, and Lot-to-Destination Travel.

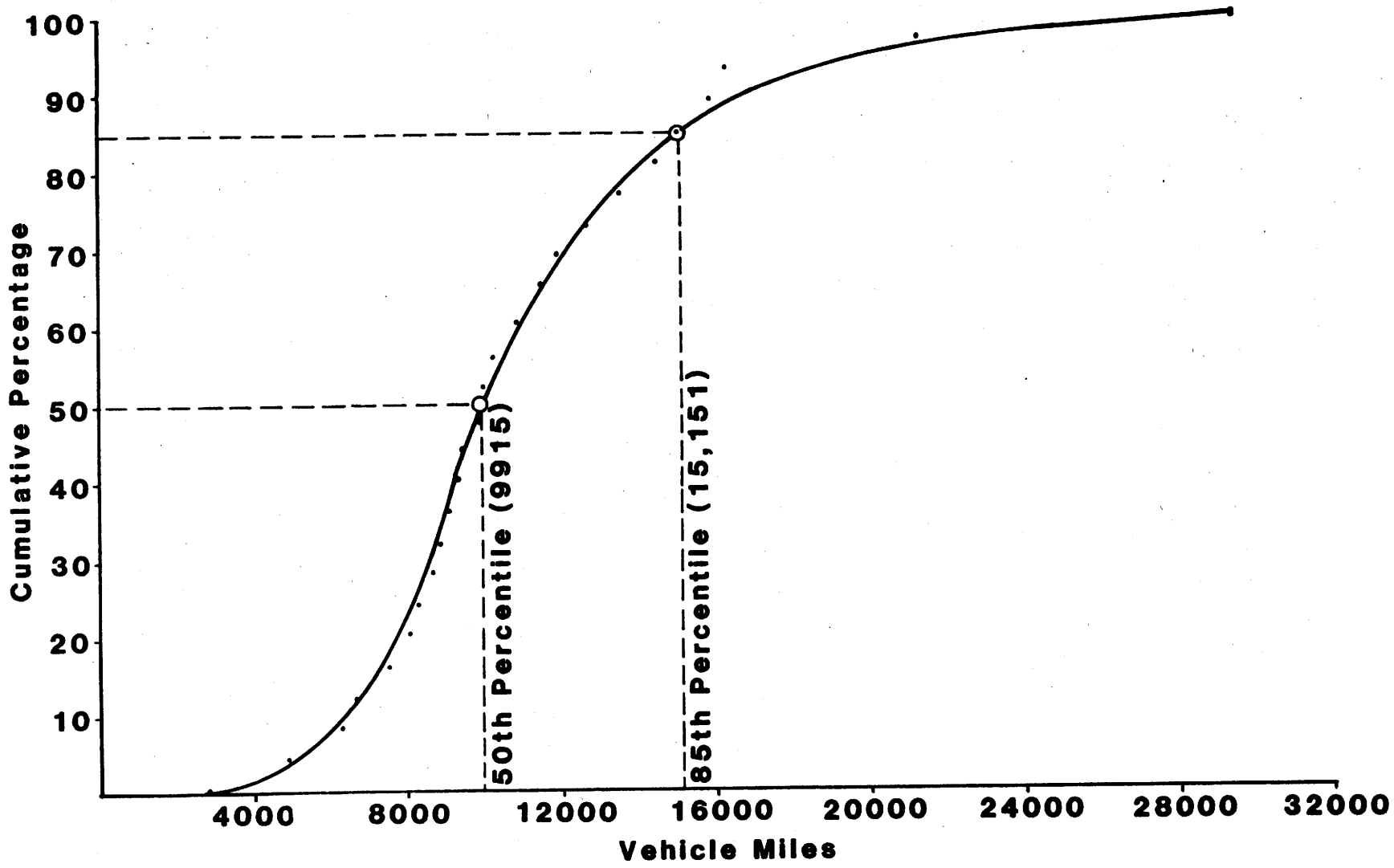


Figure 60: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #4A (n=123)

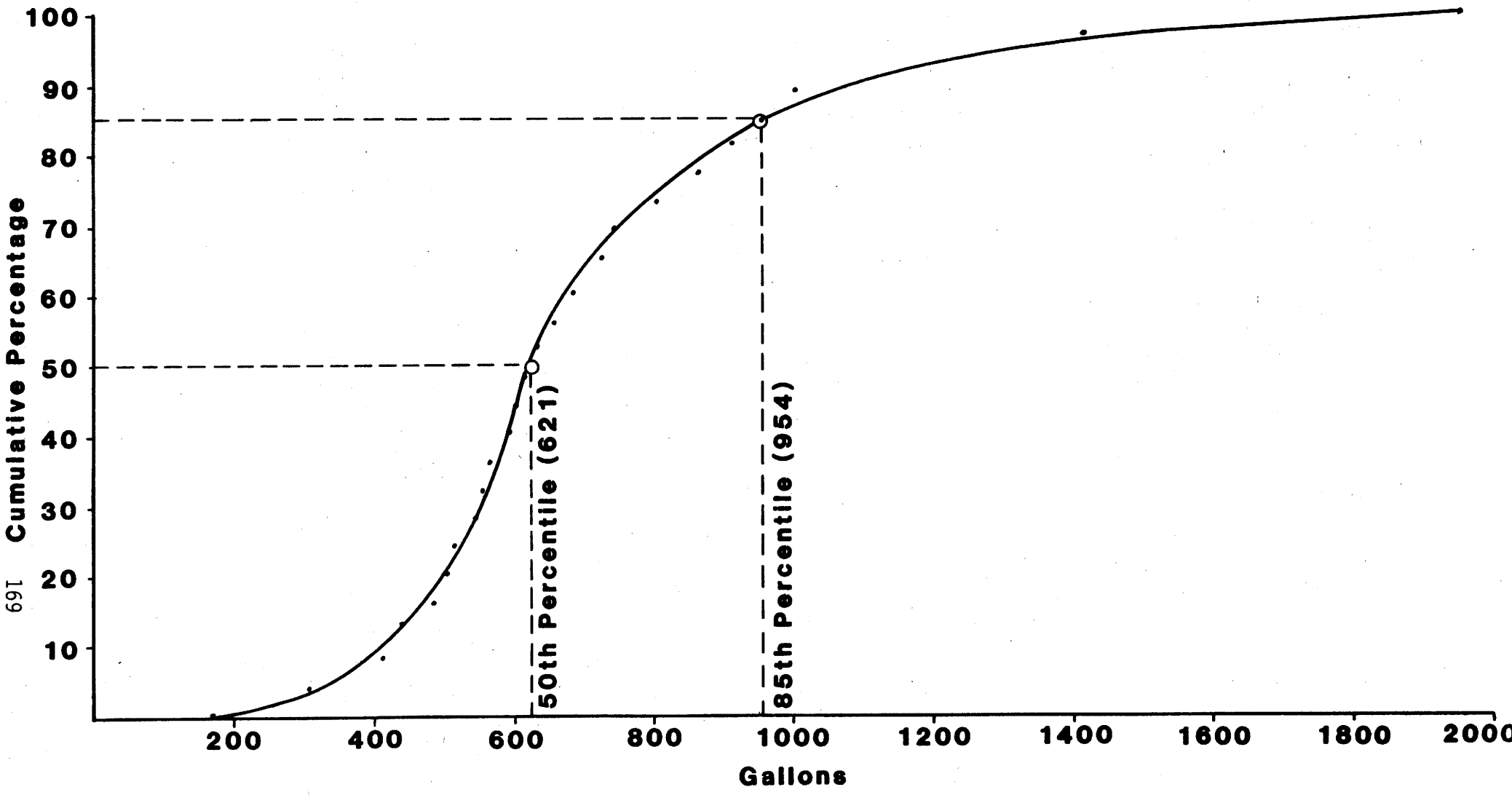


Figure 61: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #4A (n=123)

Method 5A

VMT and fuel savings estimates were calculated for a base VOR condition of 1.10 persons per vehicle, travel means by lot setting and using only Lot-to-Destination travel characteristics of the commuters. Annual VMT reductions ranged from 2,844 to 33,073 vehicle miles and averaged 11,231 miles per ridesharing participant at all 123 Park-and-Pool sites. Fuel savings per commuter ranged from 175 gallons to 2,114 gallons per year and averaged 712 gallons per year per Park-and-Pooler. Summaries of VMT reductions are presented in Table 116 and Figure 62 while Table 117 and Figure 63 present the estimated fuel savings per commuter.

Table 116. Summary of VMT Benefits for 123 Park-and-Pool Lots Using Methodology #5A

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	11,231
15th Percentile	7,802
Median (50th percentile)	10,278
75th Percentile	13,817
85th Percentile	14,823

Note: Uses Lot Location Means, A Base VOR of 1.10, and Lot-to-Destination Travel.

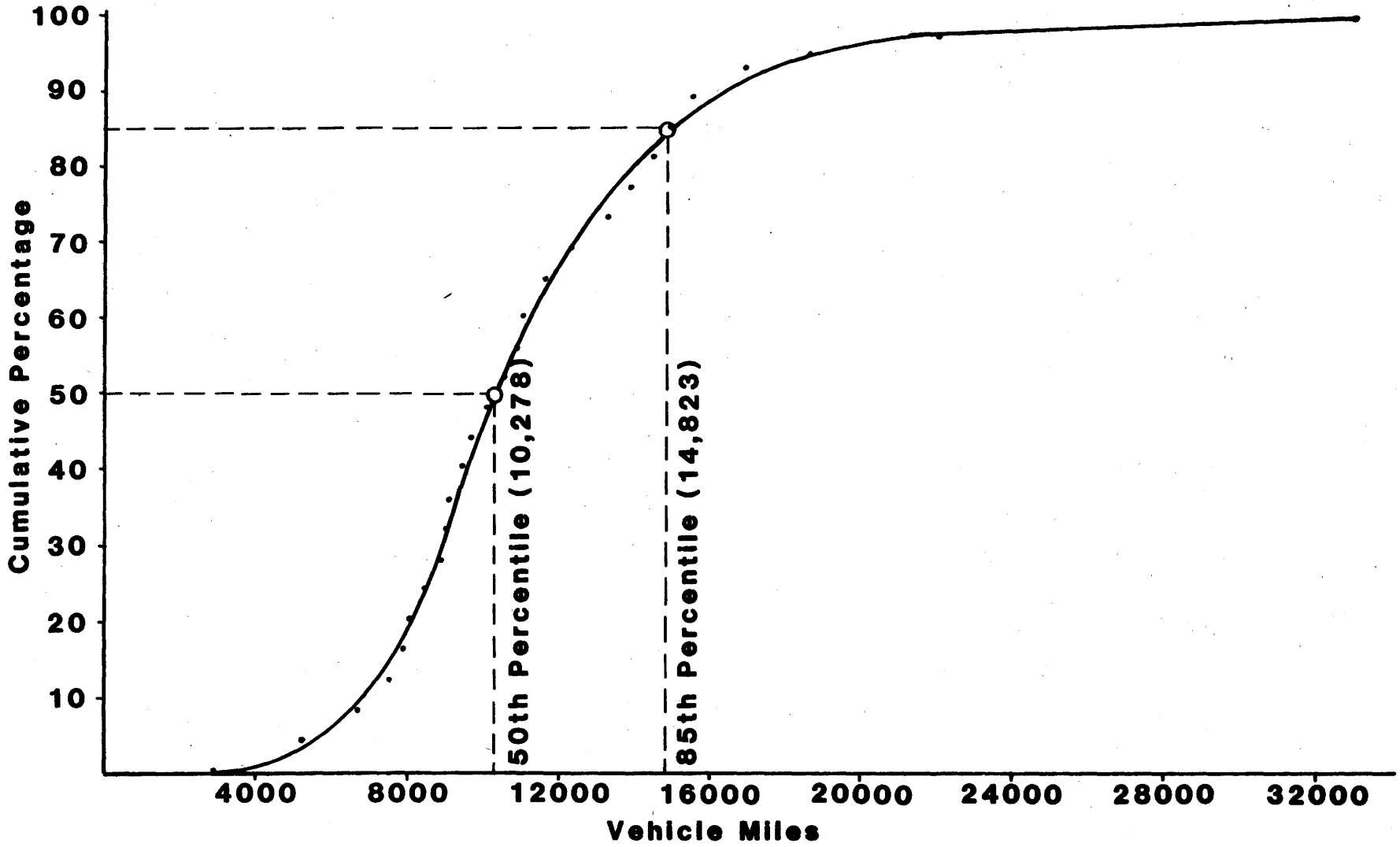


Figure 62: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #5A (n=123)

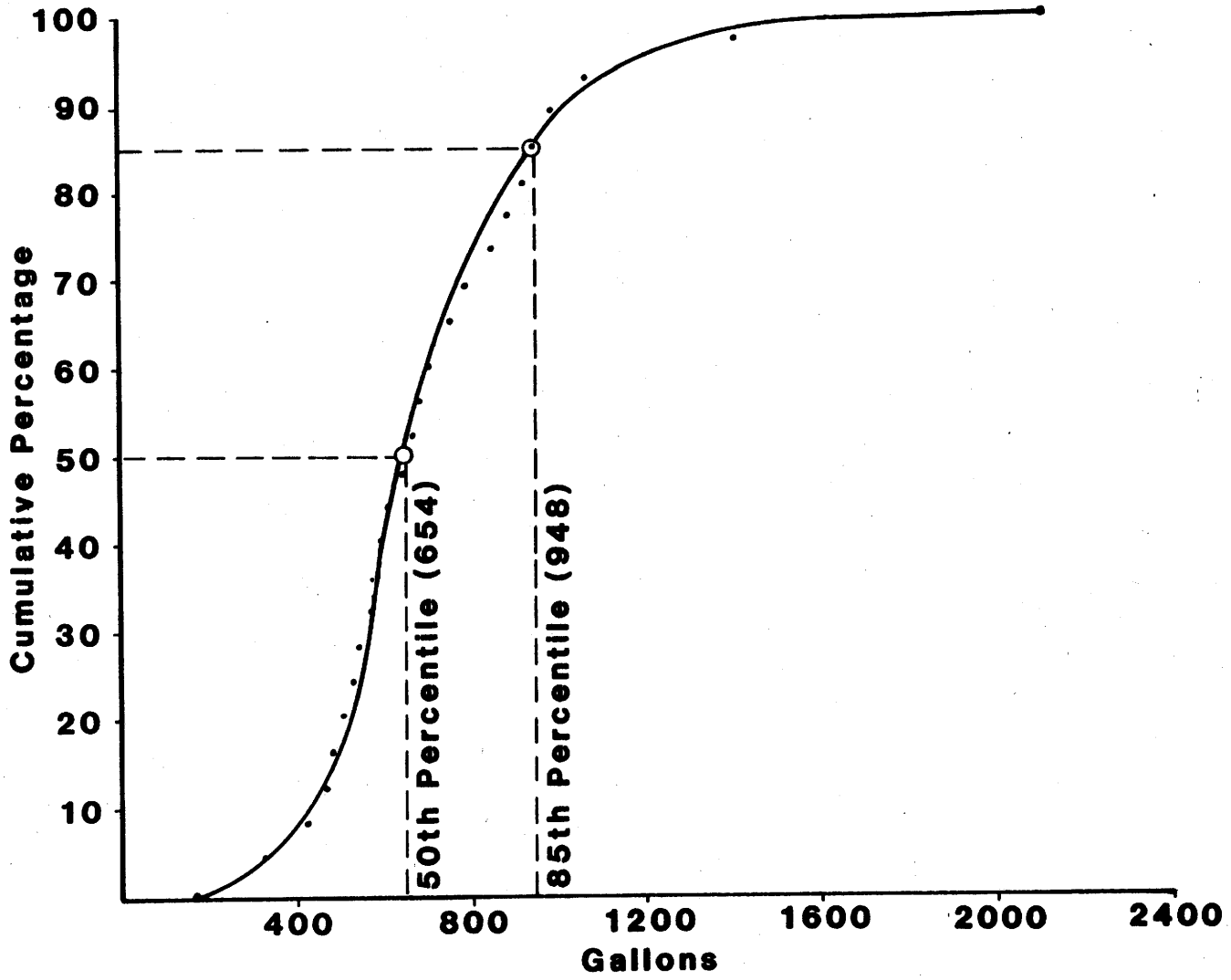


Figure 63: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #5A (n=123)

Table 117. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #5A

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	712
15th Percentile	489
Median (50th percentile)	654
75th Percentile	878
85th Percentile	948

Note: Uses Lot Location Means, A Base VOR of 1.10, and Lot-to-Destination Travel.

Method 6A

Considering only the Lot-to-Destination travel characteristics along with means of all travel data plus a base VOR condition of 1.10 persons per vehicle, estimates of annual VMT and fule reduction were made. VMT savings per year ranged from 2,780 to 33,583 vehicle miles per commuter and averaged 11,329 miles for all 123 study locations. A summary of VMT reduction estimates is presented in Table 118 and in Figure 64. Calculations of fuel savings varied from 175 to 2,114 gallons per commuter per year and averaged 713 gallons. The fuel savings estimates are presented in Table 119 and Figure 65 for this methodology.

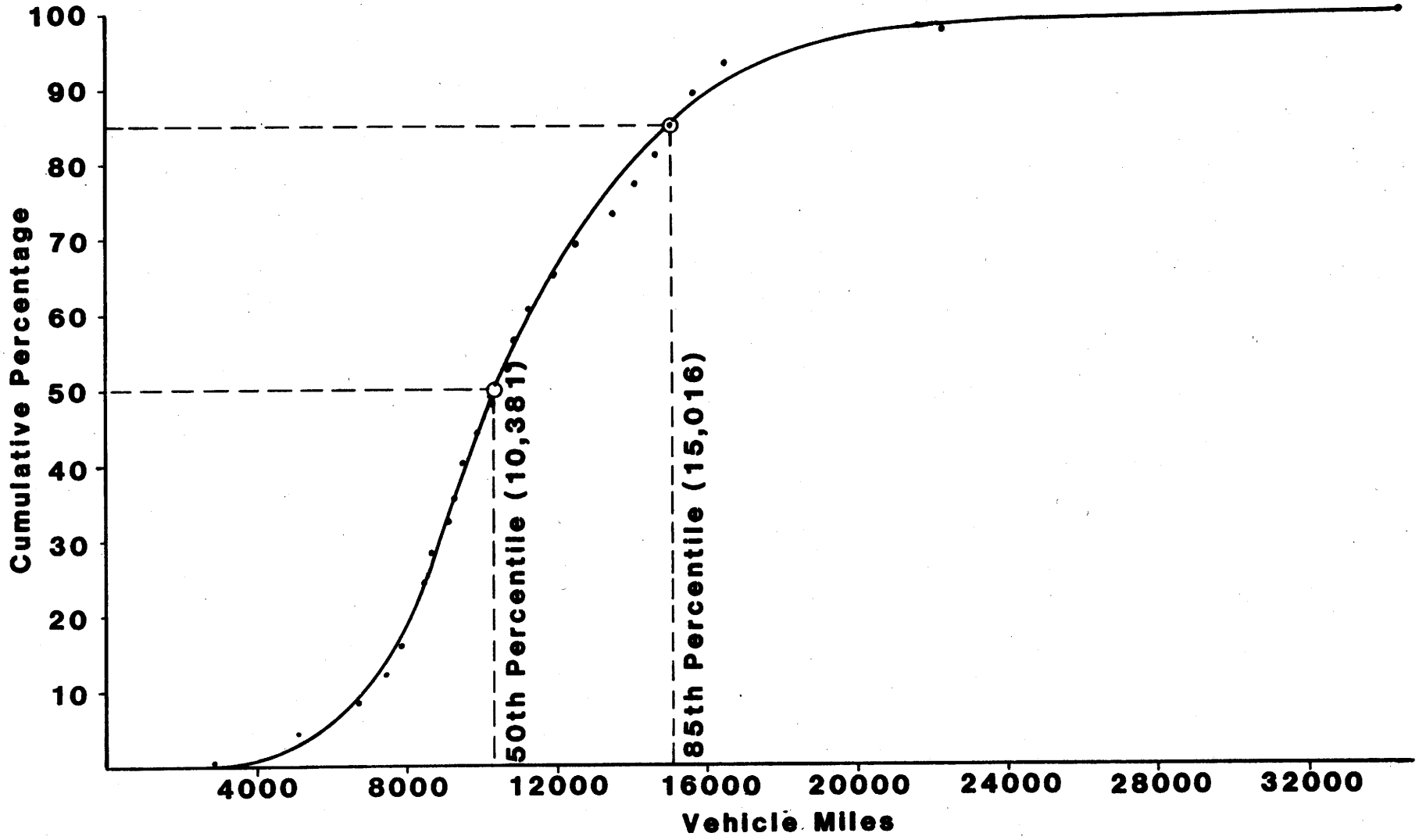


Figure 64: Cumulative Frequency Distribution of Annual VMT Saved per Commuter Using Methodology #6A (n=123)

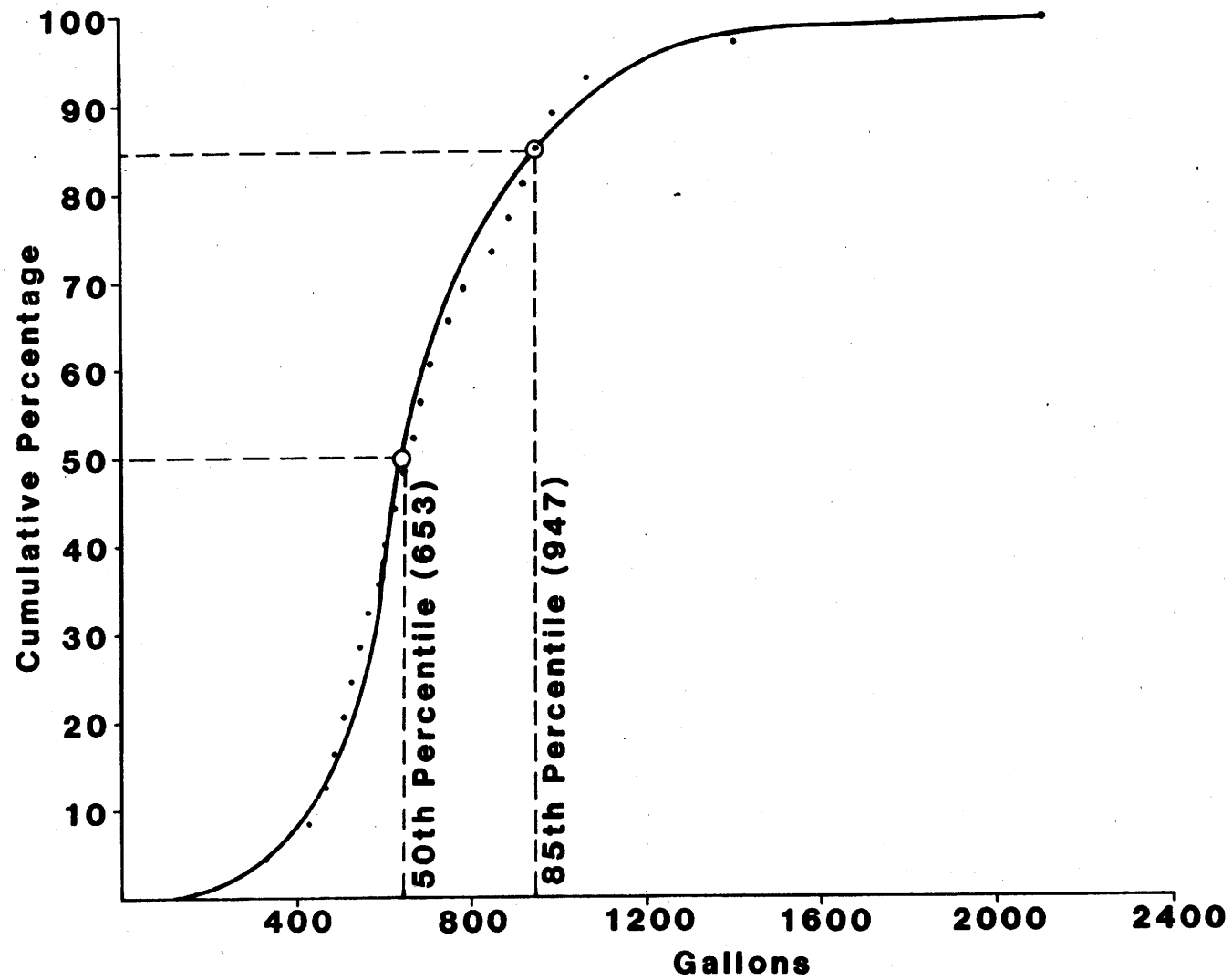


Figure 65: Cumulative Frequency Distribution of Annual Fuel Saved per Commuter Using Methodology #6A (n=123)

Table 118. Summary of VMt Benefits for 123 Park-and-Pool Lots Using Methodology #6A

Measure of Benefit:	Annual Reduction of Vehicle Mile of Travel (VMT) Per Park-and-Pool User
Average (mean)	11,329
15th Percentile	7,768
Median (50th percentile)	10,381
75th Percentile	14,001
85th Percentile	15,016

Note: Uses Means from Entire Data Base, a Base VOR of 1.10, and Lot-to-Destination Travel.

Table 119. Summary of Fuel Benefits for 123 Park-and-Pool Lots Using Methodology #6A

Measure of Benefit:	Annual Reduction of Fuel Consumption (gallons) Per Park-and-Pool User
Average (mean)	713
15th Percentile	489
Median (50th percentile)	653
75th Percentile	881
85th Percentile	947

Note: Uses Means from Entire Data Base, a Base VOR of 1.10, and Lot-to-Destination Travel.

Summary of All Methods

The preceding discussion summarizes the results of 12 approaches to estimating annual VMT reduction and fuel savings per commuter at the 123 Park-and-Pool study sites. Six of the 12 approaches (Method 1 through Method 6) considered the travel from home-to-lot-to-destination while the remaining 6 (Method 1A through Method 6A) only used the lot-to-destination journey for estimating pooling benefits. Table 120 presents an overview of estimated VMT and fuel reduction for the 6 methods which consider the entire home-to-destination journey of commuters. Table 121 shows the benefits estimated per Park-and-Pool user when only the lot-to-destination travel is considered.

Table 120. Overview of Pooling Benefits per Commuter Calculated From Travel Demand for the Home-to-Lot-to-Destination Journey

Measure of Pooling Benefit:	Methodology Used In Estimating Annual Pooling Benefits											
	Method 1A		Method 2A		Method 3A		Method 4A		Method 5A		Method 6A	
	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel
Average (mean) Reducation	8,055 mi	511 gal	8,322 mi	528 gal	8,412 mi	529 gal	11,047 mi	701 gal	11,318 mi	718 gal	11,410 mi	718 gal
Median (50th Percentile) Reduction	7,319 mi	461 gal	7,652 mi	481 gal	7,611 mi	479 gal	9,920 mi	624 gal	10,388 mi	663 gal	10,457 mi	658 gal
85th Percentile Reduction	11,315 mi	722 gal	11,137 mi	712 gal	11,304 mi	711 gal	15,172 mi	960 gal	14,967 mi	957 gal	15,160 mi	954 gal
Range of Reduction:												
Low Estimate	2,077 mi	130 gal	2,071 mi	127 gal	1,962 mi	123 gal	2,942 mi	184 gal	2,933 mi	180 gal	2,820 mi	177 gal
High Estimate	23,670 mi	1,571 gal	24,882 mi	1,591 gal	25,324 mi	1,594 gal	30,046 mi	1,995 gal	33,289 mi	2,128 gal	33,750 mi	2,124 gal

Table 121. Overview of Pooling Benefits per Commuter Calculated From Travel Demand for Only the Lot-to-Destination Journey

Measure of Pooling Benefit	Methodology Used In Estimating Annual Pooling Benefits											
	Method 1A		Method 2A		Method 3A		Method 4A		Method 5A		Method 6A	
	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel	VMT	Fuel
Average (mean) Reducation	8,427 mi	534 gal	8,727 mi	554 gal	8,822 mi	555 gal	10,928 mi	693 gal	11,231 mi	712 gal	11,329 mi	713 gal
Median (50th Percentile) Reduction	7,654 mi	481 gal	7,973 mi	509 gal	8,084 mi	509 gal	9,915 mi	621 gal	10,278 mi	654 gal	10,381 mi	653 gal
85th Percentile Reduction	11,851 mi	744 gal	11,499 mi	735 gal	11,721 mi	738 gal	15,151 mi	954 gal	14,823 mi	948 gal	15,016 mi	947 gal
Range of Reduction:												
Low Estimate	2,250 mi	140 gal	2,226 mi	137 gal	2,165 mi	136 gal	2,870 mi	179 gal	2,844 mi	175 gal	2,780 mi	175 gal
High Estimate	23,540 mi	1,563 gal	25,655 mi	1,640 gal	26,152 mi	1,646 gal	29,432 mi	1,954 gal	33,073 mi	2,114 gal	33,073 mi	2,114 gal

Considering the entire travel (Home-to-Lot-Destination) of the participating ridesharers (shown in Table 120), the mean travel reduction per commuter at all 123 study sites lies between 8,055 vehicle miles per year and 11,410 vehicle miles per year depending upon the methodology used. The VMT savings realized by the commuters varies considerably by characteristics of specific Park-and-Pool lots; however, regardless of the lot, the minimum savings observed at any of the facilities was 1,962 vehicle miles per year per pooler. Some of the Park-and-Pool users average as much as 33,750 fewer vehicle miles of travel per year by using the mode-change facility as shown in the table. Annual fuel savings estimates vary directly with the reduction in annual vehicle travel and the percentage of subcompacts or vehicle mix. The average commuter participating in Park-and-Pool activity saves between 511 to 718 gallons of fuel per year. As in the VMT reduction estimates, fuel savings varies considerably by the specific site and ranges from 123 to 2,128 gallons per year per Park-and-Pool user.

Benefits estimated for only the Lot-to-Destination portion of the commute trip (shown in Table 121) are quite similar to those benefits calculated for the entire home-to-destination journey. The average annual VMT savings per commuter pooling from a mode-change lot is somewhere between 8,427 and 11,329 vehicle miles per year, depending upon the methodology used in estimating pooling benefits. The minimum average annual savings noted at any of the 123 Park-and-Pool lots was 2,165 vehicle miles per commuter whereas the highest calculated savings was 33,583 vehicle miles per commuter. Average fuel savings is between 534 gallons per commuter per year and 713 gallons per commuter per year. The range of fuel saving was 136 to 2,114 gallons per year per Park-and-Pool participant at the study sites.

Using two of the methodologies for estimating pooling benefits, one can disaggregate the data to provide summaries of VMT and fuel reductions by:

- Type of Ridesharing Lot (Park-and-Pool versus Park-and-Go);
- Lot Location (i.e., Rural, Urban Fringe, Urban);
- Research Project; and/or,
- SDHPT District.

Methods 3 and 6 both utilize travel means from all survey data but differ in their assumed base VOR; method 3 assumes a base condition of 1.35 persons per vehicle while method 6 assumes 1.10 persons per vehicle.

Tables 122 and 123 summarize the pooling benefits by type of ridesharing lot assuming a 1.35 base VOR and a 1.10 base VOR, respectively. Considering the available data, Park-and-Pool lots are generally more effective in achieving VMT reductions and fuel savings than are the urban Park-and-Go facilities. The commuters traveling from a Park-and-Go lot save between 4,791 and 6,697 vehicle miles per year, depending upon the assumed base VOR condition. Park-and-Pool users save between 8,671 and 11,757 vehicle miles of travel per year or approximately 78% more VMT than users of Park-and-Go facilities.

Table 122. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Type of Ridesharing Lot Assuming 1.35 Persons Per Vehicle As Base Condition (Methodology #3)

Type of Lot:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
Park-and-Go	1962	7564	4791	123	476	302
Park-and-Pool	2534	25,324	8671	159	1594	546

Table 123. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Type of Ridesharing Lot Assuming 1.10 Persons Per Vehicle As Base Condition (Methodology #6)

Type of Lot:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
Park-and-Go	2820	10,432	6697	177	657	421
Park-and-Pool	4020	33,746	11,757	253	2124	740

Tables 124 and 125 present the VMT and fuel savings estimates by the location of the rideshare lot for base VOR's of 1.35 and 1.10 persons per vehicle, respectively. Depending upon the methodology employed in estimating pooling benefits, a commuter using a rural Park-and-Pool lot saves between 9,341 and 12,636 vehicle miles of travel per year. This VMT reduction is some 9.5% greater than a user of an "urban fringe" lot and approximately 56.3% more savings than that realized by an "urban" lot user.

Table 124. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Lot Location Assuming 1.35 Persons Per Vehicle as Base Condition (Methodology #3)

General Location of Lot:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
Rural Setting	3774	25,324	9341	238	1594	588
Urban Fringe Setting	5368	21,655	8531	338	1363	537
Urban Setting	1962	12,433	5895	123	783	371

Table 125. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Lot Location Assuming 1.10 Persons Per Vehicle As Base Condition (Methodology #6)

General Location of Lot:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
Rural Setting	5425	33,745	12,636	341	2124	795
Urban Fringe Setting	7292	28,013	11,537	459	1763	726
Urban Setting	2820	16,699	8,162	177	1051	514

Tables 126 and 127 summarize the estimated VMT and fuel reductions per ridesharing commuter for a base VOR of 1.35 and 1.10, respectively, for the four Park-and-Pool studies. Projects 205-13 (1), 205-21 (4) and 2072 included the investigation of Park-and-Pool facilities located in rural settings whereas Project 205-18 (2) concentrated on ridesharing facilities in the urbanized area of Dallas/Fort Worth/Arlington.

Table 126. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Research Project Assuming 1.35 Persons Per Vehicle as Base Condition (Methodology #3)

Research Project Number:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
2072 (this research)	3774	25,324	9207	238	1594	574
205-13 (1)	5804	14,184	8962	365	893	564
205-18 (2)	2534	12,433	6545	159	783	412
205-21 (4)	1962	13,167	7911	123	829	498

Table 127. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By Research Project Assuming 1.10 Persons Per Vehicle as Base Condition (Methodology #6)

Research Project Number:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
	Low	High	Average	Low	High	Average
2072 (this research)	5424	33,746	12,445	341	2124	783
205-13 (1)	7879	18,725	12,228	496	1179	770
205-18 (2)	4020	16,699	9,021	253	1051	568
205-21 (4)	2820	17,419	10,706	177	1096	674

Tables 128 and 129 provide estimates of pooling benefits by SDHPT District based upon all available research data from this and other Park-and-Pool studies (1) (2) (4). Of those mode-change facilities surveyed within the boundaries of 9 SDHPT Districts, the greatest benefits in terms of VMT reduction per commuter were observed in:

District 9, Waco;

District 13, Yoakum;

District 15, San Antonio; and,

District 20, Beaumont.

Table 128. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By SDHPT District Assuming 1.35 Persons Per Vehicle As Base Condition (Methodology #3)

SDHPT District Number:	Office:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
		Low	High	Average	Low	High	Average
2	Fort Worth	1962	13,167	7,514	123	829	473
9	Waco	9604	21,655	16,116	604	1363	1014
10	Tyler	5799	7,212	6,479	365	454	408
12	Houston	5804	11,904	8,616	365	749	542
13	Yoakum	5577	13,172	10,169	351	829	640
15	San Antonio	7639	14,184	9,407	481	893	592
17	Bryan	4337	9,160	7,064	273	577	445
18	Dallas	3187	12,955	7,526	201	815	474
20	Beaumont	4580	25,324	9,418	288	1594	593

Table 129. Comparisons of Vehicle Miles of Travel (VMT) Reductions and Fuel Savings By SDHPT District Assuming 1.10 Persons Per Vehicle As Base Condition (Methodology #6)

SDHPT District Number:	Office:	VMT Savings per Commuter (miles/year)			Fuel Savings per Commuter (gallons/year)		
		Low	High	Average	Low	High	Average
2	Fort Worth	2,820	17,419	10,214	177	1096	643
9	Waco	12,741	28,013	21,070	802	1763	1326
10	Tyler	811	9,652	8,923	510	607	562
12	Houston	7,870	16,000	11,675	496	1007	735
13	Yoakum	7,724	17,561	13,913	486	1105	876
15	San Antonio	10,116	18,725	12,818	637	1179	807
17	Bryan	6,384	11,968	9,671	402	753	609
18	Dallas	4,859	16,901	10,271	306	1064	646
20	Beaumont	5,984	33,745	12,659	377	2124	797

Commuters surveyed in the Waco District save on the average of some 16,000 to 21,000 vehicle miles per year; however, it should be noted that the number of observations or survey responses received from the Waco District was small and may not be statistically significant. Park-and-Pool users originating from within the Yoakum District save approximately 10,000 to

14,000 vehicle miles of travel per year. San Antonio's poolers average between 9,000 and 13,000 fewer vehicle miles of travel per year while those users of Park-and-Pool lots in the Beaumont area average 9,400 to 12,700 vehicle miles of savings.

B/C Analyses

As outlined under the section entitled "Case Scenarios", a total of 8 different approaches to calculating the Benefit/Cost (B/C) ratios for the 123 study sites were undertaken. The results of these B/C analyses are presented herein for the Park-and-Pool facilities. For simplicity purposes, only two of the 6 methods of computing VMT and fuel savings will be used in presenting the data analyses:

Method 2 - Means of travel characteristics by lot setting and a base VOR of 1.35 persons per vehicle.

Method 5 - Means of travel characteristics by lot setting and a base VOR of 1.10 persons per vehicle.

As was presented in the section on estimates of VMT and fuel savings (see Table 120), the use of means by lot location (i.e., rural, urban fringe, urban) results in benefits greater than the use of SDHPT District means (Methods 1 and 4) by some 2 to 4 percent. Also, the use of travel means by lot location or setting yields benefits less than those calculated by means from the entire data base (Methods 3 and 6) by approximately 1 to 2 percent. Therefore, the B/C ratios derived by Method 2 and Method 5 above will provide an indication of the Park-and-Pool lots general effectiveness and will avoid the extremes of low and high benefit estimates.

Scenarios A

This investigation considers the home-to-lot-to-destination travel and estimates construction cost at $1000 per space, maintenance cost at $40 per

space per year, subcompact operating cost at 9.3 cents per mile, and non-subcompact operating cost at 14.1 cents per mile. B/C ratios for the base VOR condition of 1.35 persons per vehicle ranged from .70 to 9.91 for the 123 Park-and-Pool lots with the average B/C ratio for all mode-change facilities investigated being 3.17. Only two of the lots (TAR B and TAR 13) fell below the threshold level of 1.00.

Using a base VOR of 1.10 persons per vehicle yields B/C ratios for the parking areas in the range of 1.05 to 13.30. The average B/C for all 123 facilities was computed to be 4.36.

Scenario B

Scenario B considers only the lot-to-destination travel by Park-and-Pool users and incorporates the same cost estimates as Scenario A, described above. For a base VOR of 1.35 persons per vehicle, the B/C ratios ranged from .76 to 10.22 and averaged 3.33 for all 123 facilities. Only one of the parking lots (TAR 13) failed to meet the threshold level (1.00) of economic feasibility.

The B/C ratios varied from 1.02 to 17.65 and averaged 4.38 for the study sites by using a base VOR of 1.10 persons per vehicle. As pointed out in the discussion of "VMT and Fuel Savings", small difference exist between the two approaches of estimating pooling benefits (total home-to-destination versus lot-to-destination only). The B/C ratios for this Scenario and for Scenario A are quite comparable.

Scenario C

This investigation considered total travel from home-to-lot-to-destination and estimated the cost of construction at $1000 per space, cost of maintenance at $40 per space per year, subcompact operating cost at 34.2

cents per mile, and non-subcompact operating cost at 50.7 cents per mile. Assuming a base VOR of 1.35 persons per vehicle, the calculated B/C ratios ranged from 2.88 to 36.09 and averaged 11.79 for all 123 study sites. Seventy-two, or 58% of the Park-and-Pool lots had a Benefit/Cost of greater than 10 to 1.

Using 1.10 persons per vehicle for the base travel condition, B/C ratios ranged from 4.14 to 48.33 and averaged 16.08 for all of the Park-and-Pool facilities. A total of 111 sites, or 90% of the lots, had B/C ratios larger than 10 to 1 using this method of calculating benefits.

Scenario D

This Scenario uses the same cost estimates as Scenario C above but only considers the lot-to-destination travel of the Park-and-Pool users. By assuming a base VOR condition of 1.35 persons per vehicle, the analysis indicates that B/C's range from 3.11 to 37.22 and average 12.37 for all 123 study sites.

If a 1.10 persons per vehicle base VOR is used in the benefit calculation, B/C ratios vary from 4.01 to 48.01 and average 15.96 for the Park-and-Pool facilities.

Scenario E

This analysis considers total travel from home-to-destination and estimates construction cost at $750 per space, maintenance cost at $25 per space per year, subcompact operating cost at 9.3 cents per mile and non-subcompact cost al 14.1 cents per mile. The B/C ratios range from 1.00 to 13.28 and average 4.30 for all study sites when a 1.35 base VOR is assumed. Only 6 of the 123 lots, or 4.9% of those analyzed, had a B/C of less than 2 to 1.

If the base travel condition of 1.10 persons per vehicle is assumed, B/C ratios vary from 1.47 to 17.80 and average 5.88 for all mode-change facilities. Using this approach, only one of the Park-and-Pool lots (TAR 13) shows a Benefit/Cost of less than 2 to 1.

Scenario F

This Benefit/Cost comparison uses identical cost estimates to Scenario E above but only considers the pooling part (lot-to-destination) of the commuters' travel. With a base VOR of 1.35 persons per vehicle, computed B/C ratios range from 1.09 to 13.69 and average 4.51 for the Park-and-Pool lots.

Using a 1.10 base VOR, the calculated B/C's vary from 1.42 to 17.69 and average 5.83 for the 123 study locations. By employing this approach to analyzing the Park-and-Pool B/C's, only one of the facilities (TAR 13) has less than a 2 to 1 Benefit/Cost ratio.

Scenario G

In this Scenario, the commuters' entire home-to-lot-to-destination travel is considered along with estimated cost of construction at $750 per space, cost of maintenance at $25 per space per year, subcompact operating cost at 34.2 cents per mile, and non-subcompact operating cost at 50.7 cents per mile. It should be noted that this approach of estimating costs is the most liberal of any of the Scenarios presented. The calculated B/C ratios range from 3.91 to 48.19 and average 15.79 for all 123 Park-and-Pool facilities when a base VOR of 1.35 persons per vehicle is assumed. A total of 111 lots, or 90% of those analyzed, had a B/C ratio of greater than 10 to 1 by using this approach.

By assuming a base VOR of 1.10 persons per vehicle, the B/C's range from 5.59 to 64.51 and averaged 21.51 for all study sites. Using this approach to

calculated B/C ratios, only 4 of the Park-and-Pool sites, or 3.3% of those studied, had a Benefit/Cost of less than 10 to 1.

Scenario H

The same cost estimates were used in this Scenario as those outlined above in Scenario G. However, only the lot-to-destination travel characteristics were used for computing the B/C's. Using the assumed 1.35 persons per vehicle as the base VOR condition, the B/C's for the 123 Park-and-Pool sites ranged from 4.21 to 49.69 and averaged 16.52.

Benefit/Cost calculations using a 1.10 base VOR resulted in a range of B/C's from 5.41 to 64.09 with an overall average of 21.34 for all study sites. Only 4 of the 123 Park-and-Pool facilities (3.3%) had a Benefit/Cost ratio of less than 10 to 1.

Summary of Scenarios

Table 130 presents a summary of the Benefit/Cost calculations for the 8 Scenarios discussed. Even in the worst, or most critical, case Scenario the B/C ratios for Park-and-Pool lots were very favorable in terms of economic feasibility; only 2 of the 123 Park-and-Pool facilities failed to meet the threshhold level (a B/C Ratio of 1.00) of economic recovery. Generally speaking, Park-and-Pool lots are extremely effective in achieving VMT reductions and fuel savings by the commuting public. Given the cost estimates used in the 8 scenarios, a public agency can expect to realize a $3.00 to $21.00 return on every dollar invested in improving these types of transportation facilities.

Table 130. Comparison of Benefit/Cost (B/C) Ratios for 123 Park-and-Pool Lots By Given Scenario

Scenario and Base VOR Condition:	Calculated B/C Ratios:		
	Low Value	High Value	Average For All Lots
Scenario A:			
1.35 ppv	.70	9.91	3.17
1.10 ppv	1.05	13.30	4.36
Scenario B:			
1.35 ppv	.76	10.22	3.33
1.10 ppv	1.02	17.65	4.38
Scenario C:			
1.35 ppv	2.88	36.09	11.79
1.10 ppv	4.14	48.33	16.08
Scenario D:			
1.35 ppv	3.11	37.22	12.37
1.10 ppv	4.01	48.02	15.96
Scenario E:			
1.35 ppv	1.00	13.28	4.30
1.10 ppv	1.47	17.80	5.88
Scenario F:			
1.35 ppv	1.09	13.69	4.51
1.10 ppv	1.42	17.69	5.83
Scenario G:			
1.35 ppv	3.91	48.19	15.79
1.10 ppv	5.59	64.51	21.51
Scenario H:			
1.35 ppv	4.21	49.69	16.52
1.10 ppv	5.41	64.09	21.34

Table 131 provides a listing of Park-and-Pool lots for the most critical analyses (Scenario A with a base VOR of 1.35 persons per vehicle) employed and ranks the locations in assending order of B/C ratio. In addition to presenting the B/C ratio for each of the 123 lots, the table provides the estimated annual VMT and fuel savings per pooling commuter for the particular

Table 131. Ranking of Park-and-Pool Lot B/C's for Most Critical Analysis (Scenario A with Base VOR or 1.35 persons per vehicle)

Rank	Lot ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC	Rank	Lot ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC
1	TAR13	2071	127	0.70	63	DAL C	7612	468	2.94
2	TAR B	2743	169	0.97	64	BRA 3	8272	524	2.94
3	TAR19	2850	175	1.02	65	ATA 1	7692	492	2.97
4	DAL F	3416	210	1.24	66	DEN 2	7708	493	2.98
5	DEN 2	3721	238	1.37	67	MON 2	8386	531	2.98
6	DAL E	3872	238	1.43	68	DEN 6	7732	494	2.99
7	TAR17	4088	252	1.51	69	GUA 2	7866	503	3.04
8	BUR 3	4281	274	1.59	70	TAR C	7907	487	3.06
9	JOH 2	4358	279	1.62	71	BRA 1	7910	506	3.06
10	TYL 2	4496	287	1.68	72	BUR 1	7977	510	3.09
11	DRA 3	5170	328	1.79	73	COM 1	8026	513	3.11
12	ORA 1	5185	329	1.79	74	KEN 1	8125	519	3.15
13	JAS 1	5275	337	1.99	75	JAS 4	8138	520	3.15
14	TAR 5	5769	366	2.01	76	DAL D	8193	504	3.17
15	HAR 8	5955	377	2.08	77	JOH 3	8211	525	3.18
16	VIC 5	5489	351	2.08	78	TYL 3	8317	532	3.22
17	DAL A	5539	341	2.10	79	DEN 4	8574	548	3.33
18	TAR11	6037	383	2.11	80	DEN 5	8780	561	3.41
19	HAD 2	5577	357	2.12	81	VIC 4	9601	608	3.43
20	SMI 2	5710	365	2.17	82	WHA 1	8841	565	3.43
21	TAR 4	5723	352	2.17	83	COM 2	8842	565	3.43
22	HAR 3	6292	399	2.20	84	DAL H	8859	545	3.44
23	BRA 2	5808	371	2.21	85	WIS 3	8993	575	3.50
24	TAR20	5818	358	2.21	86	MIL 1	8993	575	3.50
25	TAR16	5854	360	2.23	87	MON 1	9979	632	3.57
26	FOR 2	6360	403	2.23	88	VIC 3	10194	646	3.65
27	TAR 1	6467	410	2.27	89	BOS 2	9434	603	3.67
28	HAR 4	6485	411	2.27	90	WIL 1	9866	631	3.85
29	TAR E	5990	369	2.28	91	ATA 2	10060	643	3.93
30	RUS 1	6029	385	2.30	92	PAR 2	10069	644	3.93
31	HAR 5	6045	372	2.30	93	LIB 2	10082	645	3.94
32	TAR 6	6267	386	2.39	94	ELL 1	10366	663	4.05
33	GAL 1	6872	435	2.42	95	SOM 1	10394	664	4.06
34	TAR10	6892	437	2.43	96	PAR 3	10417	666	4.07
35	TAR 2	6959	441	2.45	97	AUS 1	10519	672	4.11
36	TAR F	6412	395	2.45	98	MON 3	10648	681	4.16
37	TAR 3	6975	442	2.46	99	GAL 2	11633	737	4.19
38	TAR12	6426	395	2.46	100	GUA 1	10747	687	4.20
39	TAR A	6479	399	2.48	101	HOO 3	10794	690	4.22
40	HAR 2	7053	447	2.49	102	JAS 2	10832	692	4.24
41	HAD 1	6522	417	2.50	103	LAV 1	10942	699	4.28
42	BUR 2	6547	419	2.51	104	MON 5	11060	707	4.33
43	ELL 2	6561	419	2.51	105	VIC 2	11135	712	4.36
44	TAR15	6584	405	2.52	106	MED 2	11139	712	4.36
45	ROC B	6596	422	2.53	107	PAR 1	11168	714	4.37
46	TAR G	6641	409	2.54	108	WIS 2	11209	717	4.39
47	VAN 1	6675	427	2.56	109	JOH 1	11273	721	4.42

Table 131. Ranking of Park-and-Pool Lot B/C's for Most Critical Analysis (Scenario A with Base VOR or 1.35 Persons Per Vehicle) (Cont'd)

Rank	ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC	Rank	ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC
48	FOR 1	7301	463	2.58	110	BEX 1	12420	787	4.48
50	NEW 5	6853	438	2.63	111	ERA 1	11457	732	4.49
51	DEN 7	6855	438	2.63	112	WIS 1	11650	745	4.57
52	DAL G	7029	433	2.70	113	HOO 1	11650	745	4.57
53	TAR 9	7030	449	2.70	114	MON 4	11701	748	4.59
54	HEN 2	7088	453	2.73	115	DEN 1	12717	813	5.00
55	TAR D	7134	439	2.74	116	DAL I	12917	795	5.08
56	ROC C	7239	463	2.79	117	HOO 2	12933	827	5.09
57	ROC D	7294	466	2.81	118	AUS 2	12942	827	5.09
58	TAR 8	7336	451	2.82	119	BAN 1	12931	891	5.49
59	DEN 3	7466	477	2.88	120	HIL 1	16781	1073	6.64
60	HAR 7	8149	516	2.89	121	NEW 1	18749	1199	7.43
61	MED 1	7503	480	2.89	122	MCL 1	21271	1348	7.77
62	HAR 6	8197	519	2.91	123	TYL 1	24882	1591	9.91

Note: Scenario assumes $1000 per space with 5 year life at 15% interest, $40 per space per year operating cost, 9.3 cents per mi for subcompacts, 14.1 cents for standards, using means from lot setting except means for mileage and usage at each lot.

facility. Similarly, Table 132 summarizes the study sites in assending order to B/C ratios for the most liberal approach (Scenario G at 1.10 ppv) used in ananlyzing the effectiveness of these ridesharing facilities.

Figure 66 presents the graphic relationship between the computed B/C ratios and the annual VMT savings per commuter for the most critical analyses (Scenario A); the figure shows both the 1.35 and 1.10 persons per vehicle base VOR conditions used in the calculations. Similarly, Figure 67 illustrates the realtionship between B/C ratios and fuel savings for the scenario while Figure 68 presents the annual fuel savings versus VMT reduction observed at the 123 Park-and-Pool sites.

Figures 69, 70 and 71 show the relationships of B/C versus VMT, B/C versus Fuel, and Fuel versus VMT, respectively, for the most liberal investigation (Scenario G). All three figures present the calculated values for the base VOR's of 1.35 and 1.10 persons per vehicle.

Table 133 summarizes each of the 123 Park-and-Pool lots, in alphabetical order, and presents the calculated B/C ratios for each lot indicated by the particular scenario. Only the 1.35 persons per vehicle base occupancy rate is shown in the summary of B/C's; a similar table base of a 1.10 VOR base would show even greater Benefit/Cost relationships. A more complete cross reference of Lot Identification to specific location in provided in Appendix C of this report.

Table 132. Ranking of Park-and-Pool Lot B/C's for Most Liberal Analysis (Scenario G at 1.10 persons per vehicle)

Rank	Lot ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC	Rank	Lot ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC
1	TAR13	2933	180	5.59	63	ATA 1	10343	4661	19.97
2	TAR B	4236	261	8.12	64	BRA 3	11260	5713	20.01
3	TAR19	5006	308	9.61	65	DEN 3	10433	667	20.14
4	DAL F	5094	313	9.79	66	GUA 2	10545	674	20.36
5	TAR17	5352	329	10.29	67	DEN 6	10565	675	20.40
6	DEN 2	5369	343	10.31	68	KEN 2	10658	681	20.58
7	DAL E	5385	331	10.35	69	JAS 4	10693	684	20.65
8	TYL 2	5898	377	11.34	70	BRA 1	10703	684	20.67
9	BUR 3	6324	404	12.17	71	BUR 1	10738	686	20.73
10	ORA 3	7089	449	12.55	72	TAR C	10787	664	20.85
11	ORA 1	7284	462	12.90	73	MON 2	11873	752	21.10
12	JOH 2	6831	437	13.15	74	JOH 3	11030	705	21.30
13	JAS 1	7171	458	13.81	75	DAL D	11042	680	21.34
14	TAR 5	7959	504	14.11	76	COM 1	11293	722	21.81
15	HAR 8	8060	511	14.29	77	KEN 1	11297	722	21.82
16	TAR11	8191	519	14.52	78	DAL H	11511	708	22.25
17	VIC 5	7632	488	14.70	79	WIS 3	11795	754	22.79
18	HAR 3	8367	530	14.84	80	MIL 1	11795	754	22.79
19	HAD 2	7720	494	14.87	81	DEN 4	11976	766	23.14
20	TAR20	7725	475	14.90	82	TYL 3	11984	766	23.15
21	DAL A	7753	477	14.95	83	COM 2	12136	776	23.45
22	TAR16	7831	482	15.10	84	VIC 4	13236	839	23.54
23	SMI 2	8018	513	15.45	85	DEN 5	12352	790	23.87
24	BRA 2	8093	517	15.60	86	WHA 1	12509	800	24.17
25	TAR 1	8807	558	15.63	87	BOX 2	12566	803	24.28
26	TAR E	8127	500	15.68	88	VIC 3	13735	870	24.43
27	HAR 5	8128	500	15.68	89	MON 1	14048	890	24.99
28	FOR 2	9005	571	15.98	90	ATA 2	13137	840	25.39
29	HAR 4	9014	571	15.99	91	PAR 2	13283	849	25.67
30	TAR 4	8334	513	16.08	92	WIL 1	13381	855	25.86
31	RUS 1	8408	537	16.21	93	LIB 2	13816	883	26.71
32	TAR 2	9183	582	16.30	94	ELL 1	13913	889	26.90
33	TAR 6	8448	520	16.30	95	SOM 1	13938	891	26.95
34	TAR10	9354	593	16.60	96	GAL 2	15256	967	27.15
35	HAD 1	8611	550	16.60	97	PAR 3	14080	900	27.22
36	GAL 1	9491	601	16.85	98	GUA 1	14244	911	27.54
37	ROC B	8739	559	16.85	99	AUS 1	14357	918	27.70
38	HAR 2	9537	604	16.93	100	MON 5	14460	924	27.96
39	TAR12	8776	540	16.94	101	HOO 3	14550	930	28.13
40	TAR A	8802	542	16.99	102	MON 3	14686	939	28.40
41	TAR 3	9676	613	17.18	103	JOH 1	14735	942	28.49
42	TAR15	8930	550	17.24	104	WIS 2	14753	943	28.53
43	TAR 7	9024	555	17.42	105	PAR 1	14877	951	28.77
44	DEN 7	9039	578	17.44	106	JAS 2	15042	962	29.08
45	FOR 1	9936	630	17.64	107	VIC 2	15042	962	29.09
46	TAR G	9220	567	17.80	108	HOO 1	15524	992	30.02
47	TAR F	9230	568	17.82	109	ERA 1	15578	996	30.13

Table 132. Ranking of Park-and-Pool Lot B/C's for Most Liberal Analysis (Senario G at 1.10 Persons Per Vehicle) (Con't)

Rank	ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC	Rank	ID	Annual VMT Per Pooler	Annual Fuel Per Pooler	BC
48	NEW 5	9264	592	17.87	110	LAV 1	15722	1005	30.41
49	ELL 2	9273	593	17.89	111	MON 4	15789	1009	30.54
50	VAN 1	9313	595	17.97	112	BEX 1	17385	1102	30.95
51	BUR 2	9349	598	18.04	113	WIS 1	16046	1026	31.04
52	DAL G	9482	583	18.31	114	DEN 1	16657	1065	32.22
53	TAR D	9491	584	18.33	115	MED 2	16785	1073	32.47
54	HEN 2	9523	609	18.38	116	HOO 2	17178	1098	33.24
55	TAR 9	9605	614	18.53	117	DAL I	17200	1058	33.31
56	TAR 8	9857	607	19.04	118	AUS 2	17324	1107	33.52
57	ROC D	9929	635	19.16	119	BAN 1	18464	1180	35.73
58	MED 1	9976	638	19.25	120	HIL 1	22139	1415	42.87
59	HAR 7	10852	688	19.28	121	NEW 1	24272	1552	47.01
60	HAR 6	11053	700	19.64	122	MCL 1	27612	1750	49.23
61	ROC D	10256	656	19.80	123	TYL 1	33289	2128	64.51
62	DAL C	10287	633	19.88					

Note: Scenario assumes $750 per space with 5 year life at 15% interest, $25 per space per year operating cost, 34.2 cents per mi for subcompacts, 50.7 cents for standards, using means from lot setting except means for mileage and usage at each lot.

Table 133. Listing of Calculated B/C Ratios By Park-and-Pool Lot for Eight Scenarios Assuming a Base VOR of 1.35 persons per vehicle

Lot ID:	Location Of Lot:	B/C Ratio Calculated From Scenario							
		A	B	C	D	E	F	G	H
ATA 1	Atascosa County	2.97	3.08	11.07	11.46	4.03	4.17	14.82	15.35
ATA 2	Atascosa County	3.93	3.97	14.51	14.67	5.30	5.36	19.42	19.63
AUS 1	Austin County	4.11	4.32	15.18	15.92	5.55	5.82	20.31	21.29
AUS 2	Austin County	5.09	5.25	18.71	19.30	6.85	7.07	25.01	25.80
BAN 1	Bandera County	5.49	5.62	20.15	20.62	7.38	7.56	26.93	27.56
BEX 1	Bexar County	4.48	4.94	16.51	18.17	6.04	6.65	22.08	24.29
BOS 2	Bosque County	3.67	3.78	13.60	13.98	4.97	5.10	18.20	18.70
BRA 1	Brazoria County	3.06	3.19	11.38	11.85	4.15	4.32	15.24	15.87
BRA 2	Brazoria County	2.21	2.37	8.32	8.88	3.01	3.22	11.16	11.91
BRA 3	Brazoria County	2.94	3.14	10.95	11.68	3.98	4.25	14.67	15.63
BUR 1	Burleson County	3.09	3.20	11.48	11.90	4.18	4.34	15.37	15.94
BUR 2	Burleson County	2.51	2.74	9.40	10.24	3.41	3.72	12.60	13.72
BUR 3	Burleson County	1.59	1.80	6.10	6.85	2.19	2.47	8.20	9.20
COM 1	Comal County	3.11	3.35	11.55	12.43	4.21	4.53	15.47	16.64
COM 2	Comal County	3.43	3.62	12.74	13.42	4.65	4.90	17.05	17.97
DAL A	Dallas County	2.10	2.25	7.94	8.47	2.87	3.06	10.65	11.36
DAL C	Dallas County	2.94	3.06	10.96	11.40	3.98	4.15	14.68	15.27
DAL D	Dallas County	3.17	3.30	11.80	12.26	4.29	4.46	15.81	16.41
DAL E	Dallas County	1.43	1.52	5.51	5.85	1.97	2.10	7.41	7.87
DAL F	Dallas County	1.24	1.40	4.84	5.42	1.73	1.94	6.52	7.29
DAL G	Dallas County	2.70	2.81	10.11	10.50	3.67	3.81	13.54	14.07
DAL H	Dallas County	3.44	3.48	12.77	12.93	4.65	4.71	17.10	17.30
DAL I	Dallas County	5.08	5.23	18.69	19.24	6.84	7.04	24.98	25.72
DEN 1	Denton County	5.00	5.07	18.38	18.63	6.73	6.82	24.58	24.90
DEN 2	Denton County	1.37	1.51	5.28	5.81	1.89	2.09	7.11	7.82
DEN 3	Denton County	2.88	3.09	10.74	11.49	3.91	4.18	14.38	15.38
DEN 4	Denton County	3.33	3.56	12.35	13.21	4.50	4.82	16.53	17.68
DEN 5	Denton County	3.41	3.68	12.65	13.61	4.61	4.97	16.93	18.21
DEN 6	Denton County	2.99	3.14	11.12	11.68	4.05	4.25	14.90	15.64
DEN 7	Denton County	2.63	2.68	9.85	10.03	3.58	3.65	13.20	13.45
ELL 1	Ellis County	4.05	4.19	14.96	15.47	5.47	5.66	20.01	20.69
ELL 2	Ellis County	2.51	2.72	9.42	10.18	3.42	3.70	12.63	13.63
ERA 1	Erath County	4.49	4.70	16.55	17.30	6.05	6.33	22.13	23.13
FOR 1	Fort Bend County	2.58	2.75	9.65	10.29	3.50	3.74	12.93	13.78
FOR 2	Fort Bend County	2.23	2.50	8.39	9.36	3.04	3.40	11.25	12.55
GAL 1	Galveston County	2.42	2.63	9.08	9.84	3.29	3.57	12.17	13.19
GAL 2	Galveston County	4.19	4.28	15.46	15.79	5.65	5.77	20.68	21.11
GUA 1	Guadalupe County	4.20	4.30	15.51	15.87	5.67	5.81	20.75	21.23
GUA 2	Guadalupe County	3.04	3.14	11.32	11.69	4.12	4.26	15.16	15.66
HAD 1	Hardin County	2.50	2.55	9.36	9.55	3.40	3.47	12.55	12.80
HAD 2	Hardin County	2.12	2.25	7.90	8.48	2.89	3.07	10.71	11.37
HAR 2	Harris County	2.49	2.64	9.34	9.86	3.38	3.58	12.49	13.21
HAR 3	Harris County	2.20	2.29	8.30	8.61	3.00	3.12	11.13	11.55
HAR 4	Harris County	2.27	2.49	8.56	9.35	3.10	3.39	11.48	12.53
HAR 5	Harris County	2.30	2.39	8.67	8.99	3.14	3.26	11.63	12.06
HAR 6	Harris County	2.91	3.07	10.85	11.44	3.95	4.17	14.54	15.33
HAR 7	Harris County	2.89	3.01	10.79	11.21	3.92	4.08	14.45	15.02
HAR 8	Harris County	2.08	2.21	7.85	8.31	2.84	3.01	10.53	11.15
HEN 2	Henderson County	2.73	2.83	10.19	10.54	3.70	3.83	13.65	14.13

Lot ID:	Location Of Lot:	B/C Ratio Calculated From Scenario							
		A	B	C	D	E	F	G	H
HIL 1	Hill County	6.64	6.77	24.30	24.77	8.92	9.09	32.47	33.09
HOO 1	Hood County	4.57	4.70	16.83	17.30	6.16	6.33	22.50	23.13
HOO 2	Hood County	5.09	5.22	18.70	19.16	6.85	7.02	24.99	25.62
HOO 3	Hood County	4.22	4.39	15.58	16.17	5.70	5.91	20.84	21.63
JAS 1	Jasper County	1.99	2.09	7.55	7.89	2.73	2.85	10.13	10.59
JAS 2	Jasper County	4.24	4.51	15.64	16.64	5.72	6.09	20.92	22.25
JAS 4	Jasper County	3.15	3.20	11.71	11.90	4.27	4.34	15.69	15.94
JOH 1	Johnson County	4.42	4.47	16.28	16.47	5.95	6.02	21.77	22.02
JOH 2	Johnson County	1.62	1.94	6.21	7.34	2.23	2.65	8.35	9.85
JOH 3	Johnson County	3.18	3.29	11.82	12.23	4.31	4.46	15.83	16.38
KEN 1	Kendall County	3.15	3.36	11.70	12.46	4.26	4.54	15.66	16.68
KEN 2	Kendall County	2.98	3.16	11.09	11.76	4.04	4.28	14.85	15.74
LAV 1	Lavaca County	4.28	4.70	15.80	17.30	5.78	6.33	21.13	23.13
LIB 2	Liberty County	3.94	4.15	14.55	15.31	5.31	5.59	19.46	20.47
MCL 1	Mc Lennan County	7.77	7.84	28.37	28.64	10.42	10.52	37.90	38.25
MED 1	Medina County	2.89	2.97	10.79	11.07	3.93	4.03	14.45	14.83
MED 2	Medina County	4.36	4.99	16.08	18.33	5.88	6.71	21.51	24.51
MIL 1	Milam County	3.50	3.55	12.96	13.15	4.73	4.80	17.35	17.60
MON 1	Montgomery County	3.57	3.97	13.24	14.67	4.83	5.36	17.72	19.62
MON 2	Montgomery County	2.98	3.33	11.10	12.38	4.04	4.51	14.87	16.58
MON 3	Montgomery County	4.16	4.41	15.37	16.26	5.62	5.95	20.56	21.75
MON 4	Montgomery County	4.59	4.77	16.90	17.56	6.18	6.43	22.60	23.48
MON 5	Montgomery County	4.33	4.77	15.97	16.16	5.84	5.91	21.36	21.61
NEW 1	Newton County	7.43	7.46	27.16	27.26	9.98	10.01	36.29	36.41
NEW 5	Newton County	2.63	2.74	9.84	10.24	3.58	3.72	13.19	13.72
ORA 1	Orange County	1.79	1.99	6.81	7.54	2.46	2.72	9.15	10.12
ORA 3	Orange County	1.79	1.93	6.79	7.31	2.45	2.64	9.13	9.81
PAR 1	Parker County	4.37	4.50	16.13	16.57	5.90	6.06	21.57	22.16
PAR 2	Parker County	3.93	4.01	14.53	14.81	5.31	5.41	19.43	19.81
PAR 3	Parker County	4.07	4.24	15.03	15.64	5.49	5.72	20.11	20.92
ROC B	Rockwall County	2.53	2.59	9.47	9.69	3.44	3.52	12.69	12.98
ROC C	Rockwall County	2.79	2.94	10.41	10.96	3.78	3.99	13.94	14.68
ROC D	Rockwall County	2.81	3.03	10.49	11.28	3.81	4.11	14.05	15.10
RUS 1	Rusk County	2.30	2.46	8.64	9.23	3.13	3.35	11.59	12.38
SMI 2	Smith County	2.17	2.34	8.18	8.79	2.96	3.19	10.97	11.79
SOM 1	Somervell County	4.06	4.20	15.00	15.50	5.48	5.67	20.07	20.73
TAR A	Tarrant County	2.48	2.59	9.31	9.72	3.37	3.53	12.48	13.03
TAR B	Tarrant County	0.97	1.13	3.86	4.44	1.36	1.58	5.22	5.98
TAR C	Tarrant County	3.06	3.20	11.39	11.93	4.14	4.34	15.25	15.97
TAR D	Tarrant County	2.74	2.83	10.26	10.56	3.73	3.83	13.75	14.14
TAR E	Tarrant County	2.28	2.39	8.59	8.97	3.11	3.25	11.53	12.02
TAR F	Tarrant County	2.45	2.68	9.21	10.02	3.34	3.64	12.35	13.43
TAR G	Tarrant County	2.54	2.70	9 54	10.12	3.46	3.67	12.79	13.56
TAR 1	Tarrant County	2.27	2.43	8.53	9.10	3.09	3.30	11.44	12.20
TAR 2	Tarrant County	2.45	2.52	9.19	9.46	3.33	3.43	12.32	12.67
TAR 3	Tarrant County	2.46	2.69	9.21	10.04	3.34	3.65	12.35	13.45
TAR 4	Tarrant County	2.17	2.40	8.21	9.01	2.97	3.26	11.01	12.08
TAR 5	Tarrant County	2.01	2.18	7.60	8.23	2.74	2.98	10.20	11.04
TAR 6	Tarrant County	2.39	2.49	9.00	9.35	3.26	3.39	12.06	12.53
TAR 7	Tarrant County	2.58	2.67	9.68	10.01	3.51	3.63	12.97	13.41
TAR 8	Tarrant County	2.82	2.93	10.56	10.94	3.83	3.97	14.14	14.65
TAR 9	Tarrant County	2.70	2.84	10.10	10.60	3.67	3.86	13.53	14.21

Lot ID:	Location Of Lot:	B/C Ratio Calculated From Scenario							
		A	B	C	D	E	F	G	H
TAR10	Tarrant County	2.43	2.58	9.10	9.67	3.30	3.51	12.20	12.96
TAR11	Tarrant County	2.11	2.25	7.96	8.45	2.88	3.06	10.68	11.34
TAR12	Tarrant County	2.46	2.58	9.23	9.67	3.34	3.51	12.37	12.97
TAR13	Tarrant County	0.70	0.76	2.88	3.11	1.00	1.09	3.91	4.21
TAR15	Tarrant County	2.52	2.63	9.46	9.87	3.43	3.58	12.68	13.22
TAR16	Tarrant County	2.23	2.30	8.40	8.67	3.04	3.14	11.26	11.63
TAR17	Tarrant County	1.51	1.54	5.82	5.93	2.09	2.12	7.83	7.97
TAR19	Tarrant County	1.02	1.31	4.02	5.09	1.42	1.82	5.43	6.85
TAR20	Tarrant County	2.21	2.28	8.34	8.57	3.02	3.10	11.19	11.50
TYL 1	Tyler County	9.91	10.22	36.09	37.22	13.28	13.69	48.19	49.69
TYL 2	Tyler County	1.68	1.71	6.41	6.51	2.31	2.34	8.62	8.74
TYL 3	Tyler County	3.22	3.55	11.97	13.51	4.36	4.80	16.03	17.60
VAN 1	Van Zandt County	2.56	2.74	9.59	10.24	3.48	3.72	12.85	13.72
VIC 2	Victoria County	4.36	4.54	16.08	16.72	5.88	6.12	21.50	22.36
VIC 3	Victoria County	3.65	3.85	13.53	14.25	4.94	5.20	18.10	19.07
VIC 4	Victoria County	3.43	3.72	12.73	13.77	4.64	5.03	17.04	18.43
VIC 5	Victoria County	2.08	2.22	7.86	8.37	2.84	3.03	10.54	11.23
WHA 1	Wharton County	3.43	3.72	12.74	13.77	4.65	5.03	17.05	18.43
WIL 1	Wilson County	3.85	4.02	14.23	14.84	5.20	5.42	19.04	19.86
WIS 1	Wise County	4.57	4.83	16.83	17.78	6.16	6.51	22.50	23.78
WIS 2	Wise County	4.39	4.47	16.19	16.47	5.92	6.02	21.65	22.02
WIS 3	Wise County	3.50	3.55	12.96	13.15	4.73	4.80	17.35	17.60

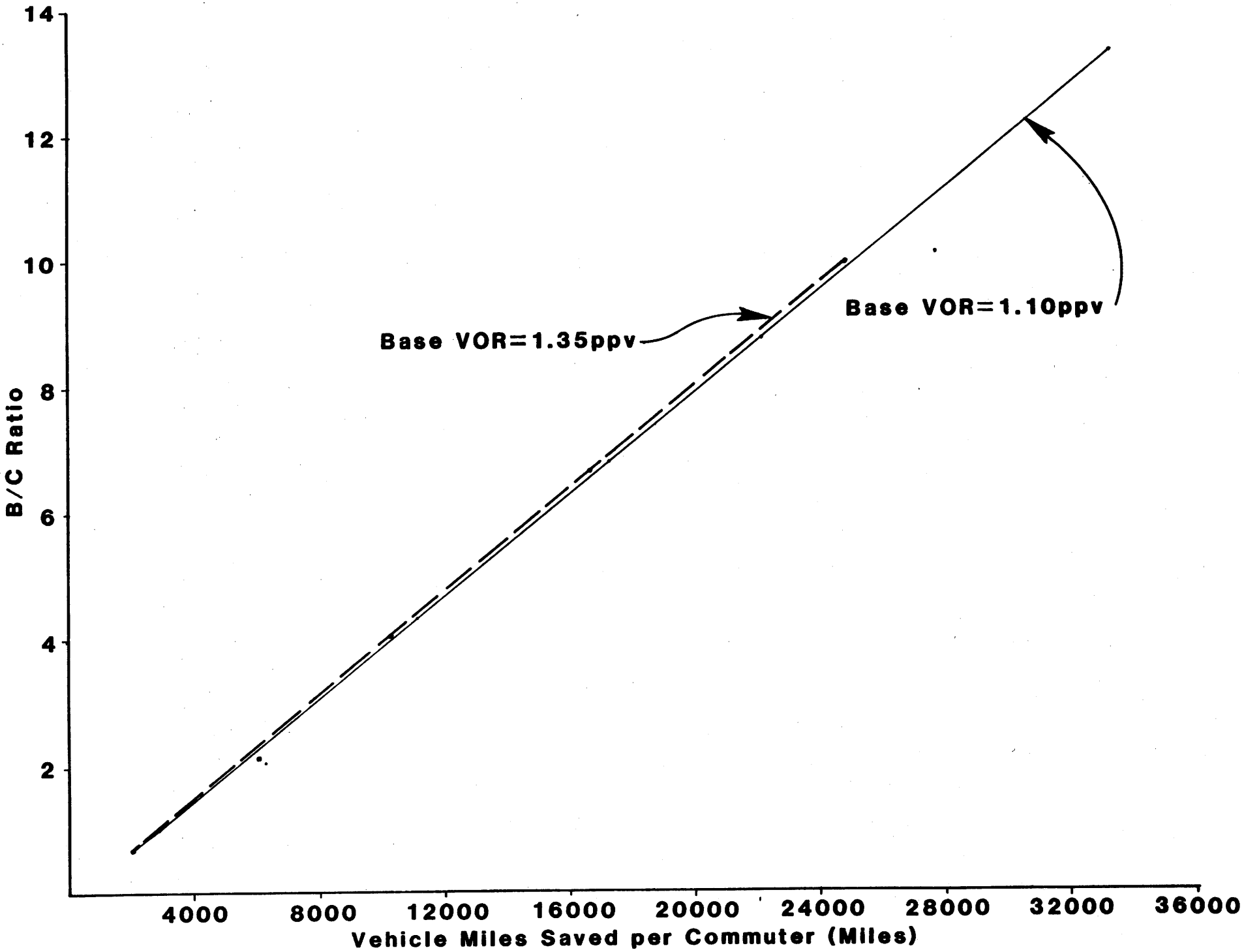


Figure 66: B/C Ratio Versus Annual VMT Estimated by Scenario A (n=123)

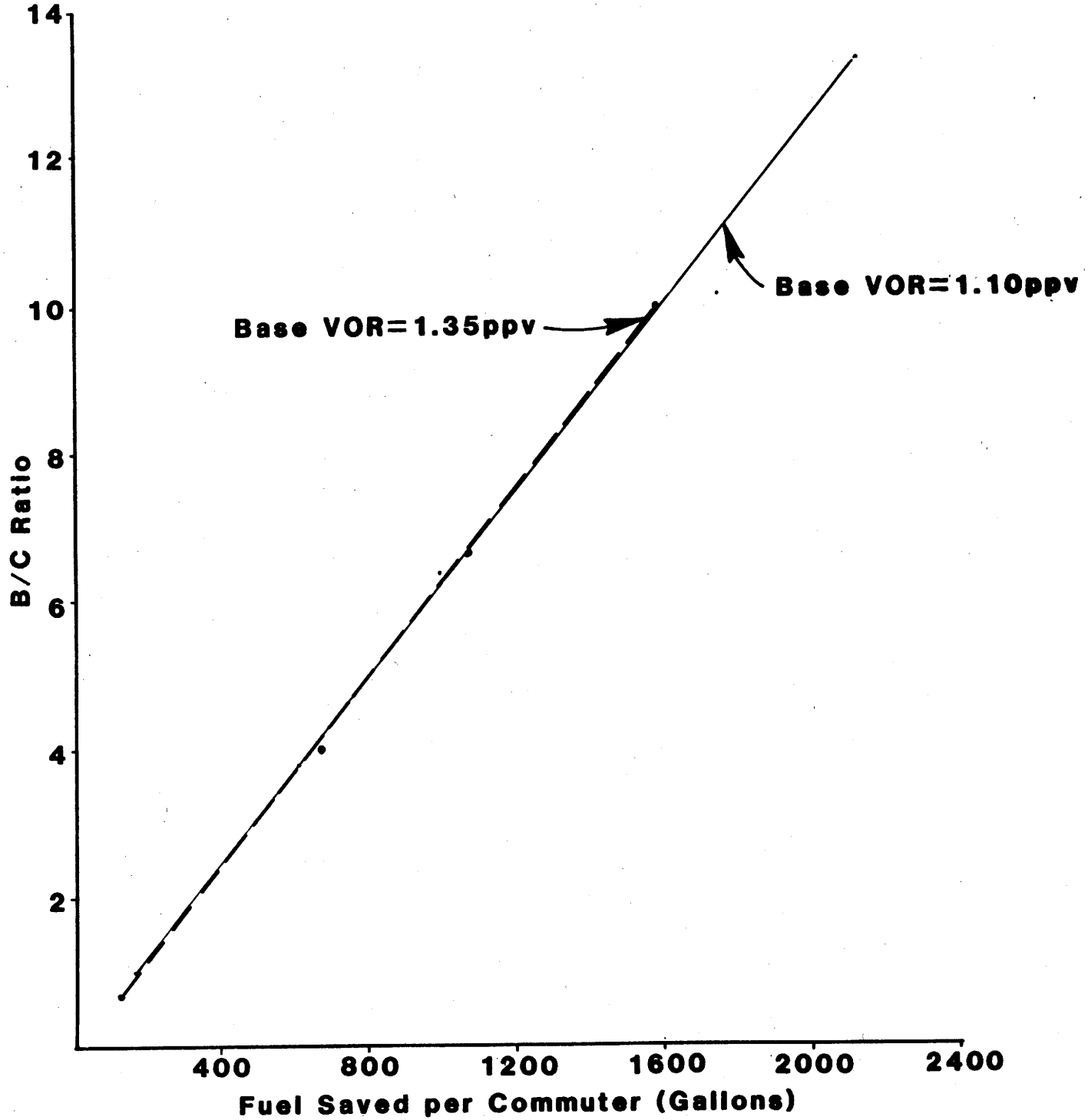


Figure 67: B/C Ratio Versus Annual Fuel Estimated by Scenario A (n=123)

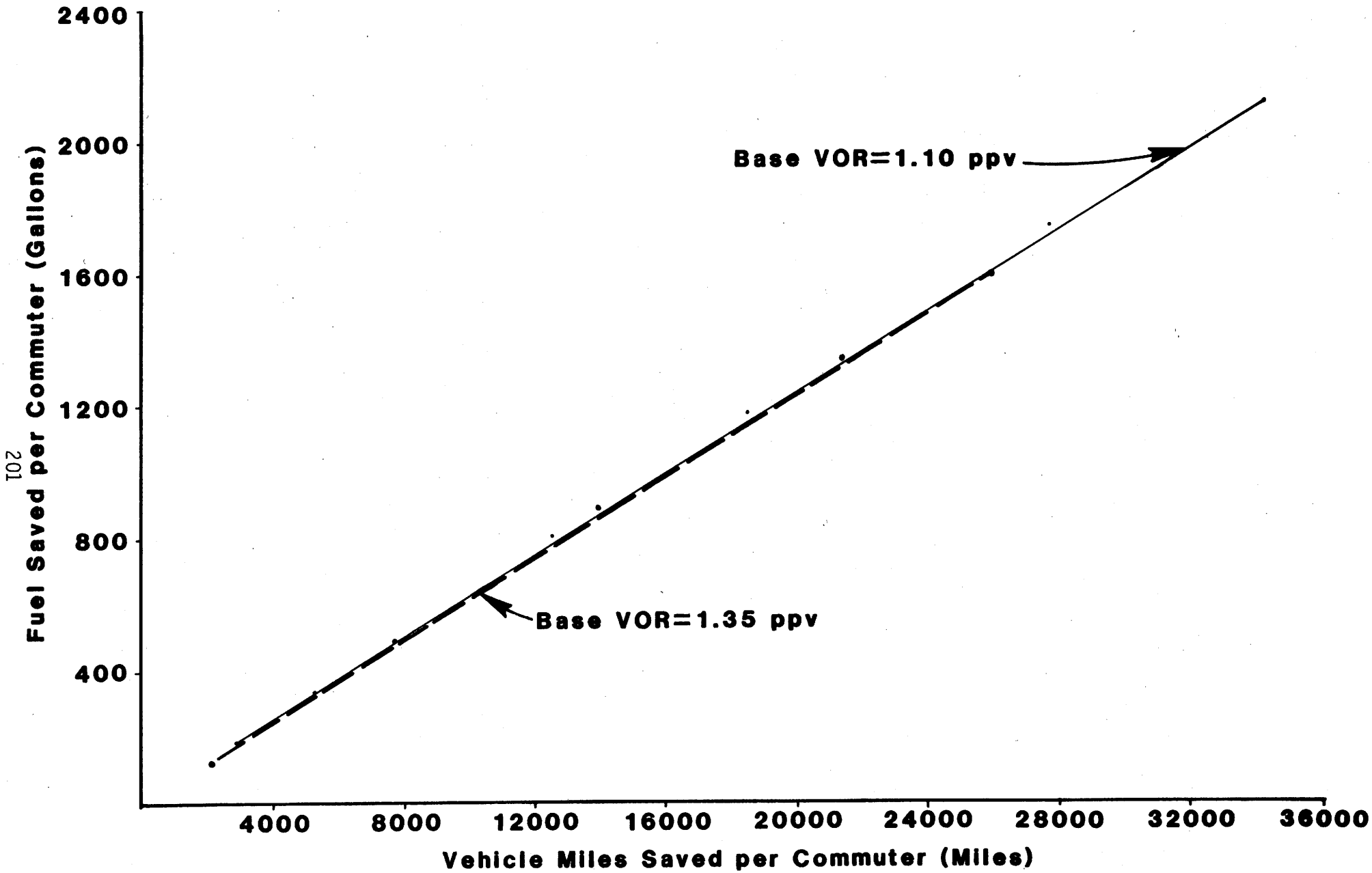


Figure 68: Annual Fuel Savings Versus Annual VMT Reduction Estimated by Scenario A (n=123)

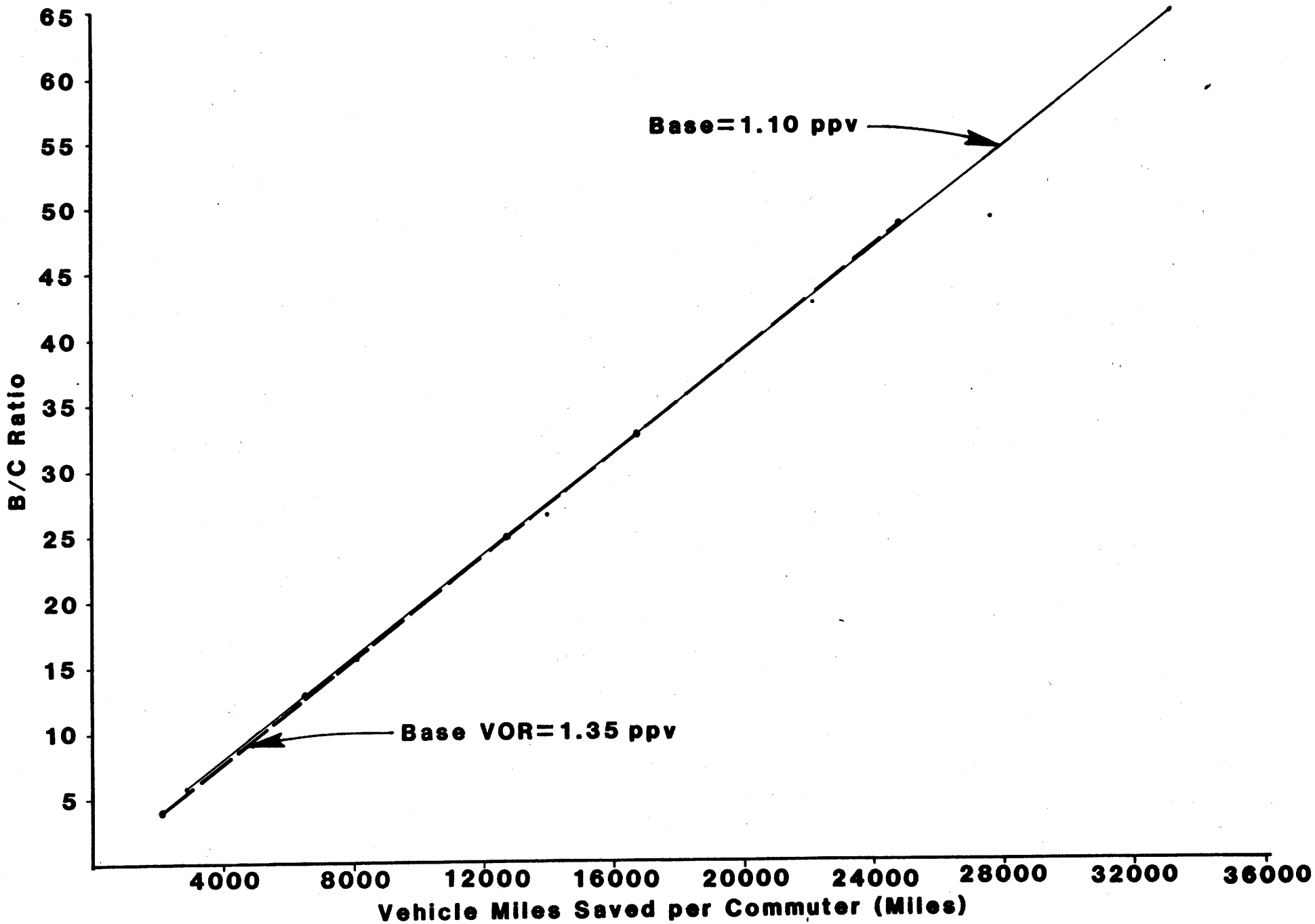


Figure 69: B/C Ratio Versus Annual VMT Estimated by Scenario G (n=123)

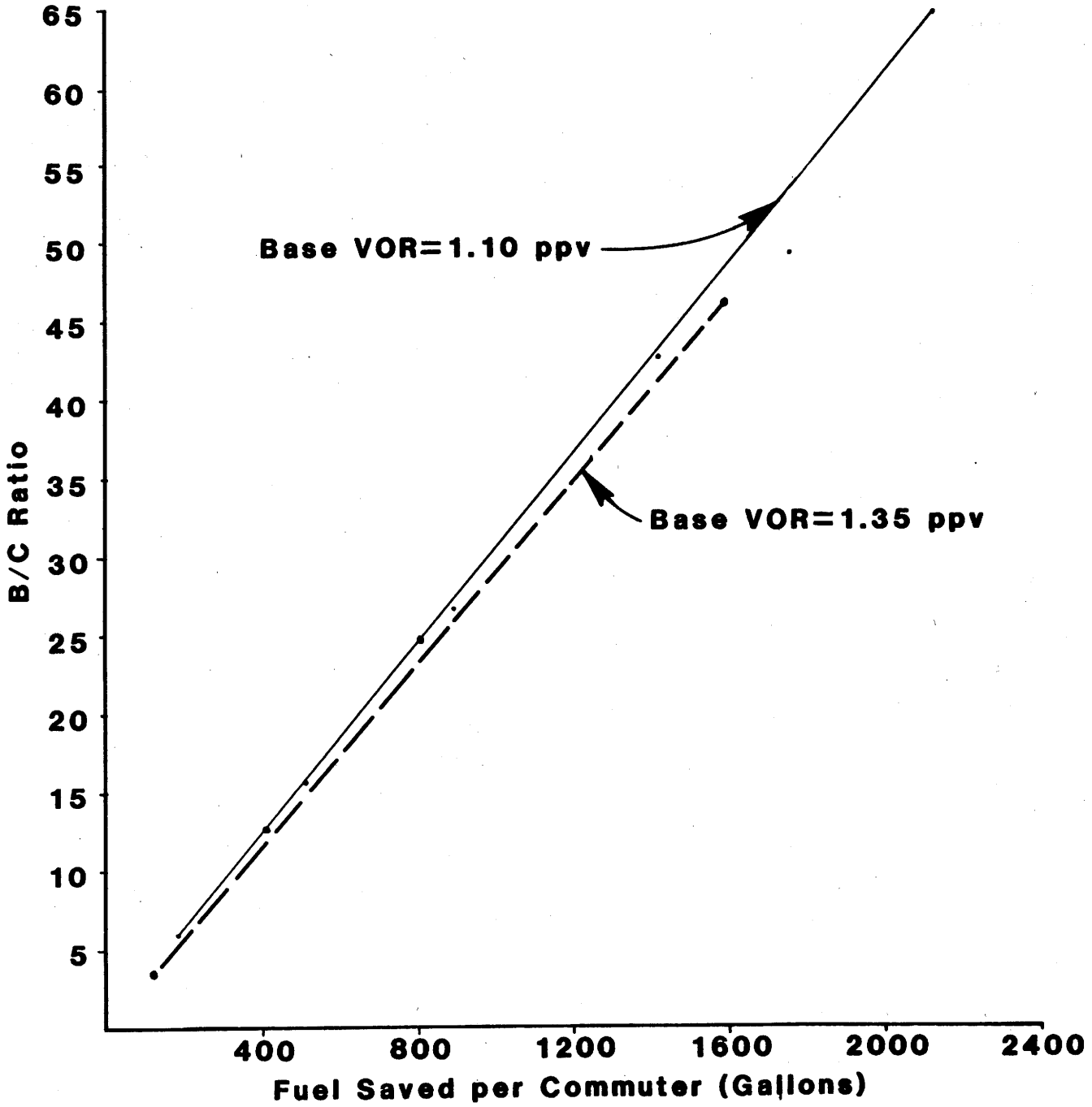


Figure 70: B/C Ratio Versus Fuel Estimated by Scenario G (n=123)

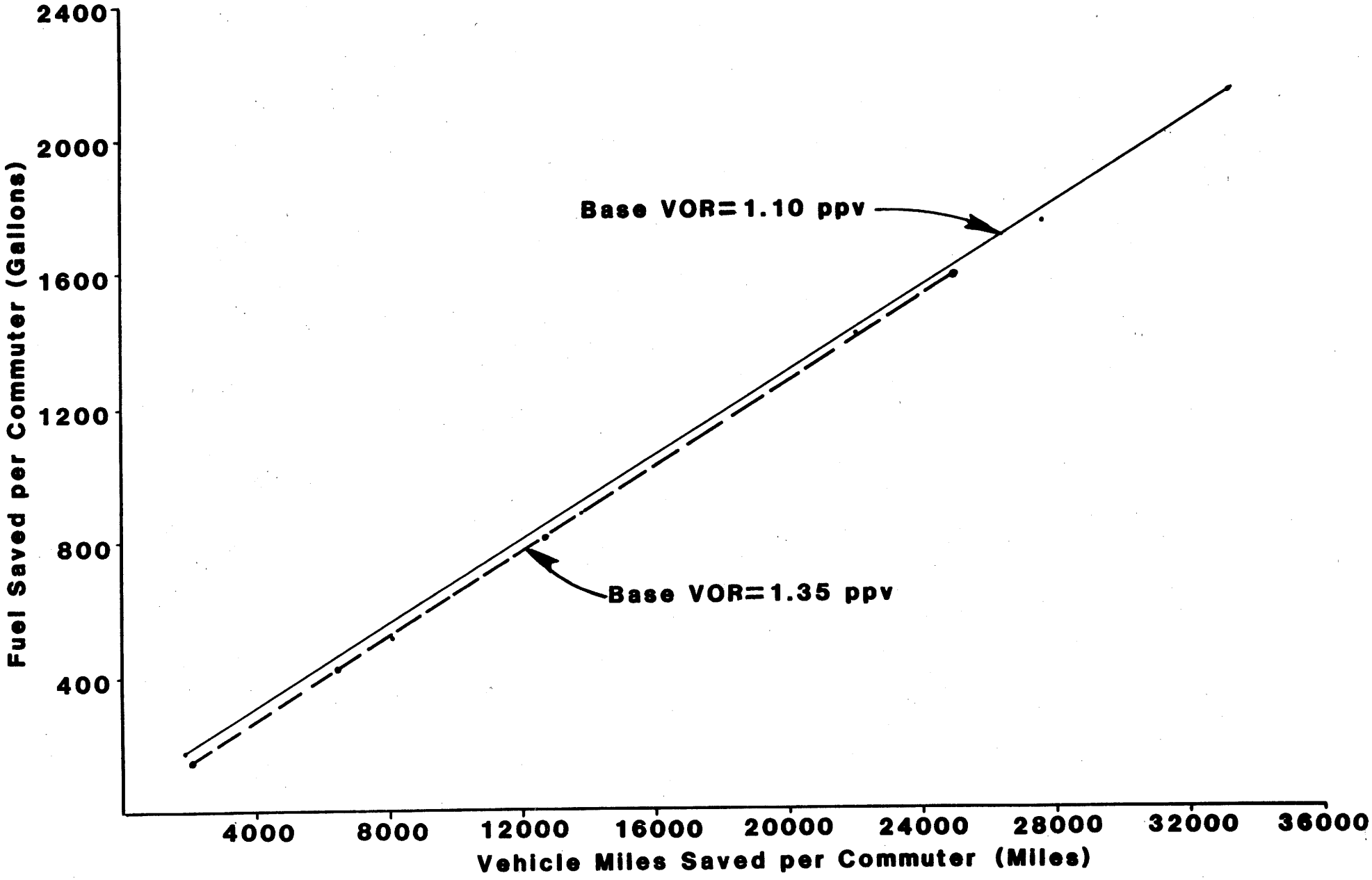


Figure 71: Annual Fuel Savings Versus Annual VMT Reduction Estimated by Scenario G (n=123)

PLANNING GUIDELINES

This report section sets forth the observations drawn from the studies of Park-and-Pool facilities to assist in planning these types of mode-change parking areas. As discussed previously, considerable benefits may be derived by the commuting public through reduced vehicle miles of travel and related fuel savings by use of Park-and-Pool lots in Texas.

Three major planning considerations are presented herein and consist of the following topics:

- Travel Characteristics;
- Origins and Destinations of Commuters; and
- Survey of States.

All of these considerations are important factors in developing an approach to locating Park-and-Pool facilities within the State of Texas.

Travel Characteristics

The benefits to be derived from Park-and-Pool lots are directly related to the commuter travel characteristics and, more specifically, the lot to destination travel parameters. As presented in the discussion on "Pooling Benefits", a commuter using a rural Park-and-Pool lot saves, on the average, between 9,341 and 12,636 vehicle miles of travel (VMT) per year or between 588 to 795 gallons of fuel. This VMT reduction for a rural commuter is some 9.5% greater than average savings realized by the user of an urban fringe lot and approximately 56.3% more than a user of an urban lot.

Table 134 summarizes the pertinent lot-to-destination travel for the surveyed commuters originating in rural areas. Figure 72 shows the cumulative frequency distribution of travel distances for the lot-to-destination journey.

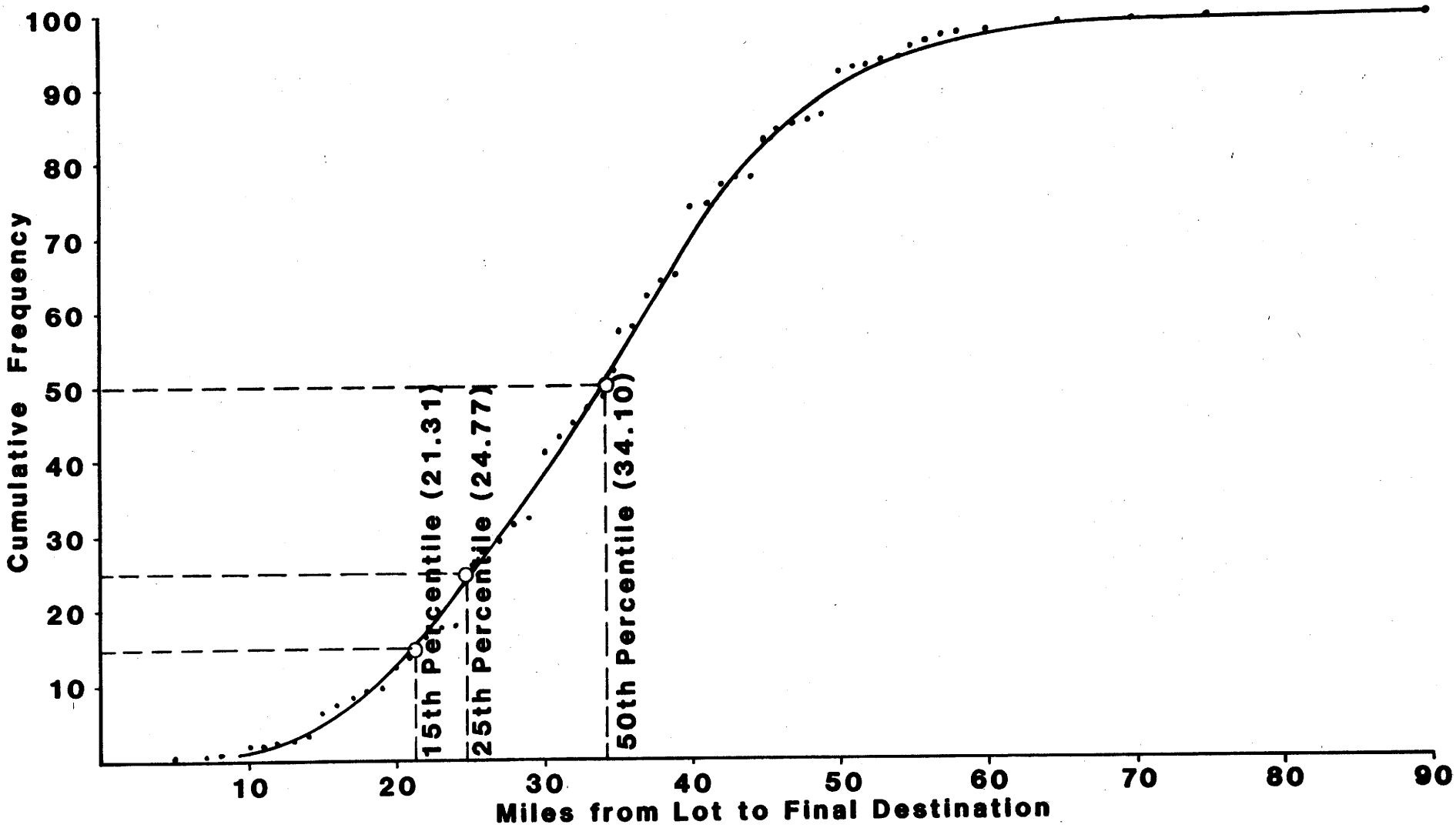


Figure 72: Cumulative Frequency Distribution for Rural Park-and-Pool Facilities (n=443)

Table 134. Lot-to-Destination Travel Parameters for Rural Park-and-Pool Users

Measure of Lot-to-Destination Travel	Rural Park-and-Pool Lot Users	
	Travel Distance (miles): (n=443)	Travel Time (minutes): (n=345)
Average (mean)	34.44	44.14
Modal (most frequent)	30.00	45.00
15th Percentile	21.31	28.48
25th Percentile	24.77	33.56
50th Percentile (median)	34.10	43.14

As shown, rural commuters travel on the average some 34.4 miles or 44.1 minutes from the Park-and-Pool facility to reach their final destination. Eighty-five percent of rural poolers travel farther than 21 miles from the lot to their destination while 75% of the users travel greater distances than some 25 miles.

Therefore, based upon observed commute distances, 75% to 85% of the rural poolers are likely to use a Park-and-Pool facility located some 21 to 25 miles from the major activity or employment centers. For planning purposes, the transportation official familiar with local conditions and major employment sites within a given rural area can draw a circle with a radius of 21 miles about the work site to identify candidate Park-and-Pool locations. Candidate sites would be at, or upstream of, the intersection of the circle boundary with principal transportation facilities (i.e., highways, freeways) serving the area. This planning concept for rural Park-and-Pool sites is illustrated in Figure 73.

A major shortcoming of this planning approach is the lack of consideration given to actual travel mileage for any given transportation corridor. In addition, this approach ignores the development patterns within the area

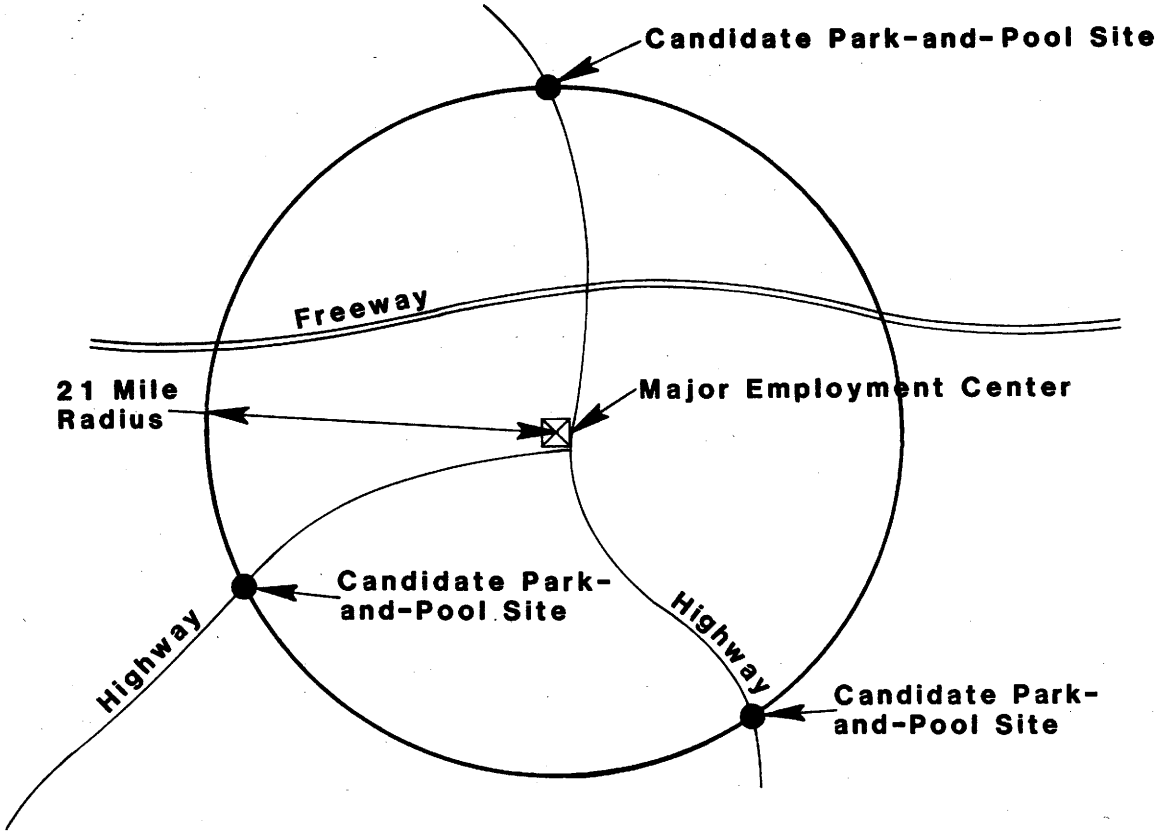


Figure 73: Conceptual Identification of Rural Park-and-Pool Sites for Major Employment Center.

of potential sites. The transportation planner must take into consideration local conditions and population concentrations when attempting to identify candidate sites for rural Park-and-Pool facilities. More detailed discussion of home-to-lot travel characteristics of commuters was presented in "Geographic Considerations" for Marketing of these types of mode-change lots.

Origins and Destinations of Commuters

Three types of summaries were performed on the travel patterns of Park-and-Pool Users to present the origins and destinations of commuters:

- From SDHPT District to SDHPT District;
- From SDHPT District to Texas County; and,
- From Texas County to SDHPT District.

In terms of SDHPT Districts, a total of 9 were represented by the survey data for the commuters' origins while 10 Districts were noted for places of trip destinations. Some 41 Texas counties were represented by the survey of Park-and-Pool facilities with the responding participants indicating their final destination being in one of 35 counties. Figure 74 shows the SDHPT Districts and the Texas counties within each of the Districts for the State.

Table 135 presents the travel noted between District to District for the ridesharing participants. The vast majority of commuters travel from the parking area within a given SDHPT District to a location within the same District; 58% to 100% of the commute trip-ends are within the District of origin with the exception of 3 observations from the Waco District (these 3 commuters were traveling to the Fort Worth District). The average home-to-lot and lot-to-destination travel distances are included in Table 136 for each of the 9 SDHPT District origins.

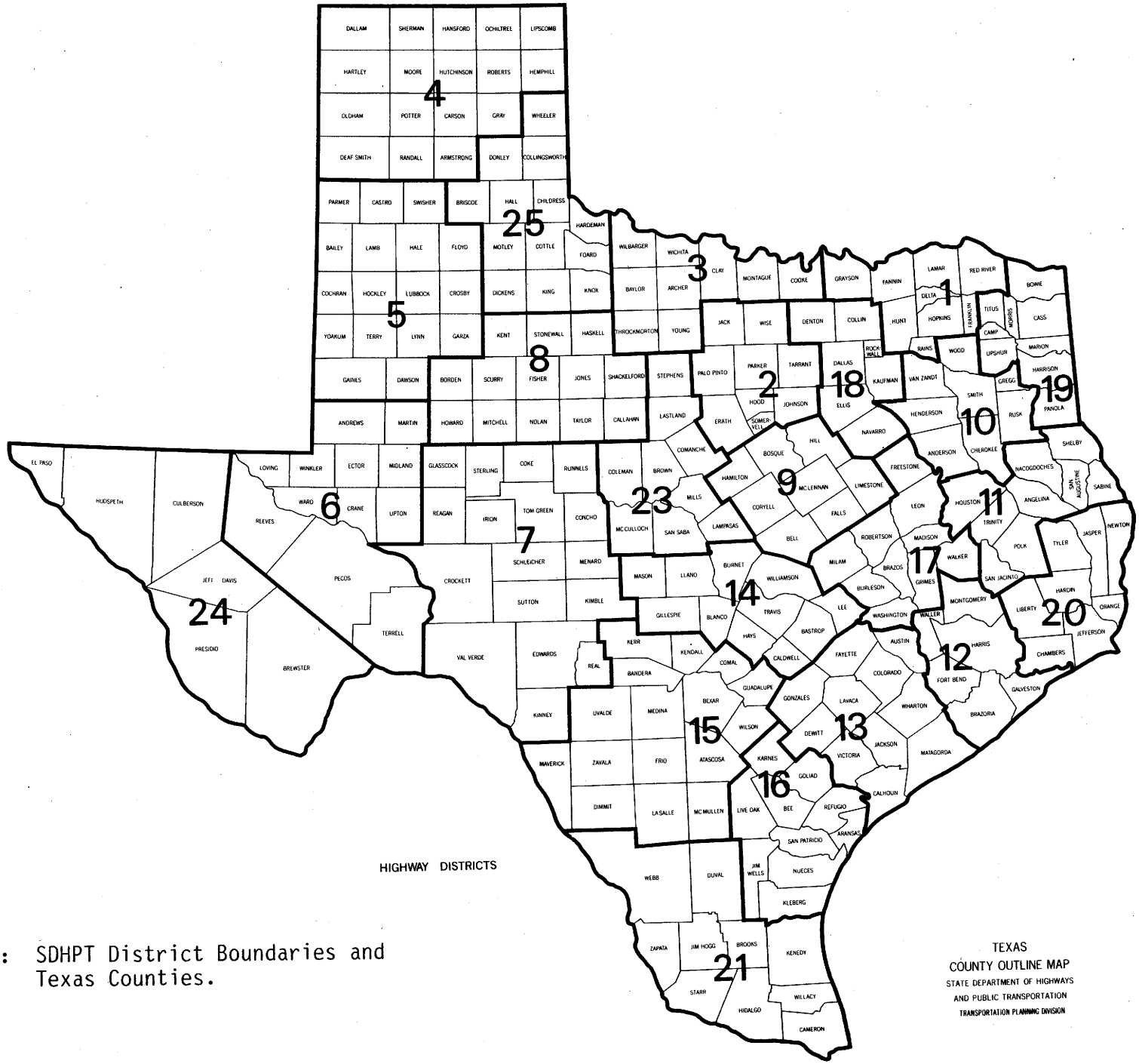


Figure 74: SDHPT District Boundaries and Texas Counties.

Table 135. Destinations of Park-and-Poolers from SDHPT District to SDHPT Districts

ORIGIN			DESTINATIONS			
SDHPT DISTRICT Number:	Office:	N=	SDHPT DISTRICT Number:	Office:	Numbers of Poolers:	Percent of Poolers:
2	Fort Worth	566	2	Fort Worth	330	58.3%
			18	Dallas	236	41.7%
9	Waco	3	2	Fort Worth	3	100.0%
10	Tyler	20	10	Tyler	20	100.0%
12	Houston	253	12	Houston	251	99.2%
			17	Bryan	2	0.8%
13	Yoakum	20	12	Houston	15	75.0%
			13	Yoakum	3	15.0%
			16	Corpus Christi	2	10.0%
15	San Antonio	140	15	San Antonio	122	87.1%
			14	Austin	17	12.1%
			13	Yoakum	1	0.7%
17	Bryan	6	17	Bryan	4	66.7%
			20	Beaumont	2	33.3%
18	Dallas	149	18	Dallas	140	94.0%
			2	Fort Worth	9	6.0%
20	Beaumont	50	20	Beaumont	40	80.0%
			12	Houston	10	20.0%
TOTAL		1207			1207	

Table 136. Travel Distance By SDHPT District Origin

ORIGIN		Average (Mean) Travel Distance From:	
SDHPT DISTRICT Number:	Office:	Home-to-Lot	Lot-to-Destination
2	Fort Worth	4.99 miles	24.00 miles
9	Waco	3.67 miles	56.33 miles
10	Tyler	5.05 miles	24.24 miles
12	Houston	5.99 miles	30.59 miles
13	Yoakum	7.86 miles	37.91 miles
15	San Antonio	7.53 miles	34.02 miles
17	Bryan	6.33 miles	22.83 miles
18	Dallas	6.38 miles	28.08 miles
20	Beaumont	5.77 miles	30.71 miles

Home-to-Lot travel ranged from about 3.7 miles (average) in the Waco District to approximately 7.9 miles (average) in the Yoakum District. Simililarly, the mean Lot-to-Destination distances varied from some 22.8 miles for the Bryan District to over 56 miles for commuters from the Waco District.

Table 137 summarizes the travel from SDHPT Districts to the Texas counties of commuter destinations. By in large, travel from District Park-and-Pool lots are to the principal county within the same SDHPT District. The mean travel characteristic for the SDHPT Districts (shown previously in Table 136) also apply to the destination counties.

The travel patterns from Park-and-Pool lots by Texas counties to SDHPT Districts are presented in Table 138. Survey data from 1207 ridesharing commuters originating in 41 counties was used in preparing the table for trip destinations.

The transportation planner concerned with locating potential Park-and-Pool facilities will need to assess local travel demand created by population concentrations and major activity or employment centers within any given areas. The information on pooler origins and destinations presented herein should be considered in light of other transportation planning data when identifying potential or candidate mode-change parking areas.

Table 137. Destinations of Park-and-Poolers From SDHPT District to Texas Counties

ORIGIN			Destinations		
SDHPT DISTRICT					
Number:	Office:	n=	Texas County:	Number of Poolers:	Percent of Poolers:
2	Fort Worth	566	Tarrant	312	55.1%
			Dallas	235	41.5%
			Somervell	12	2.1%
			Johnson	5	0.9%
			Denton	1	0.2%
			Parker	1	0.2%
9	Waco	3	Somervell	3	100.0%
10	Tyler	20	Smith	13	65.0%
			Rusk	3	15.0%
			Gregg	2	10.0%
			Henderson	2	10.0%
12	Houston	261	Harris	249	95.4%
			Galveston	8	3.1%
			Montgomery	2	0.8%
			Walker	2	0.8%
13	Yoakum	51	Calhoun	31	60.8%
			Harris	13	25.5%
			Fort Bend	2	3.9%
			Victoria	2	3.9%
			Matagorda	1	2.0%
			Nueces	1	2.0%
			San Patricio	1	2.0%
15	San Antonio	140	Bexar	99	70.7%
			Comal	20	14.3%
			Travis	17	12.1%
			Guadalupe	2	1.4%
			Gonzales	1	0.7%
			Medina	1	0.7%
17	Bryan	6	Brazos	2	33.3%
			Burleson	2	33.3%
			Milam	2	33.3%
18	Dallas	149	Dallas	133	89.3%
			Tarrant	8	5.4%
			Denton	7	4.7%
			Wise	1	0.7%
20	Beaumont	50	Jefferson	21	42.0%
			Harris	10	20.0%
			Orange	8	16.0%
			Jasper	4	8.0%
			Newton	4	8.0%
			Tyler	3	6.0%
Total		1246		1246	

Table 138. Destinations of Park-and-Poolers From Texas County to SDHPT Districts

Origin		Destination			
Texas County:	n=	SDHPT District Number:	Office:	Number of Poolers:	Percent of Poolers:
Atascosa	9	15	San Antonio	9	100.0%
Austin	13	12	Houston	13	100.0%
Bexar	17	15	San Antonio	9	52.9%
		14	Austin	8	47.1%
Bosque	1	2	Fort Worth	1	100.0%
Brazoria	7	12	Houston	7	100.0%
Burleson	6	17	Bryan	4	66.7%
		20	Beaumont	2	33.3%
Comal	37	15	San Antonio	28	75.7%
		14	Austin	9	24.3%
Dallas	64	18	Dallas	60	93.8%
		2	Fort Worth	4	6.3%
Denton	27	18	Dallas	24	88.9%
		2	Fort Worth	3	11.1%
Ellis	45	18	Dallas	43	95.6%
		2	Fort Worth	2	4.4%
Erath	2	2	Fort Worth	1	100.0%
Fort Bend	27	12	Houston	27	100.0%
Galveston	2	12	Houston	2	100.0%
Guadalupe	10	15	San Antonio	9	90.0%
		13	Yoakum	1	10.0%
Hardin	7	20	Beaumont	7	100.0%
Harris	108	12	Houston	108	100.0%
Henderson	11	10	Tyler	10	100.0%
Hill	1	2	Fort Worth	1	100.0%
Hood	12	2	Fort Worth	11	91.7%
		18	Dallas	1	8.3%
Jasper	9	20	Beaumont	9	100.0%
Johnson	8	2	Fort Worth	8	100.0%
Kendall	40	15	San Antonio	40	100.0%
Lavaca	1	13	Yoakum	1	100.0%
Liberty	10	12	Houston	10	100.0%
McLennan	1	2	Fort Worth	1	100.0%
Median	8	15	San Antonio	8	100.0%
Montgomery	109	12	Houston	107	98.2%
		17	Bryan	2	1.8%
Newton	7	20	Beaumont	7	100.0%
Orange	13	20	Beaumont	13	100.0%
Parker	19	2	Fort Worth	17	89.5%
		18	Dallas	2	10.5%
Rockwall	13	18	Dallas	13	100.0%
Rusk	6	12	Houston	6	100.0%
Smith	2	10	Tyler	2	100.0%
Somervell	6	2	Fort Worth	6	100.0%
Tarrant	511	2	Fort Worth	278	54.4%
		18	Dallas	233	45.6%
Tyler	4	20	Beaumont	4	100.0%
Van Zandt	1	10	Tyler	1	100.0%
Victoria	4	13	Yoakum	2	50.0%
Wharton	2	12	Houston	2	100.0%
Wilson	19	15	San Antonio	19	100.0%
Wise	8	2	Fort Worth	8	100.0%
TOTALS	1207			1207	

Survey of States

Twenty-six State Departments of Transportation were contacted and invited to participate in the study of Rural Park-and-Pool facilities. A listing of the State agencies and contact persons used in the survey is included in Appendix D of this report.

Each of the states were advised of the study effort's goals and objectives and were requested to share their experiences (if any) with similar mode-change facilities. In particular, the states were asked "what are your current planning guidelines or policies associated with this HOV strategy?" Any studies, reports, or demand estimation procedures used by the states applicable to Park-and-Pool were requested for consideration in developing planning guidelines for these types of facilities.

Responses were received from 20 of the 26 states representing some 77% of those contacted. Considerable information was obtained on the current state-of-the-art associated with the planning and evaluation of Park-and-Pool type facilities. This section of the report summarizes the major findings of practices employed in other states for these ridesharing parking areas.

Table 139 summarizes the activity of Park-and-Pool Programs indicated by the 20 participating state agencies. Three principal categories are included in the table:

- Type of Program;
- Funding Sources; and,
- Number of Park-and-Pool Lots.

Fifteen or 75% of the responding states indicated that they did have some form of Park-and-Pool program. Only two of the states (Mississippi and Nebraska) said they did not have any Park-and-Pool activity. The remaining

Table 139. Summary of State's Activity in Park-and-Pool Programs

State	Type of Program								Funding				Number of:	
	Park-and-Pool Program	Rural Park-and-Pool Program	No Park-and-Pool Program	Car/Van Pool Lots	Combination Lots	Formal Program	Informal Program[1]	Aggressive[2]	Locally Funded	County Funded	State Funded	Federally Funded	All Lots	Rural Lots
Arizona	●													
California	●					●		●	●		●	●	+200	
Colorado							●							
Connecticut	●				●	●		●					+100	
Georgia	●				●	●		●		●	●		18	
Maine	●					●		●			●		1	
Maryland	●			●		●				●	●			
Michigan	●	●		●		●		●			●			75
Minnesota	●					●		●	●		●		27	
Mississippi			●											
Missouri	●					●					●		74	
Nebraska			●											
Ohio	●													
Oklahoma	●	●				●		●			●	●		97[3]
Oregon							●							
Pennsylvania				●					●		●	●	5	
Rhode Island	●				●	●		●			●	●	10	
Utah	●	●		●		●								50[4]
Virginia	●				●				●		●		50	
Washington	●			●		●					●			
TOTALS	15	3	2	5	4	12	2	8	4	2	12	4		

[1]Program's which oversee existing lots with minimal involvement.
[2]Programs which actively plan new lots and/or seek to recruit more people for carpools.
[3]93 informal lots, 4 formal lots
[4]50 informal lots

three states (Colorado, Oregon and Pennsylvania) had "informal" programs which simply monitor Park-and-Pool facilities with minimal involvement in the design or operation of such improvements. Three states (Oklahoma, Michigan and Utah) specifically mentioned a "rural" Park-and-Pool program.

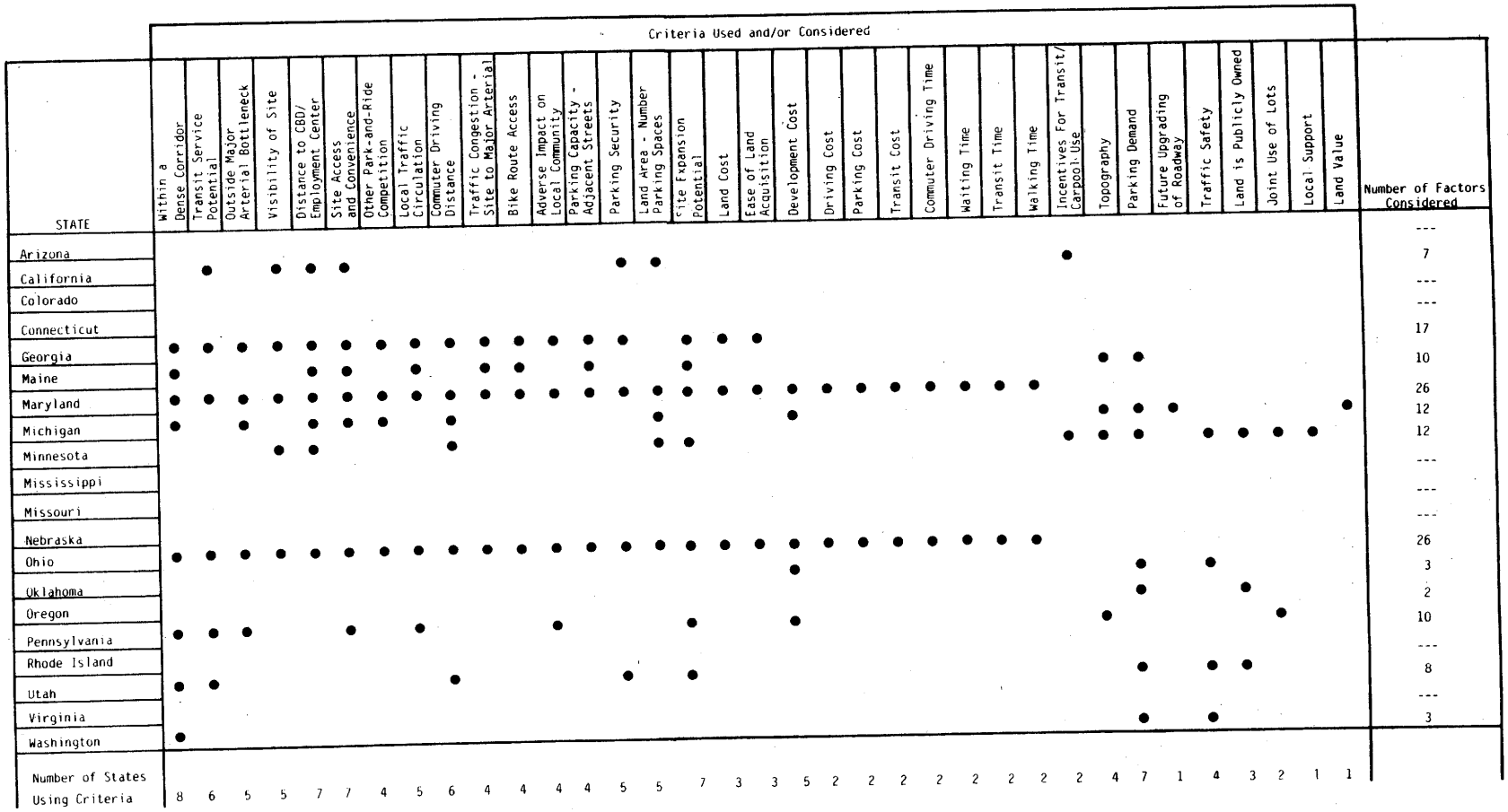
Of the 15 states indicating some form of program for Park-and-Pool, 12 or 80% had a formalized system established for the improvement of the facilities. Out of the 12 formalized programs, 8 or approximately 66% had an "aggressive" program in which the states actively plan new lots and/or promote the facilities. Considering all participants in the survey, some 40% of the states aggressively seek out opportunities for implementing these types of transportation enhancements.

As shown in the table, 12 of the responding states provided an indication of the type of funding used for Park-and-Pool facilities with four of these mentioning the use of federal funds (California, Oklahoma, Pennsylvania and Rhode Island). Six of the 12 states or 50% indicated that funding of Park-and-Pool was jointly done between the state and local or county governments.

Twelve of the 20 states provided information on the number of Park-and-Pool lots located in their state. Over 700 lots were mentioned by the 12 agencies representing an average of more than 58 lots per state reporting such data. A total of 222 rural Park-and-Pool lots were reported by three of the states (Michigan, Oklahoma, and Utah).

As presented in Table 140, 12 states provided an indication of the criteria used or considered in locating Park-and-Pool facilities. The most frequently listed items used in assessing potential Park-and-Pool sites were:

Table 140. Criteria Used by Other States in Locating Park-and-Pool Facilities



STATE	Within a Dense Corridor	Transit Service Potential	Outside Major Arterial Bottleneck	Visibility of Site	Distance to CBD/ Employment Center	Site Access and Convenience	Other Park-and-Ride Competition	Local Traffic Circulation	Commuter Driving Distance	Traffic Congestion - Site to Major Arterial	Bike Route Access	Adverse Impact on Local Community	Parking Capacity - Adjacent Streets	Parking Security	Land Area - Number Parking Spaces	Site Expansion Potential	Land Cost	Ease of Land Acquisition	Development Cost	Driving Cost	Parking Cost	Transit Cost	Commuter Driving Time	Waiting Time	Transit Time	Walking Time	Incentives For Transit/ Carpool Use	Topography	Parking Demand	Future Upgrading of Roadway	Traffic Safety	Land is Publicly Owned	Joint Use of Lots	Local Support	Land Value	Number of Factors Considered
Arizona																																			---
California		●		●	●	●								●	●																				7
Colorado																																			---
Connecticut																																			---
Georgia	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●																	17
Maine	●				●	●		●		●	●		●			●												●	●							10
Maryland	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									26
Michigan	●		●		●	●	●		●						●				●									●	●	●					●	12
Minnesota				●	●				●						●	●											●	●	●		●	●	●	●		12
Mississippi																																			---
Missouri																																			---
Nebraska																																			---
Ohio	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									26
Oklahoma																			●									●		●					3
Oregon																												●	●			●			2
Pennsylvania	●	●	●			●		●				●				●			●									●							10
Rhode Island																																			---
Utah	●	●							●					●		●													●		●	●			8
Virginia																																			---
Washington	●																												●		●				3
Number of States Using Criteria	8	6	5	5	7	7	4	5	6	4	4	4	4	5	5	7	3	3	5	2	2	2	2	2	2	2	2	4	7	1	4	3	2	1	1	

- Within a Dense Corridor
- Distance to CBD/Employment Center
- Site Access and Convenience
- Available Land Area or Parking Spaces
- The Parking Demand at the Site

The above considerations were listed by 7 of the 12 responding states representing 58% of the states indicating the type of criteria used in planning such facilities. The following items were noted by one-third or more of the states showing the type of considerations used:

- Potential for Transit Service
- Potential for Site Expansion
- Development Costs
- Adjacent Arterial System and Operation
- Local Traffic Circulation
- Competing Facilities in the Area
- Commuter Driving Distance
- Traffic Congestion Between Site and Highway (Major Arterial)
- Bike Route Access
- Parking Capacity on Adjacent Streets
- Security of Parking Area
- Land Costs
- Topography
- Traffic Safety

The preceding discussion highlights some of the general finding of the survey of State Departments of Transportation. Individual descriptions of each state's Park-and-Pool activity is included in Appendix D of this report.

Planning Overview

As presented herein on travel characteristics of rural Park-and-Pool users, some 85% of potential ridesharers may be intercepted by mode-change facilities located some 21 miles away from major employment centers. Identification of candidate sites must consider local travel characteristics, population concentrations and transportation facilities within a given area. The section on origins and destinations revealed that the vast majority of commuters (58% to 100%) travel within a given SDHPT District. Given this consideration, the individual SDHPT District offices are ideally suited planning units for assessing the need for Park-and-Pool facilities within their geographic boundaries.

The survey of other states identified various types of Park-and-Pool programs along with a number of evaluative criteria used in assessing potential sites. The most common evaluation procedure employed by state transportation planning agencies is patterned after an ITE Journal article by E.N. Burns published in February 1979 (9). Figure 75 presents the principal criteria set forth by Mr. Burns and as used by the greatest number of participating states. It is recommended that the criteria shown in the figure be used in conjunction with the planning data available for Texas Park-and-Pool facilities when evaluating potential mode-change parking areas.

SITE COMPARISONS FOR PARK-AND-POOL LOTS

PARK-AND-POOL SITE		LOCATION CRITERIA														SITE CONSIDERATIONS							ECONOMIC CONSIDER.					POTENTIAL USER COST					POTENTIAL USER TIME					
No.	Location	Within Dense Corridor	Transit Service Potential	Proximity To Freeway Bottleneck	Visibility Of Site	Distance To CBD or Activity Center	Access Convenience	Other Park-Pool Competition	Local Traffic Circulation	Commuter Driving Distance	Congestion-Site To Freeway	Bike Route Access			TOTAL POINTS	Impact On Local Community (Adjacent)	Number Of Parking Spaces	Expansion Potential	Parking Capacity-Adjacent Streets	Parking Security			TOTAL POINTS	Land Cost	Land Acquisition Time	Development Cost			TOTAL POINTS	GRAND TOTAL	Driving Cost	Parking Cost	Transit Cost			TOTAL COST	Driving Time	Waiting Time	Transit Time	Walking Time		TOTAL TIME

Source: E.N. Burns, P.E., ITE Journal, February 1979, pp 29-31.

Figure 75: Recommended Planning Criteria for Comparing Candidate Park-and-Pool Sites.

MAJOR FINDINGS

The efforts expended in this and previous Park-and-Pool studies has provided considerable information on the user characteristics of ridesharing commuters throughout Texas. Both the personal and travel characteristics of current Park-and-Poolers give valuable guidance in assessing the relative effectiveness of these mode-change facilities and in planning additional facilities.

The results of analyzing commuter surveys obtained in this research is presented in the "Survey Results" section of the report. The 367 returned surveys were then aggreagated with data obtained in other similar study efforts (1) (2) (3) (4) to provided a total data base of 1344 observations available for developing typical profiles of Park-and-Pool users. A few of the highlights resulting from the analyses performed on the aggregated data base are contained in this section.

The "Marketing Considerations" section looked at personal and travel characteristics of Park-and-Pool users to define both the target group and the geographic boundaries for developing marketing programs for these types of ridesharing facilities. Personal characteristics, by pooling mode, were presented and are summarized in Table 141. As shown, the average age of poolers is about 38 to 40 years old with the level of education being approximately 14 years or 2 years beyond high school. The majority of Park-and-Pool users are engaged in either professional, clerical, managerial or crafts occupations. The gender of poolers is fairly split between the sexes with slightly more (53.3%) females observed for the buspooling mode of travel.

Table 141. Summary of Personal Characteristics of Park-and-Pool Users By Pooling Mode

Personal Characteristics & Measure:	Buspoolers:	Carpoolers:	Vanpoolers:
Age (years):			
Average (mean)	39.4	37.6	39.5
50th Percentile (median)	35.7	35.3	38.4
Sex:			
Male	46.7%	58.1%	55.6%
Female	53.3%	41.9%	44.4%
Occupation:			
Professional	36.1%	34.2%	40.5%
Clerical	30.7%	19.5%	24.2%
Managerial	11.2%	12.1%	12.3%
Craftsman	9.8%	20.0%	14.0%
Education (years):			
Average (mean)	14.1	14.1	13.9
50th Percentile (median)	13.4	13.2	13.1

Table 142 summarizes, by lot location, the major travel characteristics observed in the surveys of Park-and-Pool commuters. The majority of poolers commute in a carpool having an average occupancy of between 3.32 and 3.36 persons per vehicle. The average commuter travels some 4.90 days per week to and from the mode change facility. The user of a rural Park-and-Pool lot travels farther than commuters originating from either an urban or urban fringe area.

Table 142. Summary of Travel Characteristics of Park-and-Pool Users By Lot Location

Travel Characteristics & Measure:	Poolers from Rural Lots	Poolers from Urban Fringe Lots	Poolers from Urban Lots
Pooling Mode			
Carpool	66.7%	61.5%	56.6%
Vanpool	26.5%	33.2%	29.6%
Buspool	6.4%	5.3%	13.5%
Pool Size (Persons per vehicle)			
Carpool	3.36 ppv	3.32 ppv	3.35 ppv
Vanpool	9.07 ppv	9.24 ppv	9.63 ppv
Buspool	26.77 ppv	25.50 ppv	15.97 ppv
Home-to-Lot Travel Distance (miles)			
Average (mean)	6.52 mi	6.20 mi	5.02 mi
50th Percentile (median)	3.97 mi	3.87 mi	2.72 mi
Lot-to-Destination Travel Distance (miles)			
Average (mean)	34.44 mi	29.05 mi	21.47 mi
50th Percentile (median)	34.10 mi	24.91 mi	19.88 mi
Travel Frequency (mean)	4.90 da/wk	4.89 da/wk	4.92 da/wk

Table 143. Summary of Estimated Annual Benefits Per Park-and-Pool User by Lot Location

Measure of Benefit:	Benefits Per Commuter Using A		
	Rural Lot	Urban Fringe Lot	Urban Lot
Annual VMT Reduction			
Low Estimate (mean)	9,341 miles	8,531 miles	5,895 miles
High Estimate (mean)	12,636 miles	11,537 miles	8,162 miles
Annual Fuel Savings			
Low Estimate (mean)	588 gallons	537 gallons	371 gallons
High Estimate (mean)	795 gallons	726 gallons	514 gallons

Pooling benefit analyses revealed that some 9,300 to 12,600 vehicle miles of travel (VMT) per year in savings can be obtained by an average commuter using a rural Park-and-Pool lot. This estimated saving shown in Table 143, is approximately 9.5% greater than the reduction realized by an urban fringe lot user and some 56.3% more savings than an urban commuter. Annual average fuel reduction ranges from 588 to 795 gallons per year for a Park-and-Pooler originating from a rural location.

An investigation of Benefit/Cost (B/C) Comparisons for 123 Park-and-Pool sites indicated the very positive effect that these mode-change facilities have on the transportation system. Depending upon the analytical procedure used in computing B/C ratios, the Park-and-Pool facilities ranged from a low of .70 to 64.51. However, even the most critical analysis of B/C's for the 123 study sites revealed that only 2 of the Park-and-Pool locations fell below the economic threshold of 1.00.

Planning guidelines based upon current travel parameters of rural Park-and-Pool users indicate that a mode-change facility located 21 to 25 miles from major activity or employment centers will serve 75% to 85% of the potential ridesharing commuters. However, as pointed out in the report, planning of these types of facilities must take into account local planning data and unique features of any given area. In addition, planning criteria for assessing the viability of a particular site was presented along with the practices of other states' transportation agencies.

Park-and-Pool lots in rural areas can achieve high transportation benefits with minimum costs. Through the analytical methods presented in this report, the transportation planning official should be able to identify and assess the potential for new or improved Park-and-Pool facilities in rural, urban fringe and urban locations.

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APPENDIX A

Park-and-Pool Surveys

- Cover letter, dated January 1983, which accompanied commuter survey left on parked commuter vehicles.
- Commuter Survey Instrument entitled "Rural Park-and-Pool Survey".
- Rural Park-and-Pool Site Investigation Form

COMMISSION
ROBERT H. DEDMAN, CHAIRMAN
A. SAM WALDROP
JOHN R. BUTLER, JR.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
AUSTIN, TEXAS 78763

ENGINEER-DIRECTOR
MARK G. GOODE

January 1983

IN REPLY REFER TO
FILE NO.

RURAL PARK-AND-POOL SURVEY

The Texas Transportation Institute, Texas A&M University System, is conducting a study of parking areas known as Park-and-Pool lots in rural areas throughout the state. The purpose of this study is to obtain information about your use of, and opinions concerning, Park-and-Pool to assist in planning possible improvements to parking areas adjacent to the Texas highways for use by carpoolers and vanpoolers.

Since there are only a very small number of Park-and-Poolers, your participation is essential to ensure the success of this project.

Please complete the enclosed survey form and return it to us in the postage-paid envelope at your earliest possible convenience. We are grateful for your participation in this transportation study.

Sincerely,

Phillip L. Wilson
State Transportation
Planning Engineer

PLW/kab

Enclosures

RURAL PARK-AND-POOL SITE INVESTIGATION

* Parking Area No. _____ County: _____ SDHPT District: _____ Page: _____ of _____

Observer: _____ Est. Usage: _____ AADT (1980): _____ Date: _____

Total Number of Vehicles: _____ Property: ☐ Public, or ☐ Private Time-of-Day: _____

Survey Form (*-Number-Type)	Vehicle Type				
	SUBC (C)	STD (S)	P.UP (P)	VAN (V)	OTHER (O)
TOTAL BY TYPE					
% TYPE OF ALL					

Location of Parking Area: _____

_____

Signing/Remarks: _____

_____

Lot Surface:
- ☐ Dirt/Grass
- ☐ Gravel
- ☐ Paved-Asphalt
- ☐ Paved-Concrete

Adjacent Land Use:
- ☐ Agriculture
- ☐ Residential
- ☐ Commercial

Improvements:
- ☐ Marked Stalls
- ☐ Wheel Stops
- ☐ Lighting
- ☐ Fenced
- ☐ Trash Containers
- ☐ Telephone
- ☐ Egress/Ingress
- ☐ Signing

Name of Nearest Town: _____

Sketch of Area:

North

Approx. Lot Capacity: _____ Vehicles

Parking Area No: _____

RURAL PARK-AND-POOL SURVEY

Undertaken by the Texas Transportation Institute, Texas A&M University System in cooperation with the Texas State Department of Highways and Public Transportation, the U.S. Department of Transportation, and the Urban Mass Transportation Administration

Dear Driver: We need your help and advice. Please complete this survey and return it in the postage-paid envelope at your earliest possible convenience. We have tried to identify only individuals parked for the purpose of sharing a ride from this location to another destination. If perchance you do not travel from this parking area to another location, please return the questionnaire with an appropriate comment on the reverse side. The survey information that you and others provide will assist in planning Park-and-Pool facilities throughout Texas. All information provided will remain confidential.

1. **How many persons (including yourself) arrived at this location in this vehicle?** _____

2. **After leaving your car parked at this location, what was your final destination and trip purpose?**

   City or Place: _____ Destination Zip Code: _____

   Trip Purpose: ☐ Work ☐ School ☐ Other (Specify) _____

   2.a. **How far is it from this location to your final destination?**

   Miles: _____ and, Minutes: _____

3. **How many days per week do you travel from this parking area to your destination by:**

   ☐ Carpool ____ days/wk ☐ Vanpool ____ days/wk ☐ Bus ____ days/wk

   ☐ Other (Specify) _____; ____ days/wk

4. **How many persons (including yourself) leave together from this location in the morning to your final destination?** _____

5. **How long have you been using this Park-and-Pool Lot?** _____ months

6. **How far do you travel in the morning to reach this parking area?**

   Miles: _____ and, Minutes: _____

   6.a. **Where does your trip originate in the morning?**

   Home County: _____ Home City: _____ Home Zip Code: _____

7. **Before you started using this parking area, how did you normally travel from home to your current destination?**

   ☐ Drove Alone ☐ Carpool ☐ Vanpool ☐ Did Not Make Trip

   ☐ Bus ☐ Other (Specify): _____

8. **Do you feel it is safe to leave your car parked at this location?**

   ☐ Yes ☐ No ☐ Not Sure

9. **Does your employer or school provide any incentives for carpools or vanpools?**

   ☐ Yes ☐ No If yes, what incentives? _____

10. **How did you first learn about this particular Park-and-Pool location?**

- ☐ Friends or Relatives
- ☐ Co-Workers or Employer
- ☐ Highway Sign
- ☐ Noticed Others Using Area
- ☐ Radio/TV/Newspaper
- ☐ Other (Specify): _____

11.a. **What time did you arrive at this parking area this morning?** _____ a.m.

11.b. **What time did you leave this parking area this evening?** _____ p.m.

12. **How did the availability of this parking area effect the formation of your carpool/vanpool or using the bus?**

- ☐ This parking area had no effect on my use of carpool/vanpool/bus.
- ☐ I would not be using carpool/vanpool/bus if this parking area was not here.
- ☐ This parking was one of several factors which encouraged me to carpool/vanpool/bus.

13. **Do you save money by using the Park-and-Pool location?**

- ☐ Yes If Yes, how much do you save? $ _____ per month
- ☐ No If No, how much do you lose? $ _____ per month
- ☐ Not sure ☐ No Difference

14. **Do you save time by using this Park-and-Pool location?**

- ☐ Yes If Yes, how much do you save per day? _____ minutes
- ☐ No If No, how much do you lose per day? _____ minutes
- ☐ Not Sure ☐ No Difference

15. **How was your carpool or vanpool formed?**

- ☐ Co-Workers ☐ Classmates ☐ Friends ☐ Employer
- ☐ Computer Matching Service ☐ Other (Specify) _____

16. **In deciding to carpool or vanpool, which one of the following considerations was "most" important to you (choose only one)?**

- ☐ Cost of Driving ☐ Cost of Parking ☐ Stress of Driving
- ☐ Energy Savings ☐ Other (Specify): _____

17. **If convenient express bus service was provided from this location to your destination, would you prefer to:**

- ☐ Continue Carpooling/Vanpooling ☐ Ride the bus

18. **What is your current occupation (Please Be Specific)?** _____

19. **How many total years of school have you completed?** _____ 20. **Age:** ____

21. **Sex:** ☐ **Male** ☐ **Female**

22. **We welcome any comments or suggestions:** _____

_____

_____

THANK YOU FOR YOUR TIME AND COOPERATAION

APPENDIX B

COMMENTS AND REMARKS PROVIDED BY SURVEY RESPONDENTS

Note: Comments/Remarks, taken directly from returned questionnaires, are identified by Lot ID code and are presented in the following major topic areas:

- Expressions of Appreciation for Parking Facility
- Comments Pertaining to Bus and/or Transit Service
- Suggestions for Improvements
- Other Types of Comments or Remarks

EXPRESSIONS OF APPRECIATION FOR PARKING FACILITY

I like this parking lot. (Mon-2)

Gig em! The paved parking area is appreciated. (Mon-1)

Even though it is little or no money difference, the convenience is greatly appreciated (Mon-4)

Before they parked at my house but this parking area is better for the other two riders. The parking area is a very good thing. (Ken-1)

Thanks for the Park & Ride availability. (Ken-1)

I really appreciate having a place to leave my car. Thanks for all your efforts. (Ken-1)

Thank you for making this survey. Our better use of our energy is necessary and this type of park & ride lot is <u>great</u> for people who want to share rides or ride buses!!! and will encourage better use of our energy. So many times people who want to ride the bus, etc., do not have a place to park - This lot offers such a facility. (Mon-4)

This lot is very convenient and I think its great that the State provides it at no cost. (Mon-2)

I only have nice things to say. It's paved real good. They keep the area clean. I would suggest putting in some lights for better vision at night. (Mon-2)

I do appreciate having a place to park which doesn't intrude on other people's property. But I have had my vehicle broken into 3 times in the past year. (Mon-4)

There have been incidents of theft and vandalism in the lot. Security could be improved but is very nice to have it. (Mon-4)

Appreciate the space you have provided (Mon-1)

Appreciate the availability of this facility. However, on at least one occasion in the evening, tires and wheels had been stolen from a car (not a member of our carpool). Also, have heard of other thefts from vehicles here. (Mon-2)

I think the park and pool location is very convenient and is kept clean. I have had no problems with leaving my car there. I think it is one of the nicest things to happen for the working people who have to commute. (Com-1)

I'm glad we have a nice place to leave our car. (Com-1)

We appreciate the parking area-both my co-worker and I. (Bur-3)

The park and pool is a lifesaver! (Bur-3)

I appreciate this area to park. The only concern I have is for the safety of leaving my car here all day. (Com-2)

The park & pools are great - saves from going from house to house. What a great idea. Thanks (Com-1)

I have been pleased with the use of this parking area. I also use the one by Canyon Middle School because its much closer. (Com-1)

This is an excellent time, gas saving innovation. Please continue research to search out other locations. (Com-2)

I am pleased with the convenience of the lot and the easy access - I also feel my car is safe parked in the lot (Gua-1)

I appreciate the park and ride places. They are convenient and safe. Thanks! (Gus-1)

I appreciate the nice parking lot (Ata-1)

I think the parking lot was the best thing that happened in Floresville since most of the people go elsewhere to make a living. Its very handy (Wil-1)

Prior to the establishment of these parking facilities it was a hassle to find parking in these small towns. I personally feel like these parking facilities have enhanced car-pooling (Wil-1)

This park and pool location is great. Also, a bus would be nice from this location to save wear and tear on my car!! (Wil-1)

We really enjoy our car pool and lot - The park and pool is in a good location with trees and all. Thanks! (Med-1)

Very convenient to use (Gus-2)

I am very appreciative of the United Methodist Church in letting me park there. I understand it is very hard to find a place to park a car every day here in Lewisville (Den-7)

We thank Sen. John Shay for getting this parking lot for us (Vic-4)

Very convenient, adequate lighting (Vic-4)

Need more parking area like this (Den-1)

We used to park at local parking lots just a few minutes from this lot however, we were threatened to be towed off so the use of this lot is very convenient. (Har-2)

I never knew this location was a park and pool location. I assumed it was highway department property and thought it ok to park there! Thanks!! (Den-3)

I am glad the car/van pool parking space is provided. (Gua-1)

Local business persons don't like for people to park on their lots - so this pool and park is the answer to my parking problem. (Lib-2)

You have a fine parking area. Keep up the good work. (Jas-2)

Park & pool locations are one of the very few government expenses I don't mind seeing my tax dollars used for upkeep and maintenance. (Jas-2)

Anything to improve the cost and relieve the stress of driving by your self is much appreciated by me. (Lib-2)

We really enjoy this park and ride service. It needs to be enlarged at times it is so crowded their is no parking space. (Lib-2)

A paved parking lot marked off for parking cars, would help the congested area on Highway 31 east. Appreciated very much. Thank you. (Hen-2)

I appreciate the State for letting the carpoolers leave their vehicles at this location. (Hen-2)

Park and pool locations are a great idea if they are in areas where regular police patrols provide security. I like them!. (New-1)

Park and pool facilities would be very helpful to average working people. Tax money well spent (Hen-2)

I really think that this idea for this park and pool location is very good (Wil-1)

If it wasn't for this car pool parking I would have to quit my job. (Tyl-3)

I appreciate the State providing us a place to park without having to park on private property. (Tyl-1)

COMMENTS PERTAINING TO BUS AND/OR TRANSIT SERVICES

Reliable, comfortable and timely bus service to Houston, with the current growth rate of this area, would not only be welcomed, it is mandatory (Mon-4)

I liked my old economical time saving van pool more than bus but driver moved and haven't found another one. (Mon-4)

Parking area needs security. Need additional bus scheduled. (Mon-4)

The problem with the present riding conditions is that it is only good for workers in the downtown area. If you work outside the loop you must drive to work. (Mon-4)

I wish the bus drivers could stick to one schedule instead of being early one day and late the next! (Mon-4)

I suggest Houston Metro begin to run several daily buses from Conroe to Houston and return. (Mon-4)

Would like to see better security at lot, more street lights and mass transit on expressway extended from Houston. (Mon-4)

Buses are more comfortable and feel safer on contraflow lane. (Mon-4)

How about a reliable and convenient commuter train? (Com-1)

We work shift work so would be unable to ride bus. (Bur-2)

Would love to see an express bus service or vanpool from New Braunfels to U.T. Science Center in San Antonio. (Com-2)

A contraflow lane would reduce time and increase rider participation. Work hours are 8 to 5. I spend two and a half hours on the bus, if this could be decreased it would increase number of riders. (Har-2)

Wouldn't mind if we could have a VIA bus from this destination. (Ata-2)

A bus service would be fantastic - 10 - 12 people, that I know of (maybe more) live in this area. (Com-2)

A lot of people would like to ride the bus, if it is economical, reliable and convenient. 2 or 3 stops inbetween is ok. (Har-2)

Would welcome express bus servicing this area. (Aus-1)

The question on #17 means I would need more information. (Ora-3) Q #17, deals with preference for bus service .

This form was on my car at the Fry Road park and ride lot. Since then I have begun using the Addicks viewpoint. The Fry Road park and ride proved impossible to deal with because I got home at 7:00 p.m. - with the Addicks bus I usually get home before 6:00 p.m. (Har-3)

A convenient bus service would be used frequently, I believe, if the cost was competitive. (New-1)

My father works for Goodyear in Beaumont and carpools along with several other people from Silsbee and they do not have a convenient parking place. My father is from Evadale. Myself I feel the more parking lots the better, and would welcome busing. (Jas-4)

Lewisville Area is in bad need of some kind a public transportations to Dallas. (Den-7)

SUGGESTIONS FOR IMPROVEMENTS

Trash can and some sort of security is needed. (Mon-2)

The lighting is not sufficient at our lot. We really need some security patroling and are considering petition to our council in Conroe. (Mon-2)

In relation to (security) question I have had my four tires stolen (new). Others have had, 2 cars stolen, 6 windshields broken, and several cars broken into and ram sacked - **WE NEED PROTECTION!!!** (Mon-4)

Need better lighting - public telephone. (Mon-4)

Provide security for parked cars. Many loose wheels, hubcaps, windshield, and other items. I know of at least one car being stolen. (Mon-4)

Would be nice if park and pool location was fully paved and lit. (Mon-1)

I would like for the State or county to build us a parking lot in this area and more people would park and ride. (Mon-3)

Would be both safer and easier on carpoolers if there was sufficient lighting on both sides of the road. The added asphalt sure made it easier to find a place to park. (Mon-1)

Parking lot needs trash barrel and needs to be cleaned of litter more often. (Mon-1)

Suggest the state provide lighting to these type of parking lots for convenience and added safety for those as my self who work shiftwork. (Mon-2)

Very convenient - I think a police patrol should drive by each hour and a better (brighter) light would be appreciated. (Mon-4)

Eliminate Beer drinking parties in evenings, especially in summers. (Ken-1)

Perhaps a sign to request truckers not to park their 18 wheelers across all 8 to 10 parking spaces. Also, ask Highway Patrols to scan these lots periodically each day. (Ken-1)

Signs are needed to notify truckers and RV travelers to move to parking area by 6:00 a.m. -- Fines and Police Assistance needed to keep the area safe. (Ken-1)

Prevent overnight trucks and campers from parking in the Park and Pool location. We don't have room to park sometimes. (Ken-1)

Place sign to prohibit alcoholic beverages on this site. At present a group of people meet each work day to drink beer, etc. (Ken-1)

Needs to be kept cleaner and to be patrolled regularly. (Mil-1)

Plant some trees for shade and tell some people how to park their cars inside white lines and not where they feel like it. (Com-2)

Should clean up broken glass and garbage every other month. (Com-2)

It would be very highly recommended that we have trash cans available to dispose of excess bottles, cans etc. at these locations. (Com-2)

Think lot should be checked as law goes by. Also a notice saying this lot is patroled to discourage any hanky pankey, parkers would feel more at ease. (Com-1)

This lot is very poorly lighted and I often arrive after dark. I know of one person who has had hubcaps stolen and have seen a truck with 3 wheels stolen. (Mon-4)

Keep this parking area clean. (Bur-1)

I think this area would be used more if people knew, you at least had patrolmen pass by once in a while. Just to see if everything is alright. (Gua-2)

Carpool area needs a security light and telephone for emergencies. (Gua-1)

Needs to be lighted. (Har-2)

This parking lot would not have as many burglaries and vandalism if it was on the north side of highway across from the 24 hour service station. (Vic-4)

Could grade chuckholes in road leading to parking lot. (Vic-3)

A security light would help. Sometimes area is too small when employment is good. You put survey letter out on a Friday when the amount of cars parked is the least. (Vic-2)

With carpooling we are more flexible about stopping in town for needed items. More comfortable ride, much quieter, and less expensive. This spot needs light for security. (Vic-2)

Need a bigger and better parking area. Sometime owner of station block part of parking area. (Vic-5)

It would be good to know that the police would patrol the parking lot. (Vic-4)

State should provide lighted parking space on State rights of way such as on Loop next to overpasses or highway such as next to this parking area. (Aus-2)

If possible, improve parking area for safety even if a slight charge was made to people using parking area. (Aus-1)

State should utilize the available space at loops and overpass to provide additional parking space for carpoolers. (Aus-1)

Lot needs to be graded. (Aus-2)

Need better on and off ramps at Cooks Lake Location in Lumberton, Texas in all directions. Thank you. (Had-1)

Location needs maintenance, and in this area there is an over abundance of overnight campers and if they are not limited they will be using this location for camping. (Har-4)

I would like to see this parking area black topped and possibly lighted. At one time there were several other vanpools using this area but now park across the highway at the Exxon station possibly for security. (Har-4)

More lights needed. (Har-4)

It would help if our parking spot would have lights. We are a little uncomfortable sitting in the dark. (Har-4)

Our parking area is not a designated carpool area. Need one bad. At times approximately 20 cars locate at intersection of Highway 12 and 87 north corner. (New-5)

This parking area is badly needed. Please consider installing lights. This area takes care of about 25-30 people. Thank you. (New-5)

Stop trailer trucks and moble homes from parking in carpool lot. (Ora-1)

Prohibit 18 wheelers to use location. (Ora-1)

Teach some people where to park. (Com-2)

Better security is needed as I have seen cars with wheels/tires stolen! (Har-3)

Please pave the lot. Very muddy when wet. (Har-3)

The car parking is a good incentive for car/van pooling. The only bad thing is it not being cement due to weather conditions. (Har-3)

The parking area is not lighted enough and there is no telephone in case of an emergency. (Mon-4)

This parking lot should be paved with concrete. Otherwise it is very inconvenient to park when it rains. (Har-3)

This parking area needs to be enlarged. Lots of times its hard to find a place to park. Also, some lights put on the back and far sides. (Jas-2)

Pavement or more gravel. This lot is very muddy when it rains. (Har-3)

Would like to have security lights installed. I had a battery stolen from this location while working 2 p.m. to 10 p.m. shift. (Mon-2)

It would be nice to have the area tarred-especially on rainy days. Also this lot is usually much busier than on the day this survey was left. You may have to resurvey for more valid results. (Har-3)

This parking lot is a mud hole appropriate for Texas cowboys and horses not sophisticated office workers and secretaries. Pave it, show some class. (Har-3)

A paved facility and lighting would be greatly appreciated. (Har-3)

Parking area should be paved and should have a sign that the area is being watched. (Har-3)

Questions 13 and 14 are ambiguous. I answered based on overall carpool savings vs driving myself to work. Also paved parking would be appreciated. (Har-3) (Questions 13 and 14 deals with money and time savings)

The park and pool location needs to be larger. (Jas-2)

It would be nice if the area was asphalted or graveled for parking convenience. The area as is is not in very good condition. (Jas-1)

Need light in area. Need larger area - sometimes in the evening area is full. (Lib-2)

We need more spaces and a sign detailing if there is a security of some means patroling the area for warning. (Lib-2)

Parking area should be made larger for more cars and should be lighted better. (Lib-2)

Our lot needs to be a little larger. (Lib-2)

Make the parking area larger. (Lib-2)

The bigger corporations with large numbers of employers who must commute a long distance should encourage and provide some kind of incentive for carpooling. (Aus-1)

Fix the pot holes. (Har-4)

Parking areas could be paved. Lighting would be nice. (Mon-1)

It would be nice not to worry about stepping in the mud. (Hen-1)

Need pavement because of mud when wet. (Wha-1)

It would be nice to have a paved covered area to park my car during the day. (Smi-2)

Need trash cans. (Rus-1)

The parking area to be topped and sectioned off so more people can park there. (Hen-2)

OTHER TYPES OF COMMENTS OR REMARKS

I ride a 15 passenger van which 2 people catch at this location. (Mon-5)

Survey does not provide for additional stop(s) at pick up location(s) for additional passengers. In our case one stop for 8 people. Unless noted in comments a single van (Conroe to Houston) may appear two or three times considering number of stops to pick up people. Survey does not appear to consider convenience. Our van goes to two locations. (Mon-4)

Just recently, concern for auto security at this location. Autos have been reported stolen, cars have been stripped and just last week a carryall was stripped off. (Mon-4)

The recent blacktopping made parking much nicer. (Mon-1)

Got a Job? (Mon-4)

One lady that rides in our van had her rear wheels stolen off her car. (Mon-2)

I don't mind answering questions I feel are relative to your study, but personal questions are none of your business. (Mon-2)

The parking lot is not patroled enough. I had a windshield broken and I know of numerous tires and wheels stolen. (Mon-4)

Each day we work is a different schedule. (Mon-2)

The parking area has had problems with vandalism of the cars. (Mon-2)

There has been a problem of stealing at this lot. Cars, trucks, batteries, tires, hubcaps, you name it, they take it. Maybe there could be some kind of secuirty formed. (Mon-1)

Keep on carpooling. (Mon-2)

Worked for same company locally - but vanpool was used as part of incentive to transfer. Disadvantage is if in middle of job or meeting everything must stop in order not to hold up vanpool. (Med-1)

Safe parking areas are very important for carpooling or busing. (Aus-2)

Would like to have more in our car pool. (Aus-2)

I drive an 18 wheeler which I park here and drive my pick-up to and from my house. (Aus-1)

Park and pool location I use is a super-market parking lot. (Ata-2)

Everyone should consider carpooling for energy savings and cost of driving if possible. There is a great abundance of carpooling, vanpooling and buses running at this plant site. Brown and Root Inc. (Bos-2)

No, I do not travel to another destination from this place. (Den-6)

We had formed a carpool and were parking along the highway R.O.W. Others were parking on the R.O.W. also. I asked District 15 to construct a park and ride lot, which they did. (Ken-1)

Park and Pool locations near interstate may increase chance of theft, etc. (Vic-4)

I would like $20 for use of my time in filling out this Aggie survey. (Vic-4)

It is safe to park in daytime but several cars have been broken in on night shifts. (Vic-4)

Security system against theft and vandalism is needed. (Vic-4)

Not enough security causes night-time parking to be basically a park at your own risk situation. (Vic-4)

Still like the other lot best. (Vic-4)

I work off shore for Dresser Magcobar Data and I leave my truck at the park for seven straight days, two times a month while I am offshore. I prefer leaving it there, so I don't have to park near the salt water. (Vic-4)

Broken glass is a problem at this park and pool location. (Vic-4)

I do not work, but I do appreciate the convenience of being able to leave my car parked here when I go shopping to Bryan with my daughter. (Bur-3)

Ben Ivey of Denton, Texas drives his buses to the State, to help us from our destination to the State retarded school. He is a courtesy man and has 2 qualified drivers. (Den-2)

The driver of my carpool will be changing work locations shortly and will no longer go downtown. I will have to have another ride. (Den-5)

Vehicle was sideswiped one time-extensive damage and no one claimed or acknowledged having done it. (Had-2)

I would like to read more information concerning this study being conducted. Thank you. (Had-2)

My only concern is security. I found the lugs on my left rear wheel loosened this month. And another car on the lot had two deflated tires. (Had-1)

I commute to Houston from a park and ride lot provided by the Houston MTA bus system. (Har-2)

I'm encouraged to see someone looking at Houstons Traffic problem - I hope you have some solutions in mind. (Har-3)

Myself and two others in my vanpool of eight have had our vehicles broken into once. (Har-3)

I can't afford not to carpool for $4.12 an hour a 2 year old and no child support. It is hard to get by these days for a divorcee with kids. (Hen-2)

18 wheelers are tearing the park up. (Ora-1)

Don't put things under my windshield wiper, its rude. Have a nice day. (Ora-3)

A carpool parking lot is in existence in Bridge city. However, no one uses it because of thefts, vandalism, etc. (Ora-3)

The parking provided by the State by the Twin Lakes was impossible to get back on the highway once you pulled off. So we use Wal-Marts. (Ora-3)

Parking area is always littered with broken bottles. (Jas-4)

I cannot use this location at night because of thefts. I lost an 8 track player and gasoline. (Rus-1)

Why do you need to know the answers to questions 18-21. (Mon-2)

There is sometimes as many as fourteen cars crammed into this little place when all of the workers are on the same shift and time. (New-5)

Work shiftwork. Use this parking lot only on days. At night, park near private area due to theft and or vandalism. (New-5)

APPENDIX C

All Park-and-Pool

Summary of Study Sites

* Study Site for Project 2072
* Study Sites for Project 2205-13
* Study Sites for Project 2205-18
* Study Sites for Project 2205-19
* Study Sites for Project 2205-21
* Master Listing of All Study Sites
* Master Listing of ALl Study Sites with Available Survey Data

GENERAL

This appendix provides a master listing of all study sites included in this and the other 4 related ridersharing studies. Where possible, the number of surveyed commuter vehicles at individual lots is noted along with the number of returned surveys and the percent response rate. Data from all study sites were aggregated to develop user profiles by pooling mode as presented in the section on "Marketing Considerations." Given the nature of Project 2205-19 surveys (on-board versus windshield) and the intent of the study (transit potions versus all ridersharers), this data set was deleted from the aggregated data base prior to analyzing the "Pooling Benefits" and Benefit/Cost ratios for Park-and-Pool facilities. Brief highlights of the 5 studies performed in the State of Texas follows along with table listings of each research project.

Project 2072 was performed in 1983 and is the source of all primary data presented within this report. A total of 78 sites in 29 Texas counties were investigated. Twelve of the Park-and-Pool study sites had zero vehicles parked at the location when field inspection was undertaken; a total of 856 vehicles received survey forms at the remaining 66 lots representing an average of about 13 parked commuter vehicles per site. Nine of the 66 lots receiving questionnaires did not have any response from the commuters; therefore, only 57 Park-and-Pool sites with commuter survey data were available for analysis. Of all 78 sites investigated, 13 (16.7%) were located in an urban fringe area while 65 (83.3%) were classified as being in a rural setting. Considering only the 57 lots with returned survey data, 10 sites (17.5%) were urban fringe locations and 47 (82.5%) were rural locations.

Project 2205-13 was the first Park-and-Pool study undertaken by the Institute and included 25 sites within 13 counties around San Antonio and Houston. A total of 588 surveys were distributed at the 25 locations representing an average utilization per lot of 23.5 vehicles. Three of the lots had a zero response rate which left 22 sites for analysis. Of the 22 Park-and-Pool lots with Commuter data, 11 (50.0%) were urban fringe sites, 10 (45.5%) were rural sites and 1 (4.5%) was classified as an urban site.

Project 2205-18 investigated 21 Park-and-Pool lots in 4 counties within and surrounding the Dallas/Fort Worth Area. A total of 669 surveys were distributed at all locations representing an average utilization of 31.9 vehicles per site. Three of the lots had zero response from the commuters leaving 18 sites for further analysis. Of the remaining 18 locations, 3 or 16.7% were located in rural areas while the remaining 15 (83.3%) were within urban settings.

Eight Park-and-Go lots were included for study in Project 2205-19. This study was an on-board transit survey which collected only minimal information about the particular lot site. A total of 113 returns were received from the bus patrons participating in this research effort. All 8 Park-and-Go lots were located in the City of Forth Worth or Tarrant County.

Thirty-seven study sites were investigated in Project 2205-21 of which 8 were Park-and-Go lots and 29 were Park-and-Pool lots. The parking areas were dispersed throughout 9 counties within and adjacent to SDHPT District 2 (Fort Worth). Two of the study locations had zero vehicles at the time of investigation; 928 surveys were distributed at the remaining 35 lots representing an average use of 26.5 vehicles per site. Surveys were returned from all but one of the 35 locations which resulted in avail-

able commuter data from 34 sites of which 17 (50.0%) were rural lots, 11 (32.4%) were urban lots, and 6 (17.6%) were urban fringe lots.

Aggregating all 5 ridesharing studies results in a total of 156 sites located in 47 Texas counties which were included for investigation. Of all study locations, 28 (17.9%) were in an urban fringe area, 33 (21.2%) were in an urban area, and 95 (60.9%) were classified as being in a rural area. Considering the master listing of all study sites "with available survey data," 128 ridesharing lots located in 43 counties were included in one or more of the research efforts. Of the 128 sites, 25 (19.5%) were urban fringe lots, 32 (25.0%) were urban lots and 71 (55.5%) were classed as rural lots. Five of the study sites (TAR-18, TAR-31, TAR-34, TAR-39 and TAR-46) were Park-and-Go facilities included only in the transit study conducted under Project 2205-19. These 5 locations were deleted from the analysis of Pooling Benefits due to the nature of the user survey data. The remaining 123 study sites were clssified as 25 (20.3%) urban fringe lots, 27 (22.0%) urban lots, and 71 (57.7%) rural lots.

Table C-1

STUDY SITES FOR PROJECT 2072-83
SURVEY COMPLETED 1982-83

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
ATA 1	POTEET	ATASCOSA	RURAL	4	2	50.00
ATA 2	PLEASANTON	ATASCOSA	RURAL	8	3	37.50
AUS 1	SAN FELIPE	AUSTIN	RURAL	18	8	44.44
AUS 2	SEALY	AUSTIN	RURAL	18	6	33.33
BOS 1	WALNUT SPRINGS	BOSQUE	RURAL	3	0	0.00
BOS 2	MERIDIAN	BOSQUE	RURAL	4	1	25.00
BOS 3	LAGUNA PARK	BOSQUE	RURAL	0	0	.
BUR 1	CALDWELL	BURLESON	RURAL	2	2	100.00
BUR 2	CALDWELL	BURLESON	RURAL	3	1	33.33
BUR 3	COOKS POINT	BURLESON	RURAL	4	3	75.00
COM 1	SOLMS	COMAL	RURAL	21	11	52.38
COM 2	NEW BRAUNFELS	COMAL	RURAL	40	15	37.50
DEN 1	PILOTS POINT	DENTON	RURAL	14	5	35.71
DEN 2	AUBREY	DENTON	RURAL	4	3	75.00
DEN 3	DENTON	DENTON	RURAL	2	1	50.00
DEN 4	DENTON	DENTON	RURAL	19	7	36.84
DEN 5	DENTON	DENTON	RURAL	15	9	60.00
DEN 6	LEWISVILLE	DENTON	RURAL	8	1	12.50
DEN 7	LEWISVILLE	DENTON	RURAL	5	2	40.00
GRE 1	LONGVIEW	GREGG	RURAL	0	0	.
GRE 2	KILGORE	GREGG	RURAL	0	0	.
GUA 1	SEGUIN	GUADALUPE	RURAL	13	7	53.85
GUA 2	SEGUIN	GUADALUPE	RURAL	9	4	44.44
HAD 1	BEAUMONT	HARDIN	RURAL	11	3	27.27
HAD 2	BEAUMONT	HARDIN	RURAL	12	4	33.33
HAR 2	KATY	HARRIS	URBAN FRINGE	30	18	60.00
HAR 3	BARKER	HARRIS	URBAN FRINGE	42	23	54.76
HAR 4	FOUR CORNERS	HARRIS	URBAN FRINGE	9	7	77.78
HEN 1	ATHENS	HENDERSON	RURAL	0	0	.
HEN 2	BROWNSBORO	HENDERSON	RURAL	15	11	73.33
HIL 1	WHITNEY	HILL	RURAL	9	1	11.11
JAS 1	JASPER	JASPER	RURAL	7	3	42.86
JAS 2	KIRBYVILLE	JASPER	RURAL	17	6	35.29
JAS 3	CALL	JASPER	RURAL	1	0	0.00
JAS 4	EVADALE	JASPER	RURAL	9	2	22.22
JAS 5	GIST	JASPER	RURAL	0	0	.
JAS 6	BUNA	JASPER	RURAL	0	0	.
KEN 1	BOERNE	KENDALL	RURAL	12	8	66.67
KEN 2	BOERNE	KENDALL	RURAL	11	6	54.55
LAV 1	YOAKUM	LAVACA	RURAL	5	2	40.00
LIB 1	HARDIN	LIBERTY	RURAL	7	0	0.00
LIB 2	DAYTON	LIBERTY	RURAL	21	10	47.62
LIB 3	CLEVELAND	LIBERTY	RURAL	0	0	.
MCL 1	WACO	MC LENNAN	URBAN FRINGE	4	1	25.00
MCL 2	WOODWAY	MC LENNAN	URBAN FRINGE	0	0	.
MED 1	CASTROVILLE	MEDINA	RURAL	14	7	50.00
MIL 1	GAUSE	MILAM	RURAL	2	1	50.00
MON 1	CAMP STRAKE	MONTGOMERY	URBAN FRINGE	31	10	32.26
MON 2	PORTER	MONTGOMERY	URBAN FRINGE	65	23	35.38
MON 3	SPLENDORA	MONTGOMERY	RURAL	7	2	28.57
MON 4	CONROE	MONTGOMERY	RURAL	76	36	47.37
MON 5	NEW CANEY	MONTGOMERY	RURAL	8	4	50.00
NEW 1	NEWTON	NEWTON	RURAL	5	3	60.00
NEW 2	BLEAKWOOD	NEWTON	RURAL	3	0	0.00
NEW 3	TROUT CREEK	NEWTON	RURAL	2	0	0.00
NEW 4	BUNA	NEWTON	RURAL	0	0	.
NEW 5	DEWEYVILLE	NEWTON	RURAL	5	4	80.00
ORA 1	MAURICEVILLE	ORANGE	URBAN FRINGE	9	4	44.44
ORA 2	ORANGE	ORANGE	URBAN FRINGE	0	0	.
ORA 3	BRIDGE CITY	ORANGE	URBAN FRINGE	25	10	40.00
ORA 4	BRIDGE CITY	ORANGE	URBAN FRINGE	0	0	.
RUS 1	HENDERSON	RUSK	RURAL	14	7	50.00
SMI 1	TYLER	SMITH	RURAL	7	0	0.00
SMI 2	MT. SYLVAN	SMITH	RURAL	2	2	100.00
TYL 1	WOODVILLE	TYLER	RURAL	1	1	100.00
TYL 2	WARREN	TYLER	RURAL	5	1	20.00
TYL 3	FRED	TYLER	RURAL	3	2	66.67
TYL 4	SPURGER	TYLER	RURAL	2	0	0.00
VAN 1	CANTON	VAN ZANDT	RURAL	2	1	50.00
VAN 2	CANTON	VAN ZANDT	RURAL	0	0	.
VAN 3	CANTON	VAN ZANDT	RURAL	11	0	0.00

STUDY SITES FOR PROJECT 2072-83
SURVEY COMPLETED 1982-83

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
VIC 1	NURSERY	VICTORIA	RURAL	5	0	0.00
VIC 2	MISSION VALLEY	VICTORIA	RURAL	8	5	62.50
VIC 3	VICTORIA	VICTORIA	URBAN FRINGE	3	2	66.67
VIC 4	VICTORIA	VICTORIA	URBAN FRINGE	66	28	42.42
VIC 5	PLACEDO	VICTORIA	RURAL	4	2	50.00
WHA 1	HUNGERFORD	WHARTON	RURAL	4	2	50.00
WIL 1	FLORESVILLE	WILSON	RURAL	31	14	45.16
			TOTAL =	856	367	42.87

Table C-2

STUDY SITES FOR PROJECT 2205-13
SURVEY COMPLETED 1980-81

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
ATA 1	POTEET	ATASCOSA	RURAL	16	7	43.75
BAN 1	LAKE HILLS	BANDERA	RURAL	4	1	25.00
BEX 1	SELMA	BEXAR	URBAN FRINGE	50	19	38.00
BRA 1	LAKE JACKSON	BRAZORIA	RURAL	31	9	29.03
BRA 2	ANGLETON	BRAZORIA	RURAL	6	2	33.33
BRA 3	ALVIN	BRAZORIA	URBAN FRINGE	41	14	34.15
COM 1	SOLMS	COMAL	RURAL	1	0	0.00
COM 2	NEW BRAUNFELS	COMAL	RURAL	19	12	63.16
FOR 1	RICHMOND	FORT BEND	URBAN FRINGE	27	12	44.44
FOR 2	RICHMOND	FORT BEND	URBAN FRINGE	47	24	51.06
GAL 1	HITCHCOCK	GALVESTON	URBAN FRINGE	24	5	20.83
GAL 2	TEXAS CITY	GALVESTON	URBAN FRINGE	6	2	33.33
HAR 5	HOUSTON	HARRIS	URBAN	67	30	44.78
HAR 6	TOMBALL	HARRIS	URBAN FRINGE	10	8	80.00
HAR 7	TOMBALL	HARRIS	URBAN FRINGE	19	12	63.16
HAR 8	TOMBALL	HARRIS	URBAN FRINGE	35	24	68.57
KEN 1	BOERNE	KENDALL	RURAL	6	5	83.33
KEN 2	BOERNE	KENDALL	RURAL	30	23	76.67
MAT 1	CEDAR LANE	MATAGORDA	RURAL	1	0	0.00
MAT 2	HINKLES FERRY	MATAGORDA	RURAL	7	0	0.00
MED 2	DEVINE	MEDINA	RURAL	4	2	50.00
MON 1	CAMP STRAKE	MONTGOMERY	URBAN FRINGE	21	8	38.10
MON 2	PORTER	MONTGOMERY	URBAN FRINGE	40	15	37.50
MON 4	CONROE	MONTGOMERY	RURAL	51	24	47.06
WIL 1	FLORESVILLE	WILSON	RURAL	25	8	32.00
			TOTAL =	588	266	45.24

Table C-3

STUDY SITES FOR PROJECT 2205-18
SURVEY COMPLETED 1981-82

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
DAL A	GRAND PRAIRIE	DALLAS	URBAN	41	23	56.10
DAL B	GRAND PRAIRIE	DALLAS	URBAN	18	0	0.00
DAL C	DALLAS	DALLAS	URBAN	21	5	23.81
DAL D	DALLAS	DALLAS	URBAN	15	1	6.67
DAL E	DALLAS	DALLAS	URBAN	12	4	33.33
DAL F	DALLAS	DALLAS	URBAN	20	4	20.00
DAL G	GARLAND	DALLAS	URBAN	80	31	38.75
DAL H	GARLAND	DALLAS	URBAN	30	1	3.33
DAL I	GARLAND	DALLAS	URBAN	19	5	26.32
KAU A	TERRELL	KAUFMAN	RURAL	5	0	0.00
ROC A	ROCKWALL	ROCKWALL	RURAL	7	0	0.00
ROC B	ROCKWALL	ROCKWALL	RURAL	6	3	50.00
ROC C	ROCKWALL	ROCKWALL	RURAL	22	2	9.09
ROC D	ROCKWALL	ROCKWALL	RURAL	24	11	45.83
TAR A	FORT WORTH	TARRANT	URBAN	45	18	40.00
TAR B	FORT WORTH	TARRANT	URBAN	11	2	18.18
TAR C	FORT WORTH	TARRANT	URBAN	118	42	35.59
TAR D	ARLINGTON	TARRANT	URBAN	11	8	72.73
TAR E	ARLINGTON	TARRANT	URBAN	133	63	47.37
TAR F	ARLINGTON	TARRANT	URBAN	8	3	37.50
TAR G	ARLINGTON	TARRANT	URBAN	23	9	39.13
			TOTAL =	669	235	35.13

Table C-4

STUDY SITES FOR PROJECT 2205-19
SURVEY COMPLETED 1981-82

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
TAR13	FORT WORTH	TARRANT	URBAN	.	47	.
TAR16	FORT WORTH	TARRANT	URBAN	.	27	.
TAR18	FORT WORTH	TARRANT	URBAN	.	9	.
TAR20	FORT WORTH	TARRANT	URBAN	.	12	.
TAR31	FORT WORTH	TARRANT	URBAN	.	2	.
TAR34	FORT WORTH	TARRANT	URBAN	.	6	.
TAR39	FORT WORTH	TARRANT	URBAN	.	4	.
TAR46	FORT WORTH	TARRANT	URBAN	.	6	.
			TOTAL =	0	113	.

Table C-5

STUDY SITES FOR PROJECT 2205-21
SURVEY COMPLETED 1982-83

LOT ID	NEAREST TOWN TO LOT	COUNTY	SETTING OF LOT	NUMBER SURVEYED	TOTAL RETURN	PERCENT RETURNED
ELL 1	ENNIS	ELLIS	RURAL	87	32	36.78
ELL 2	RED OAK	ELLIS	RURAL	34	13	38.24
ERA 1	STEPHENVILLE	ERATH	RURAL	7	2	28.57
HOO 1	GRANBURY	HOOD	RURAL	3	1	33.33
HOO 2	GRANBURY	HOOD	RURAL	12	4	33.33
HOO 3	GRANBURY	HOOD	RURAL	14	7	50.00
JOH 1	EGAN	JOHNSON	RURAL	4	2	50.00
JOH 2	CRESSON	JOHNSON	RURAL	5	1	20.00
JOH 3	CLEBURNE	JOHNSON	RURAL	19	5	26.32
PAL 1	NEW SALEM	PALO PINTO	RURAL	2	0	0.00
PAR 1	WEATHERFORD	PARKER	RURAL	11	4	36.36
PAR 2	WEATHERFORD	PARKER	RURAL	12	4	33.33
PAR 3	WEATHERFORD	PARKER	RURAL	30	11	36.67
SOM 1	GLEN ROSE	SOMERVELL	RURAL	13	6	46.15
TAR 1	AZLE	TARRANT	URBAN FRINGE	40	18	45.00
TAR 2	AZLE	TARRANT	URBAN FRINGE	22	2	9.09
TAR 3	ARLINGTON	TARRANT	URBAN FRINGE	42	22	52.38
TAR 4	LAKE WORTH	TARRANT	URBAN	7	2	28.57
TAR 5	LAKESIDE	TARRANT	URBAN FRINGE	8	5	62.50
TAR 6	EULESS	TARRANT	URBAN	35	22	62.86
TAR 7	BEDFORD	TARRANT	URBAN	89	50	56.18
TAR 8	HURST	TARRANT	URBAN	69	14	20.29
TAR 9	CROWLEY	TARRANT	RURAL	17	8	47.06
TAR10	ARLINGTON	TARRANT	URBAN FRINGE	39	15	38.46
TAR11	ARLINGTON	TARRANT	URBAN FRINGE	39	13	33.33
TAR12	FOREST HILL	TARRANT	URBAN	40	17	42.50
TAR13	FORT WORTH	TARRANT	URBAN	49	20	40.82
TAR14	FORT WORTH	TARRANT	URBAN	0	0	.
TAR15	FORT WORTH	TARRANT	URBAN	33	3	9.09
TAR16	FORT WORTH	TARRANT	URBAN	78	37	47.44
TAR17	FORT WORTH	TARRANT	URBAN	26	12	46.15
TAR18	FORT WORTH	TARRANT	URBAN	0	0	.
TAR19	FORT WORTH	TARRANT	URBAN	3	1	33.33
TAR20	FORT WORTH	TARRANT	URBAN	7	1	14.29
WIS 1	DECATUR	WISE	RURAL	21	6	28.57
WIS 2	BOYD	WISE	RURAL	3	1	33.33
WIS 3	NEWARK	WISE	RURAL	8	2	25.00
			TOTAL =	928	363	39.12

Table C-6

MASTER LISTING OF ALL STUDY SITES

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
ATA 1	ATASCOSA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
ATA 2	ATASCOSA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
AUS 1	AUSTIN	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
AUS 2	AUSTIN	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
BAN 1	BANDERA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
BEX 1	BEXAR	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	URBAN FRINGE	2205-13
BOS 1	BOSQUE	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
BOS 2	BOSQUE	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
BOS 3	BOSQUE	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
BRA 1	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2205-13
BRA 2	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2205-13
BRA 3	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
BUR 1	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
BUR 2	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
BUR 3	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
COM 1	COMAL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
COM 2	COMAL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
DAL A	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL B	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL C	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL D	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL E	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL F	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL G	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL H	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL I	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DEN 1	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 2	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 3	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 4	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 5	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 6	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 7	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
ELL 1	ELLIS	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-21
ELL 2	ELLIS	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-21
ERA 1	ERATH	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
FOR 1	FORT BEND	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13

Table C-6 (Cont'd)

MASTER LISTING OF ALL STUDY SITES

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
FOR 2	FORT BEND	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
GAL 1	GALVESTON	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
GAL 2	GALVESTON	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
GRE 1	GREGG	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
GRE 2	GREGG	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
GUA 1	GUADALUPE	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
GUA 2	GUADALUPE	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
HAD 1	HARDIN	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
HAD 2	HARDIN	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
HAR 2	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 3	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 4	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 5	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN	2205-13
HAR 6	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HAR 7	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HAR 8	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HEN 1	HENDERSON	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
HEN 2	HENDERSON	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
HIL 1	HILL	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
HOO 1	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
HOO 2	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
HOO 3	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JAS 1	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 2	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 3	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 4	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 5	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 6	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JOH 1	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JOH 2	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JOH 3	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
KAU A	KAUFMAN	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
KEN 1	KENDALL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
KEN 2	KENDALL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
LAV 1	LAVACA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
LIB 1	LIBERTY	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83

Table C-6 (Cont'd)

MASTER LISTING OF ALL STUDY SITES

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
LIB 2	LIBERTY	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
LIB 3	LIBERTY	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
MAT 1	MATAGORDA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2205-13
MAT 2	MATAGORDA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2205-13
MCL 1	MC LENNAN	DISTRICT 9, WACO	PARK-AND-POOL	URBAN FRINGE	2072-83
MCL 2	MC LENNAN	DISTRICT 9, WACO	PARK-AND-POOL	URBAN FRINGE	2072-83
MED 1	MEDINA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
MED 2	MEDINA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
MIL 1	MILAM	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
MON 1	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
MON 2	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
MON 3	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2072-83
MON 4	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2205-13
MON 5	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2072-83
NEW 1	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
NEW 2	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
NEW 3	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
NEW 4	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
NEW 5	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
ORA 1	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
ORA 2	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
ORA 3	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
ORA 4	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
PAL 1	PALO PINTO	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
PAR 1	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
PAR 2	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
PAR 3	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
ROC A	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
ROC B	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
ROC C	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
ROC D	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
RUS 1	RUSK	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
SMI 1	SMITH	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
SMI 2	SMITH	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
SOM 1	SOMERVELL	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
TAR A	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR B	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18

Table C-6 (Cont'd)

MASTER LISTING OF ALL STUDY SITES

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
TAR C	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-18
TAR D	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR E	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR F	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR G	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR 1	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 2	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 3	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 4	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 5	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 6	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 7	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 8	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 9	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
TAR10	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR11	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR12	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR13	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR14	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR15	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR16	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR17	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR18	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR19	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR20	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR31	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR34	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR39	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR46	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TYL 1	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
TYL 2	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
TYL 3	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
TYL 4	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
VAN 1	VAN ZANDT	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
VAN 2	VAN ZANDT	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
VAN 3	VAN ZANDT	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83

MASTER LISTING OF ALL STUDY SITES

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
VIC 1	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
VIC 2	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
VIC 3	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	URBAN FRINGE	2072-83
VIC 4	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	URBAN FRINGE	2072-83
VIC 5	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
WHA 1	WHARTON	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
WIL 1	WILSON	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
WIS 1	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
WIS 2	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
WIS 3	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21

Table C-7

MASTER LISTING OF ALL STUDY SITES
WITH SURVEY DATA

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
ATA 1	ATASCOSA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
ATA 2	ATASCOSA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
AUS 1	AUSTIN	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
AUS 2	AUSTIN	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
BAN 1	BANDERA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
BEX 1	BEXAR	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	URBAN FRINGE	2205-13
BOS 2	BOSQUE	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
BRA 1	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2205-13
BRA 2	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2205-13
BRA 3	BRAZORIA	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
BUR 1	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
BUR 2	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
BUR 3	BURLESON	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
COM 1	COMAL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
COM 2	COMAL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
DAL A	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL C	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL D	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL E	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL F	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL G	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL H	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DAL I	DALLAS	DISTRICT 18, DALLAS	PARK-AND-POOL	URBAN	2205-18
DEN 1	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 2	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 3	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 4	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 5	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 6	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
DEN 7	DENTON	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2072-83
ELL 1	ELLIS	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-21
ELL 2	ELLIS	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-21
ERA 1	ERATH	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
FOR 1	FORT BEND	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
FOR 2	FORT BEND	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
GAL 1	GALVESTON	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13

Table C-7 (Cont'd)

MASTER LISTING OF ALL STUDY SITES
WITH SURVEY DATA

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
GAL 2	GALVESTON	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
GUA 1	GUADALUPE	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
GUA 2	GUADALUPE	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
HAD 1	HARDIN	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
HAD 2	HARDIN	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
HAR 2	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 3	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 4	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
HAR 5	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN	2205-13
HAR 6	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HAR 7	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HAR 8	HARRIS	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2205-13
HEN 2	HENDERSON	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
HIL 1	HILL	DISTRICT 9, WACO	PARK-AND-POOL	RURAL	2072-83
HOO 1	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
HOO 2	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
HOO 3	HOOD	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JAS 1	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 2	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JAS 4	JASPER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
JOH 1	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JOH 2	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
JOH 3	JOHNSON	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
KEN 1	KENDALL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
KEN 2	KENDALL	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
LAV 1	LAVACA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
LIB 2	LIBERTY	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
MCL 1	MC LENNAN	DISTRICT 9, WACO	PARK-AND-POOL	URBAN FRINGE	2072-83
MED 1	MEDINA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
MED 2	MEDINA	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2205-13
MIL 1	MILAM	DISTRICT 17, BRYAN	PARK-AND-POOL	RURAL	2072-83
MON 1	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
MON 2	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	URBAN FRINGE	2072-83
MON 3	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2072-83
MON 4	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2072-83
MON 5	MONTGOMERY	DISTRICT 12, HOUSTON	PARK-AND-POOL	RURAL	2072-83

Table C-7 (Cont'd)

MASTER LISTING OF ALL STUDY SITES
WITH SURVEY DATA

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
NEW 1	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
NEW 5	NEWTON	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
ORA 1	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
ORA 3	ORANGE	DISTRICT 20, BEAUMONT	PARK-AND-POOL	URBAN FRINGE	2072-83
PAR 1	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
PAR 2	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
PAR 3	PARKER	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
ROC B	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
ROC C	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
ROC D	ROCKWALL	DISTRICT 18, DALLAS	PARK-AND-POOL	RURAL	2205-18
RUS 1	RUSK	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
SMI 2	SMITH	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
SOM 1	SOMERVELL	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
TAR A	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR B	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR C	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-18
TAR D	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR E	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR F	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR G	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-18
TAR 1	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 2	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 3	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 4	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 5	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR 6	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 7	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 8	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR 9	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
TAR10	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR11	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN FRINGE	2205-21
TAR12	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-POOL	URBAN	2205-21
TAR13	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR15	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR16	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR17	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21

Table C-7 (Cont'd)

MASTER LISTING OF ALL STUDY SITES
WITH SURVEY DATA

LOT ID	COUNTY LOT LOCATED IN	SDHPT DISTRICT & OFFICE	TYPE OF LOT	SETTING OF LOT	PROJECT NUMBER
TAR18	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR19	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR20	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-21
TAR31	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR34	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR39	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TAR46	TARRANT	DISTRICT 2, FORT WORTH	PARK-AND-GO	URBAN	2205-19
TYL 1	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
TYL 2	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
TYL 3	TYLER	DISTRICT 20, BEAUMONT	PARK-AND-POOL	RURAL	2072-83
VAN 1	VAN ZANDT	DISTRICT 10, TYLER	PARK-AND-POOL	RURAL	2072-83
VIC 2	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
VIC 3	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	URBAN FRINGE	2072-83
VIC 4	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	URBAN FRINGE	2072-83
VIC 5	VICTORIA	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
WHA 1	WHARTON	DISTRICT 13, YOAKUM	PARK-AND-POOL	RURAL	2072-83
WIL 1	WILSON	DISTRICT 15, SAN ANTONIO	PARK-AND-POOL	RURAL	2072-83
WIS 1	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
WIS 2	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21
WIS 3	WISE	DISTRICT 2, FORT WORTH	PARK-AND-POOL	RURAL	2205-21

APPENDIX D

SURVEY OF OTHER STATE PROGRAMS

- Listing of State Departments of Transportation Contacted in Park-and-Pool Study (Part 1)
- Summary of State Park-and-Pool Programs.
- Individuals Participating and/or Providing Information Relevant to the Research Effort.

GENERAL

This appendix summarizes the mailout survey of state transportation agencies and the inquiry of Park-and-Pool activity throughout the nation. A total of 26 states were contacted with 20, or 76.9%, responding to the invitation to participate in this study effort. A listing of addresses for all contacted states is included in the first part of this Appendix. Part 2 of the Appendix provides a state-by-state summary of Park-and-Pool programs, funding and evaluation criteria noted by the 20 participating transportation agencies.

Part 3 of this appendix lists the individual, plus their address and phone number, who responded on behalf of the transportation agency. These individuals and agencies are gratefully acknowledged for their contribution to this research effort.

Part 1

Summary of Other States' Park-and-Pool

Arizona

Arizona doesn't have a statewide Park-and-Pool program or any rural Park-and-Pool lots but it does have facilities in the Metropolitan areas of Phoenix and Tucson. These lots principally support the urban public transit systems in those cities.

California

California has a formal Park-and-Pool program, with over 200 lots state-wide, which was started in 1974. The program could be classified as "aggressive" as California actively plans new lots and promotes existing facilities. State funds are used to match local and Federal funds for construction and operating and maintenance costs.

Areas which are used as informal Park-and-Pool lots (i.e., public rights-of-way, vacant land, etc.) are judged upon the following criteria: the transit service potential; if the site is highly visible and easily patrolled; the distance to the CBD or employment centers; the site and freeway access convenience; the security of the facility; if the lot size is adequate for present and future demand; and if there are incentives for transit and carpool use.

Colorado

Colorado doesn't have a state-wide Park-and-Pool program but it does provide minimal maintenance and security for existing informal lots.

Connecticut (January 1976 source)

Connecticut has a formal Park-and-Pool program which was started in 1969. There are now over 100 lots state-wide, most of which are combination (car/van pool and transit) lots. The State of Connecticut campaigns to inform the public about the benefits of carpooling. Connecticut is also involved in the improvement and/or establishment of the state's lots.

Georgia

Georgia has a formal Park-and-Pool program which was started in 1979. There are 18 combination lots statewide. Georgia's Park-and-Pool program is financed with state and county funds.

The feasibility of a site for use as a Park-and-Pool lot is determined by a refined version of the methodology presented in an article in the ITE Journal by E.N. Burns titled "Priority Rating of Potential Park-and-Ride Sites." Seventeen factors are considered; each factor has a value and a weight.

Maine

Maine has a formal Park-and-Pool program which is relatively new. Thus, Maine only has one operational lot. There is a fair amount of activity in developing a strategy and a list of locations for future Park-and-Pool lot development. Maine's Park-and-Pool program is state funded.

The feasibility of a Park-and-Pool lot is dependent upon the distance from an employment center, population and characteristics in node periphery, site features (i.e., traffic conditions, bike access, etc.), and evidence of rideshare use.

Maryland

Maryland has a formal Park-and-Pool program with lots that are used, mainly by car and van pools. The program is county-and state-funded.

The criteria used in site determination are those presented in the ITE Journal article by E.N. Burns, "Priority Rating of Potential Park-and-Ride Sites."

Michigan

Michigan has a formal state-wide Park-and-Pool program. They also have a Rural Park-and-Pool program. As of January 1978, there were 75 rural lots in the state which are used by car and van pools. Michigan has an aggressive program; a number of lots are developed every year and many more are under study. The program is financed with state funds.

The criteria used in determining the feasibility of a site are as follows: location, topography, cost of construction, future upgrading of roadway, access, parcel size, land value, alternative sites, and parking demand.

Minnesota

In 1980, a formal Park-and-Pool program was started in Minnesota. To date, there are 27 lots state-wide. Minnesota's Department of Transportation is very active in planning new sites and determining if informal lots should be upgraded to formal lots. The Park-and-Pool program is financed with local and state funds.

The criteria used by the Minnesota Department of Transportation in determining the feasibility of a site are: location should serve existing needs, emphasis on joint use of existing lots, publicly owned land, minimize access travel mileage, maximize visibility, sufficient capacity, future

expansion potential, sites that serve longer distance commuter trips, topography, safety hazards that can be eliminated by improved parking, strong local support, and sites being planned as part of an area rideshare program.

Mississippi

Mississippi doesn't have a Park-and-Pool program.

Missouri

Missouri's formal Park-and-Pool program was started in 1973. There are now 74 Park-and-Pool lots within the program. State funds are used to finance Missouri's Park-and-Pool program.

Nebraska

There is no Park-and-Pool program in Nebraska.

Ohio

Ohio does have a Park-and-Pool program. The guidelines used in determining the feasibility of a lot are those in the ITE Journal articale by E.N. Burns.

Oklahoma

Oklahoma does have a formal Park-and-Pool program. Due to the nature of the state, Oklahoma's Park-and-Pool program is largely rural. The Park-and-Pool program was started in 1975 when it was recognized that cars parking around interchanges, intersections, and parking areas were becoming a problem. At last count, there are 97 rural lots in Oklahoma. Ninety-three are informal parking areas and four are formal lots. The Park-and-Pool program is State funded.

The decision as to whether to develop an informal or not is determined by demand, construction costs, and safety aspects.

Oregon

Oregon doesn't have a statewide system of Park-and-Pool lots but they do have an informal program where the state establishes or improves formal or informal lots. This is done in cases where the land is publicly owned and people are already using the area for parking.

Pennsylvania

Pennsylvania doesn't have a statewide Park-and-Pool program but they do have a demonstration program in progress with five car/vanpool lots to determine the feasibility of such a program on a statewide scale. The federal government pays a percentage of the total cost of a project and either the local government or the State pays the rest depending on the type of project that is being financed.

The criteria Pennsylvania uses in the determination of the feasibility of a site are: located in a dense travel corridor, in advance of congested portions, access to transit service, access convenience, minimize cost of development, joint use of land, topography, minimize adverse effects on adjacent areas, effect on traffic circulation and future land use.

Rhode Island

Rhode Island has a formal Park-and-Pool program. Currently, there are ten lots in operation; six are run by the Rhode Island Department of Transportation and four are run by the Rhode Island Public Transit Authority. Most of the lots are state-funded by those facilities which serve federal-aid highways are eligible for federal funds. Rhode Island is

aggressive in its Park-and-Pool program; there a number of facilities under construction or under design.

Utah

The State of Utah has a formal Park-and-Pool program. It also has a rural Park-and-Pool program. There are 50 rural lots in Utah which accommodate mostly car and vanpoolers.

The criteria used in determining the potential in developing a site as a formal Park-and-Pool lot are as follows: existing usage by commuters availability of land, well located for current commuters, near a proposed inter-city transit route, available land to allow for design of increased parking capacity, safety conditions, available police patrol, and public acceptance.

Virginia

The Commonwealth of Virginia has a formal, statewide Park-and-Pool program. It was started in 1973. Currently, there are 50 lots in the State; sixteen are served by transit; the rest are car and vanpool lots. All of the lots except one is state funded. The remaining one is financed with local funds.

Washington

Washington State has a formal Park-and-Pool program. The lots are car and vanpool lots.

The major factors used in determining the feasibility of a particular site are as follows: the existing operational characteristics and safety of the system shouldn't significantly be reduced, a demand for carpool parking exists, and the lots should be as close to highway interchanges as possible.

Part III

Listing Of Participating Individuals and Agencies

Arizona
Arizona Department of Transportation
Robert P. Mickelson, Deputy Director
Transportation Planning Division
206 South 17th Avenue
Phoenix, AZ 85007

California
Department of Transportation
Ted Berg, Chief
Office of Ridesharing Facilities
1120 N. Street
Sacramento, CA 95814
(916) 445-9233

Colorado
Department of Highways
Harvey R. Atchison, Director
Division of Transportation Planning
4201 East Arkansas Avenue
Denver, CO 80222
(303) 757-9525

Connecticut
Connecticut Department of Transportation
Bureau of Planning and Research
John Drake, Director of Planning
24 Wolcott Hill Road
Wethersfield, CT 06109

Georgia
Department of Transportation
James L. Stanley, Chief
Bureau of Public Transportation
No. 2 Capitol Square
ATlanta, GA 30334-1002

Maine
Department of Transportation
Paul Minor, Assistant Director
Bureau of Planning
Transportation Building
State House Station 16
Augusta, ME 04333

Maryland
Maryland Department of Transportation
Clyde E. Pyers, Director
Office of Transportation Planning
P.O. Box 8755
Baltimore - Washington International Airport, MD 21240-0755
(301) 859-7333

Montgomery County Government
Department of Transportation
John J. Clark, Director
Office of Transportation Planning
Executive Office Building
101 Monroe Street
Rockville, MD 20850
(301) 251-2145

Michigan
Department of Transportation
Sam F. Cryderman, Deputy Director
Bureau of Transportation Planning
Transportation Building
425 West Ottawa
P.O. Box 30050
Lansing, MI 48909

Minnesota
Department of Transportation
Douglas H. Differt, Assistant Commissioner
Program Management Division
Transportation Building
St. Paul, MN 55155
(612) 296-8532

Mississippi
Mississippi State Highway Department
Brian N. Grogan
Transportation Planning Division
P.O. Box 1850
Jackson, MS 39205

Missouri
Highway and Transportation Commission
Robert N. Hunter, Chief Engineer
P.O. Box 270
Jefferson City, MO 65102
(314) 751-2551

Nebraska
Department of Roads
Derald S. Kohles, Planning Engineer
P.O. Box 94759
Lincoln, NE 68509-4759

Ohio
Ohio Department of Transportation
Richard L. Buchwalter, Acting Administrator
Bureau of Planning
25 South Front Street
P.O. Box 899
Columbus, Ohio 43216

Oklahoma
Oklahoma Department of Transportation
Monty C. Murphy, Assistant Director--Planning & Research
200 N.E. 21st Street
Oklahoma City, OK 73105
(405) 521-2704

Oregon
Department of Transportation
Paul R. Norris, Manager
Policy and Planning
Transportation Building
Salem, OR 97310

Pennsylvania
Department of Transportation
Harvey Haack, Deputy Secretary
Harrisburg, PA 17120

Rhode Island
Department of Administration
Statewide Planning Program
Susan P. Morrison, Supervising Planner
265 Melrose Street
Providence, RI 02907

Utah
Utah Department of Transportation
W. Ronald Delis, Engineer for Transportation Planning
4501 South 2700 West
Salt Lake City, UT 84119

Virginia
Department of Highways and Transportation
Oscar K. Mabry, Director of Planning
1221 East Broad Street
Richmond, VA 23219

Washington
Department of Transportation
Robert S. Nielsen, Assistant Secretary for Public Transportation
and Planning
Highway Administration Building
Olympia, WA 98504
(206) 753-6005