PB98-142367

Transportation Research, Public Service & Education

MPC REPORT NO. 97-86

The National Short Line Railroad Database Project, 1996-97

Trent Byberg
Douglas Benson

October 1997

Colorado State University
Fort Collins, Colorado

North Dakota State University
Fargo, North Dakota

University of Wyoming
Laramie, Wyoming

Utah State University
Logan, Utah

Acknowledgements

This report has been prepared with funds provided by the Federal Railroad Administration (FRA), the American Short Line Railroad Association (ASLRA), and the United States Department of Transportation to the Mountain-Plains Consortium (MPC). The authors would like to acknowledge John Bitzan for his assistance with the modeling, Dr. M.B. Rao for his assistance with the variance computation, and Shelly Glatt, Kathy McCarthy and Bev Trittin for their administrative assistance.

THE NATIONAL SHORT LINE RAILROAD DATABASE PROJECT

1996-1997

Trent Byberg
Douglas Benson

Upper Great Plains Transportation Institute
North Dakota State University
Fargo, North Dakota

October 1997

ABSTRACT

This project is dedicated toward creating an annual information base on short line and regional railroads. Due to the ever faster changing railroad system, the value of such information is becoming increasingly important. The collected data is a viable tool for depicting industry trends and providing industry bench marks for policy makers, railroad managers, financiers, potential suppliers, and transportation agencies. Three years of collection and analysis of this data is complete, with another year in process. In this report, techniques for collecting short line information by mail and electronically are discussed. Also included in this report are an indepth look at some of the statistical analysis techniques and reporting methods used.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1. INTRODUCTION

The economies of rural America depend directly on transportation links to major markets. Rail service is one of the major contributors in providing access to these markets. The short line railroad industry is a principal contributor in providing rail service between rural America and major markets. There exist different needs and requirements necessary to preserve this vital transportation link, and a broad range of information is required to distinguish the characteristics of the short line industry. The American Short Line Railroad Association's Annual Data Profile is a major source for information used in analyzing these needs and requirements, and contributes to the awareness of the many challenges that lie ahead for this industry.

In 1993, the Federal Railroad Administration (FRA), in conjunction with the American Short Line Railroad Association (ASLRA), the University Transportation Centers Program (UTCP), and the Upper Great Plains Transportation Institute (UGPTI) initiated the American Short Line Railroad Association's Annual Data Profile of the short line industry to provide statistical data for the industry and to illustrate the contribution made by the short line industry. The ASLRA's Annual Data Profile of the small railroad industry now includes short line railroad information from 1993, 1994, and 1995 calendar years, with the 1996 data collection process underway.

An important step in the development of the ASLRA database is to obtain consistent, credible information over time. To facilitate this process, the majority of the Annual Data Profile content will remain constant with minor additions and deletions only occurring in response to the changing needs of the industry. In spite of several minor changes to the survey content, information collected each year has remained virtually unchanged. Evaluation of responses and response rates to survey questions and changes in the industry allow for modifications to the survey. Survey stability allows railroads to

become familiar with the survey information that must be compiled each year, and allows for more effective and efficient analysis.

This report identifies the methods and techniques used in collecting and analyzing the short line data and presents results of the analysis. The first part of the report begins by describing the data collection methods used for the third annual data profile (1995) and the development of the fourth annual data profile (1996). Tasks described in the following sections of the report include the maintenance of the main database, data analysis efforts, programming efforts for the 1996 electronic survey, generation of annual reports, and distribution of the reports and the electronic survey. Several Appendices are included to provide a copy of the Annual Data Profile, the User's Guide for the electronic survey, show details of analysis techniques, and display the formulated plan for the Annual Data Profile Web site.

CHAPTER 2. DATA COLLECTION METHODS

The Mailing Process

The Annual Data Profile is sent to more than 400 short line railroads across the United States. These railroads include all American Short Line Railroad Association members, and any other short line railroads requesting inclusion in the survey. Included in each package were a paper copy of the survey, a set of four installation disks for Dentry 3.0, a paper copy of the survey glossary, a paper copy of the Dentry 3.0 User's Guide, a letter from the president of the ASLRA, a letter of instructions from the UGPTI, and a postage paid return envelope.

A second mailing was sent to each railroad that responded to the 1995 survey. This mailing included a disk with a copy of their 1995 survey response in Microsoft Access database format. Railroads can use this file in the Dentry 3.0 software program to assist in filling out their 1996 response. The 1995 data speeds up the filing process and can be viewed, printed, or copied to the 1996 database.

Collection Process

The 1996 survey content remained identical to the survey sent for the previous year. The electronic form, Dentry 3.0, also was identical in content to the previous version sent to collect 1995 data. There are, however, several new major features included with version 3.0 of Dentry, which include the following:

- Allow printing of the railroad's previous year data
- Allow print previewing of sections of the survey and print previewing of the entire survey
- Allow the user to send a completed survey back via a modem and electronic file transfer
- Addition of a context-sensitive help system for Dentry 3.0

These new features were implemented to increase ease of use of the software package, to reduce the resources needed to complete the comprehensive Annual Data Profile, and to provide the users with additional program functionality.

Inputting individual railroad responses into the main database remained unchanged from the previous year. The Microsoft Access interface program created to input 1994 data was used to input the 1995 and 1996 data surveys. The program is a Microsoft Access interface with data entry forms designed similarly to the survey pages. The only adjustments necessary to the Access interface is the addition and deletion of database fields as they change. Since one objective is to keep the database consistent, not many changes will be required unless the entire underlying database structure is modified.

The 1995 electronic collection effort involved the returning information on a floppy disk. A Visual Basic 4.0 program called Append was created to append a 1995 electronic survey from a floppy disk to the main database. This program copies the information saved to disk by a responding railroad to the corresponding tables in the main database. For 1996 information, both the database files returned on floppy disk and via an electronic file transfer are appended to the main database using the same Append program used for 1995 data.

CHAPTER 3. SURVEY RESPONSE

The 1995 survey response rate was slightly lower than that of the previous two years, although it was still about a 50 percent response rate, a good rate for a survey of this magnitude. However, due to the length of the survey, many small railroads reported not having the resources necessary to gather all the survey information in a timely fashion. For the majority of the questions, the number of valid responses actually consisted of about 25 to 40 percent of all small United States railroads.

The short line industry includes many different operational sizes of railroads operating in different economic regions of the United States. Each of the railroads in the survey is categorized by railroad type and by region of railroad operation. The railroad types used conform with the Surface Transportation Board's (STB) and the Association of American Railroads' (AAR). A "Regional" railroad is a line-haul railroad with $40 million to $255.9 million in operating revenues, and/or operating over 350 miles of road. In 1995 there were 30 Regional railroads. Line-hauls with less than $40 million in annual operating revenues and less than 350 miles of road are defined as "Local" as well as "Switching and Terminal" railroads. The majority of "Switching and Terminal" railroads' traffic movement is switching and terminal and they are self-designated as being "Switching and Terminal" railroads. Figure 3.1 displays the survey response by railroad type, and the total number of railroads by railroad type for each year of the Annual Data Profile.

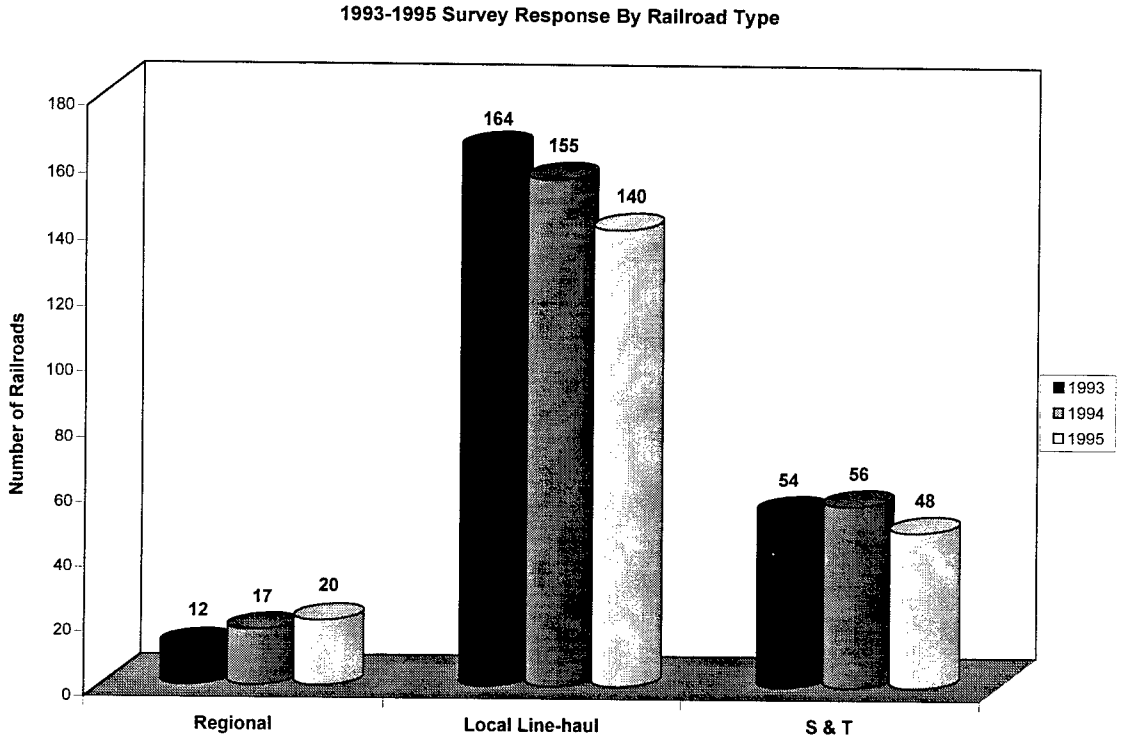
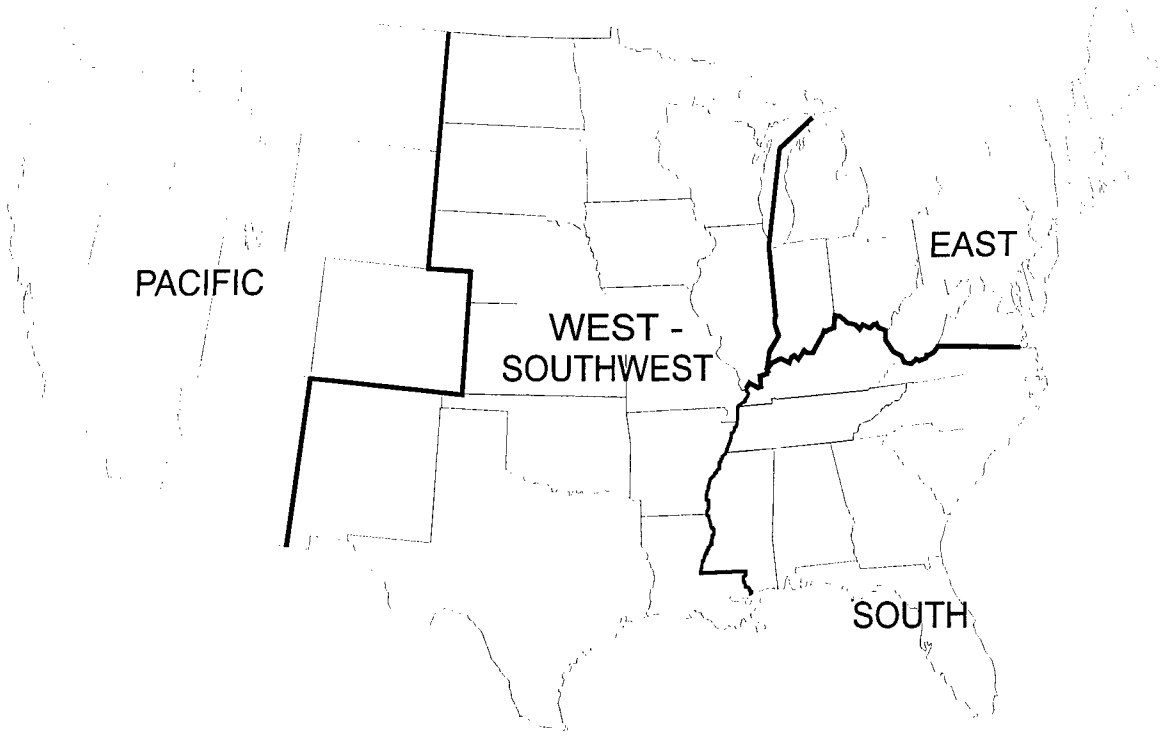

1993-1995 Survey Response By Railroad Type
Number of Railroads
180
160
140
120
100
80
60
40
20
0
164
155
140
12
17
20
54
56
48
Regional
Local Line-haul
S & T
1993
1994
1995

Figure 3.1



ASLRA Regions of Railroad Operation

Figure 3.2

The ASLRA has defined five different regions of railroad operations in the United States. A short line belongs to the region in which the majority of their operations take place. The regions are the East, Pacific, South, Southwest, and West. The map in figure 3.2 displays the borders of each region. The West and Southwest regions are combined for most of the *by region* analysis done on the database. Alaska and Hawaii are not shown on the map, but are included in the Pacific region.

CHAPTER 4. DATA ANALYSIS

Data Integrity

The first major step in the data analysis process is to evaluate and confirm the integrity of the reported data. Distributions of each variable in the database are reviewed and observations that appear to not fit the norm of the response are further scrutinized. These responses may be found to be accurate and other times are found to be data entry errors. An error is corrected if the corresponding valid response can be found, otherwise the error is treated as a missing observation in the data analysis calculations.

A second method of validating data compares results to previous years. A significant difference between the present data and the previous year's corresponding data would signal the need for further review of the data points included in each year. This review included a closer look at influential data points that may be affecting any calculations, and included examining whether the makeup of the database for each year may be the cause of the discrepancy. The number of observations eliminated by the data integrity validation was not significant.

Comparison with AAR Data

Another means of testing data integrity is to compare survey data with information from the American Association of Railroads (AAR) Profiles. The AAR has values for four variables — carloads handled, employees, miles owned and operated, average length of haul — for nearly all small railroads. A comparison of the average and median for each variable was conducted on 1995 data. Table 4.1 presents the results of the analysis comparing carloads handled between the 1995 AAR data and 1995 ASLRA survey data. Results show that there is not a statistically significant difference between the results from the survey and the results from the AAR list for carloads handled.

Table 4.1 1995 Carloads Handled Statistics (for railroads responding to both the survey and the AAR)		
	Survey	**AAR**
Mean Carloads Handled	26,561	28,753
Median Carloads Handled	7,281	7,828
Sample Variance	5,141,344,828	6,648,330,342
Pearson Correlation	.67985	
Minimum	12	20
Maximum	594,344	621,745
Number of Observations	174	174

Table 4.2 presents the results of the analysis comparing the number of employees between the 1995 AAR data and 1995 ASLRA survey data. Results show that there is not a statistically significant difference between the results from the survey and the results from the AAR list for number of employees.

Table 4.2 1995 Number of Employees Statistics (for railroads responding to both the survey and the AAR)		
	Survey	**AAR**
Mean Employees	70	71
Median Employees	17	16
Sample Variance	35,904	35,130
Pearson Correlation	.883596	
Minimum	1	1
Maximum	1,765	1,641
Number of Observations	168	168

Table 4.3 presents the results of the analysis comparing miles owned and operated between the 1995 AAR data and 1995 ASLRA survey data. Results show that there is not a statistically significant difference between the results from the survey and the results from the AAR list for miles owned and operated.

Table 4.3 1995 Miles Owned & Operated Statistics
(for railroads responding to both the survey and the AAR)

	Survey	AAR
Mean Miles Owned and Operated	128	115
Median Miles Owned and Operated	50	44
Sample Variance	67,139	48,722
Pearson Correlation	.93389	
Minimum	2	2
Maximum	2,493	2,014
Number of Observations	174	174

Table 4.4 presents the results of the analysis comparing average length of haul between the 1995 AAR data and 1995 ASLRA survey data. Two data points from the ASLRA data survey were removed due to inaccurate data responses. After removing these two data points, results show that there is not a statistically significant difference between the results from the survey and the results from the AAR list for average length of haul.

Table 4.4 1995 Average Length of Haul Statistics (for railroads responding to both the survey and the AAR)		
	Survey	**AAR**
Mean Avg. Length of Haul	44	46
Median Avg. Length of Haul	20	20
Sample Variance	4,648	5,251
Pearson Correlation	.9616	
Minimum	.2	1
Maximum	486	486
Number of Observations	133	133

The comparison of the ASLRA data with the AAR data is a good indicator of the accuracy of the information going into both databases. The closer the two data sets match, the more assured we are that the ASLRA provides an accurate representation of the short line railroad industry. On the basis of the comparison of the ASLRA data with the AAR data, the data going into the ASLRA database is comparable with the AAR data.

Statistical Analysis Techniques Used

The ASLRA database has three years of small railroad data and continues with the collection of a fourth year. This multi-year information provides the opportunity to employ statistical techniques that analyze industry-wide impacts and trends across time and also allows the development of small railroad industry estimates of statistics for each year of the survey. Using these industry estimates, trends in the industry can be examined.

The main estimation approach uses a combination of the ASLRA data and the AAR profiles data (Bitzan, Byberg).[1] The AAR Profiles is the database compiled from an annual survey conducted on all railroads in the United States. It contains selected data items from nearly all railroads in the United States. If each sample is used in conjunction, fairly accurate industry estimates can be derived for the entire United States short line industry. The main approach used to estimate industry values for variables such as revenues, costs, and others is composed of roughly four steps. First, statistical models are estimated using ASLRA data with independent variables that also are contained in the AAR profiles data. Second, values of AAR profile data are multiplied by the parameter estimates obtained from the statistical models. Third, where AAR profile data for one of the independent variables is missing, regional or local averages are used. Finally, estimates obtained from this process are summed. The statistical models used for such estimation are strictly atheoretical. Only the statistical properties of the estimated models are used for model choice. The following paragraphs describe the process in more detail.

There are five variables that are included in both the ASLRA sample and the AAR profiles. These include:

- Miles Owned and Operated
- Carloads Handled
- Employees
- Average Length of Haul
- Type of Railroad

The first step in this process is to utilize the ASLRA survey sample to estimate a model. The variable to be estimated is regressed on the variables common to both surveys. The variable of interest can be any variable or combination of variables included in the ASLRA survey. To increase the estimating power, interaction terms between each independent variable and the railroad type are

---

[1]Personal Communication. Discussion with John Bitzan, Upper Great Plains Transportation Institute, May 1997.

included. Also, some of the variables are transformed so their values fall in a range similar to the other variables used in the modeling technique. For example, values for carloads handled are much larger than values for average length of haul, employees, and miles owned and operated. If a regression is run without transforming carloads to a smaller number, the parameter estimate for carloads handled would be quite small with respect to the other parameter estimates. It is common practice to transform the variables so their values fall in a range similar to the other variables used in the model. Before running the regression, divide carloads handled by 1,000, and the range changes from "1 to 500,000" to ".0001 to 500"; a range similar to the other variables in the model. As an example, to obtain an estimate for freight revenue, the following model is first estimated:

$$freight = \beta_0 + \beta_1 * Tcar + \beta_2 * Emp + \beta_3 * MO + \beta_4 * Av + \beta_5 * RT + \beta_6 * (Tcar * RT) + \beta_7 * (Emp * RT) + \beta_8 * (MO * RT) + \beta_9 * (Av * RT)$$

where Tcar = (1/1,000) * carloads handled
freight = Annual Freight Revenue
Emp = Total Number of Employees
MO = Miles of Road Operated
Av = Average Length of Haul
RT = Railroad Type

Estimates for each of the β parameters are obtained by running the model on the ASLRA data. While fitting the model to the data, diagnostics are run on the data, which involves detection of outliers in the data. The following table lists cutoff values for diagnostic outlier checks on the data.

[2]

Table 4.5 General Cutoffs	
Diagnostic	**Cutoff Formula**
DFBETAS	$\frac{2}{\sqrt{n}}$
DFFITS	$2\sqrt{\frac{p}{n}}$
HAT DIAGONAL	$2p/\ n$
COOK'S D	$F(p,n-p)$
R-STUDENT	$t(n-p-1)$

The value of n in the table is the total number of observations used in calculating the model. Since response rates differ for each variable, each model may have a different n. The value p in the table stands for the number of estimated parameters in the model. The model described earlier in this section has 10 parameters in it. If possible outliers are detected by any of the above diagnostics, further analysis is required. One method used to determine which observations are truly significant outliers is to assign dummy variables to the suspect data points and fit them in the model. If the associated dummy variable is significant, then that observation is significantly influencing the model. During the analysis process, several outliers were found to be data entry errors and were removed from the data set.

After all the diagnostics are run on the model, the model providing the best fit on the data is chosen. Model adequacy is checked by looking at the adjusted R-Square value and root mean square error (RMSE). If the model provides a good fit to the data, the process continued.

---

[2]Lantz, Brenda M., *A Model For the Vehicle Violation Rates of Trucking Companies*, North Dakota State University, May 1993.

The next step in the process is to calculate an estimate for each of the short line railroads in existence during the analysis year. Values are inserted into the model for the railroads that have a valid response to each of the five independent model variables. From this calculation, an estimate for the dependent variable is calculated for each railroad. To get a complete industry estimate, railroads that did not respond to each of the five AAR questions must be accounted for. To accomplish this, the average of the derived dependent variable estimates for regional railroads and the average of the derived dependent variable estimates for the local railroads are calculated. Next, the average estimate for regional railroads is added to the population estimate for each missing railroad that is a regional railroad, and the average estimate for local railroads is added to the population estimate for each missing railroad that is a local railroad. A short line industry estimate is then computed by adding up each of the individual railroad estimates.

Once a population estimate has been derived, the accuracy of the estimate must be computed. One of the most common indicators of estimation accuracy used is confidence intervals. To compute a confidence interval, the variance of the population estimate is needed. Measuring the variance of the sum of a number of point estimates is not a straight-forward process. The error attributed to using averages for the missing AAR data points also must be accounted for. Appendix F steps through the process of calculating the variance. The following table gives several industry estimates, along with a 95 percent confidence interval for the estimates.

Table 4.6 Industry Estimate Analysis

Variable	1995 Estimate	R-Square	RMSE	Lower Bound	Upper Bound
Carloads	10,526,687	.7783	37,062.60	7,241,888	13,811,486
Freight Revenue	$2,936,795,783	.9632	2,744,830.00	$2,595,795,211	$3,277,796,355
Employees	24,039	.8613	75.88	17,320	30,759
Ties Laid in Replacement	3,080,586	.8817	8,418.00	2,277,226	3,883,947

Validating criteria must be set to select estimates for publication. The following criteria had to be met to use the model's estimate.

- After running different models on the data, the model that best fit the data was selected.
- The R-Square value had to be above 0.70.
- Influential observations were all accounted for.

More 1995 industry estimates that met validation criteria can be found in Appendix A, on page 23.

Other important statistics that can be utilized to measure the characteristics of the short line industry are ratios and indexes. Ratios and indexes commonly used to measure characteristics of different industries can be used to measure similar traits in the short line railroad industry. Financial measures such as the operating ratio, density measures such as carloads handled per mile of track operated, traffic diversity measures such as a concentration index, and many others can be applied to the 1995 ASLRA database. Appendix G contains several charts and tables displaying results of these analysis techniques.

Specialized Data Analysis Requests

Over the past year specialized data requests utilizing the database have been made by several organizations and railroads. The requests are for data analysis using the database and information not reported in the Annual Data Profile. Those making such requests include but are not limited to:

- A.T. Kearney
- Bain & Company
- Canadian Pacific Railroad
- Federal Railroad Administration
- Fort Worth & Western Railroad
- Lewis, Hinckley & Brod
- Rail Management & Consulting Corporation
- Red River Valley and Western Railroad
- Southern Electric Railroad

The specialized data requests are only performed if approved by the American Short Line Railroad Association (ASLRA) and if the results of the analysis can be presented in an aggregate form preventing the identification of any individual railroad's data.

The first step in the process of a specialized data analysis is a request forwarded to the ASLRA that outlines the desired analysis. After approval has been granted, a preliminary analysis is conducted on the data request. The preliminary analysis involves using a variety of diagnostic checks on the data necessary for the analysis. The diagnostic checks ensure the validity and the integrity of the data, and highlight the observations whose presence in the data set strongly impacts the results. The next step involves the analysis itself which may include computing univariate statistics, inferential statistics, models, estimations or other statistical techniques. Next, the preliminary results are reviewed by the ASLRA, and several minor adjustments to the analysis may be requested. Upon approval, the analysis results are sent to the requesting railroad or organization.

During the data request process, the only participants are the short line railroad project team at the Upper Great Plains Transportation Institute (UGPTI) and the requesting organization. The ASLRA does not participate in the analysis, but does review the results and may request minor adjustments to the analysis. Data integrity is an important issue and is assured to each railroad that responds to the survey. To ensure this data integrity, only the project team members at the UGPTI are allowed to see individual railroad records. The following list is an example of the statistics calculated for specialized data analysis and information requests using the database:

Average Annual Hours Worked Per Employee
Average Annual Cost of Health/Pension/Benefit Plans Per Employee
Average Carloads Per Operating Employee
Average Carloads Per Route Mile
Average Employees Per Route Mile
Average Gross Revenues Generated Per Hour Worked
Average Locomotives Per Mile of Track
Average Operating Ratios
Average Revenue Per Operating Employee
Average Revenue Per Route Mile
Average Revenue Per Carload
Average Wage Per Hour

Average Wages for Supervisory and Non-supervisory employees
Expense Breakdown
Percent of railroads providing a 401(k) plan
Percent of laborer covered by a labor agreement
Percent of Total Operating Expenses attributed to Health/Pension/Benefit Plans
Road, Equipment, and Other Investments
Total Annual Compensation Paid
Total Employees (Exempt vs. Non-Exempt
Total Gallons of Locomotive Fuel Consumed
Total Man-Hours Worked

CHAPTER 5. PROGRAMMING EFFORTS

Dentry 3.0

The latest version of Dentry, version 3.0, was developed utilizing the same fundamental design in the previous version of Dentry. Version 3.0 has nearly identical survey pages and content to version 2.0, and most of the previous functionality remains the same. However, several major enhancements to the program were added. A decision to replace R&R Report Writer with Crystal Reports 5.0 was made to facilitate the printing of the survey. One major advantage in making this change is Crystal Reports' capabilities of handling the entire report with one file. This report also will handle both the 1995 and 1996 survey data, giving the user the opportunity to print the previous year's survey and the current year's survey.

Another new feature is the file transfer option. Crescent Software's PDQComm 3.0 was the third party Visual Basic product used to assist in creating the file transfer capabilities of Dentry 3.0. This feature allows the user to return a completed electronic 1996 survey via modem. The end-user is required to enter the correct modem model, type, and maximum baud rate. This information is then stored in a script file so the user does not need to enter it again, unless they wish to change the modem type. Next, the user enters the server's phone number and presses the dial command. The program will connect to the server and automatically upload the database file containing the railroad's survey responses.

The 1996 Dentry software package also features a new electronic help file. This file was created using a text editor and a help compiler. Three source files were created — a topic file, a project file, and an index file. The topic file is a rich text format file that contains the text for the help file and the code required to link topics and display graphics. Each page in this document contains a link to another topic in the source file or to a topic in another source file. The project file lists the text files and graphics files required, and gives formatting instructions used during the compilation process. The index file contains

the index numbers for each topic that has context-sensitive help capability. Once these files are finished, they are compiled into one .hlp file, which can be referenced by Dentry 3.0.

The help file contains the same content that is included with the paper version of Dentry 3.0's User's Guide. Also included are all the definitions of the survey questions found in the paper version of the survey glossary. Access to the help file and glossary is gained by the help menu, the help command button or by context sensitive help. The help menu lists a table of contents that can be browsed to find information on a topic. The search functionality allows a user to search the help file by a specific topic. Context-sensitive help functionality displays the definition of a survey question by double-clicking on the question's corresponding label.

Web Site

Another programming objective for the past year was to place ASLRA survey information on a web site. Information was placed on the world wide web, WWW, to increase the knowledge of the existence of this database and to disseminate analysis results to interested parties. Increased awareness of this data source on short line and regional railroads would increase the use of the data and increase the utility of this database. Appendix D describes the general plan for the National Short Line Railroad Database Project.

Appendix A:

1995

Annual Data Profile

of the

American Short Line

and Regional Railroad Industry

Developed by the American Short Line Railroad Association

and the

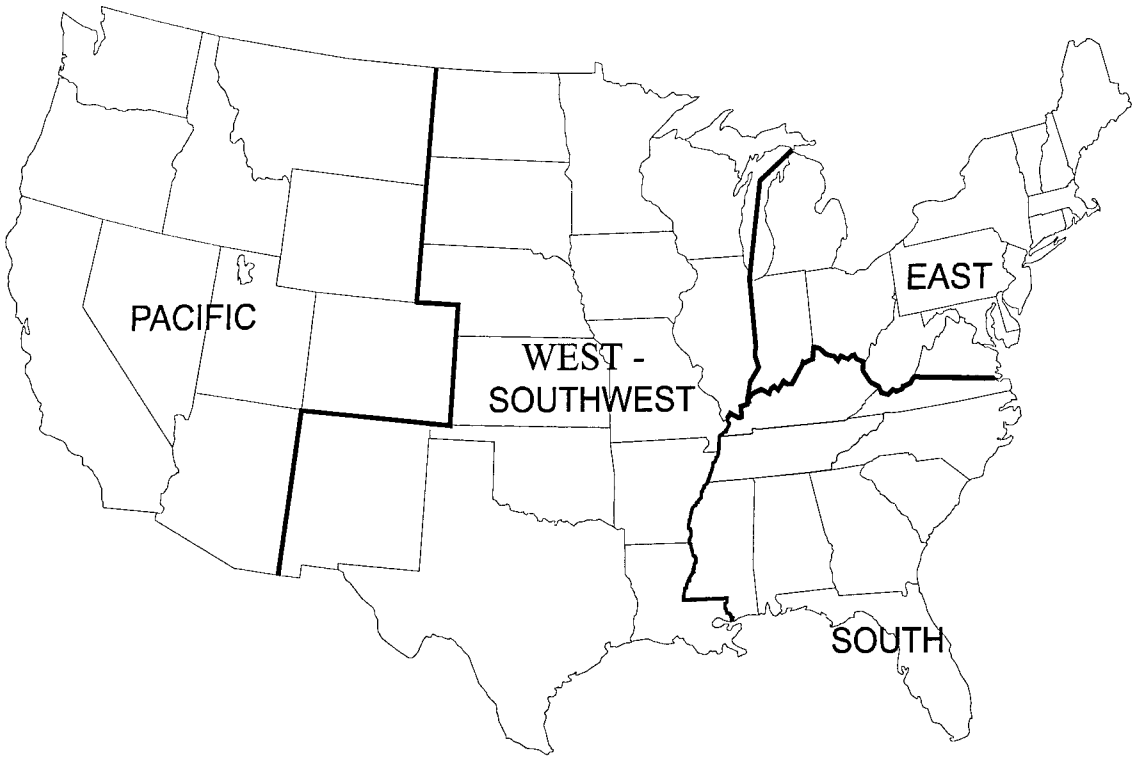
Upper Great Plains Transportation Institute

INTRODUCTION

The Annual Data Profile (ADP) of the American Short Line & Regional Railroad Industry has reported on the short line railroad industry since 1993. Created out of the need to recognize the important and growing contribution the short line industry makes to the nation's transportation system, the ADP summarizes the data contained in the American Short Line Data Base (ASLDB). The ASLDB was developed in 1994 to compile industry-wide information about short line and Regional railroads operating in the United States. Since its inception, the ASLDB has been maintained with the support of the American Short Line Railroad Association, the Federal Railroad Administration, the University Transportation Centers Program, and the Upper Great Plains Transportation Institute. The current ADP records the contributions the short line industry made in 1995.

Over 400 annual data profile surveys were sent out to collect the 1995 information from short line railroads. Two hundred and nine surveys were received and entered into the 1995 database, nearly a fifty percent response rate. The 1995 ADP contains summary statistics for railroad types, railroad regions, and short line database totals. The railroad type definitions used by the ADP conform with those of the Surface Transportation Board (STB) and the Association of American Railroads (AAR). The STB classifies railroads by their operating revenues. In 1994 (the latest year available), Class I railroads were defined as those with operating revenues exceeding $255.9 million. There were 11 U.S. railroads classified as 'Class I' in 1995. The STB-defined non-Class I railroads are defined by the AAR as Regional or Local Line-haul. A 'Regional' railroad is a line-haul railroad with $40 million to $255.9 million in operating revenues, and/or operating over 350 miles of road. In 1995 there were 30 Regional railroads. 'Local' railroads are line-haul railroads with less than $40 million in annual operating revenues and less than 350 miles of road, as well as Switching and Terminal railroads. There were 500 local railroads in 1995. Railroad type specification in this report follows the definitions of the AAR to separate Regional and Local railroads. Switching and Terminal railroads are designated by the individual

railroads. The short line railroad regions used are those defined by the American Short Line Railroad Association. The following map displays these regions.



ASLRA Regions Of Railroad Operation

The four regions highlighted on the map are the East, Pacific, South, and West-Southwest. A railroad that operates in more than one region is considered to belong to the region where the majority of it's operations take place. The West and Southwest ASLRA regions are combined for any 'by region' analysis done for the ADP.

Two new sections were added to the ADP for 1995: 1) Estimated Industry Totals and 2) 1993-1995 Industry Profile. The Estimated Industry Totals section utilized several statistical modeling and estimation techniques to detail the characteristics of the entire short line railroad industry. The statistical methods were used to approximate several totals for the entire population of 530 U.S. short line railroads.

These estimates present a more complete analysis of the impacts, trends, and characteristics of the entire short line industry.

The 1993-1995 Industry Profile is the second new section in the Annual Data Profile. This section presents and highlights selected statistics from the life of the ASLRA database, 1993-1995.

ESTIMATED INDUSTRY TOTALS

The statistics presented in this report are derived from the data reported by the small railroads responding to the Annual Data Profile survey. The survey is in its third year of data collection and from year-to-year, the number of respondents and makeup of the database can change. Statistical modeling may be utilized to extrapolate the reported values in the survey to generate estimated values for the entire small railroad industry. These estimates, while not exact, may be used to provide a general benchmark of the entire industry.

The statistical models to estimate industry totals were first developed from the 1995 survey data and a model was run for each variable of interest from the data profile. The independent variables for each model consisted of statistics from the AAR electronic profiles. The 1995 AAR database had values for nearly all 530 small railroads for the following elements: carloads handled, average length of haul, number of employees, miles owned and operated, and type of railroad. First, the model is calculated using the 1995 ASLRA Data Profile. Once the model is calculated, the AAR data is entered into the model to get an estimate for each of the 530 railroads. Then the sum of these estimates gives an estimate for the industry total. [1]

---

[1] The following model was run for each industry estimate:

Estimated Variable = β_0 + (Miles Owned & Operated) * β_1 + (Carloads Handled) * β_2
+ (Average Length of Haul) * β_3 + (Number of Employees) * β_4 + (Type of Railroad) * β_5
+ (Type of Railroad * Miles) * β_6 + (Type of Railroad * Cars) * β_7 + (Type of Railroad * AvgLeng) * β_8
+ (Type of Railroad * Employees) * β_9

Estimates for each of the β parameters are derived. If the model did not fit the data well, the estimation procedure for that particular variable is dropped until further analysis can be done. If a good fit was found for the estimated variable, the process continued. The next step is to calculate an estimate for each of the 530 short line railroads by using the 1995 AAR electronic profiles data. These estimates are added up to give an industry total estimate. The same procedure is followed for each of the industry estimates computed.

Note: (If the AAR profiles is missing data that is needed in the model for a particular railroad, it is replaced by the average of the other railroads of the same railroad type.)

The following table shows a comparison of estimates with totals derived from the AAR electronic profiles.

Table 1. A Comparison of the ASLRA Database Estimates and the AAR-Derived Estimates.

Variable	1995 Short Line Database Estimate	1995 AAR Total – Adjusted for Missing Values	% Difference between Estimate and AAR
Carloads	10,768,701	11,073,482	-2.75%
Employees	25,537	24,871	2.68%
Freight Revenue	$2,794,592,496	$2,986,438,000	-6.42%

These estimates are all within 7 percent of the AAR numbers.

An additional point of reference used to benchmark the quality of the estimates is the American Shortline Railway Guide, 5th Edition. The total number of locomotive units was tallied from this reference. The number of locomotive units from approximately 528 railroads was 3,822. The estimated total locomotive units owned from the ASLRA Data Profile and AAR profiles is 3,756 for a difference of approximately 2 percent. The estimate derived for the total locomotive units owned and leased by small railroads is 4,151. The following table lists the statistical estimates for industry totals that were computed from the 1995 ASLRA Data Profile.

Table 2. Selected Estimated Industry Totals.

Data Item	Estimated 1995 Small Railroad Industry Total
Total Number of Customers Served	13,000
Bridges	25,000
Ties Laid in Replacement	3,000,000
Number of Highway Grade Crossings	65,000
Freight Cars Owned	72,000
Freight Cars Owned & Leased	159,000
Locomotives Owned	3,800
Locomotives Owned & Leased	4,200
Revenue Ton Miles	90,766,000,000
Gallons of Fuel Consumed	215,000,000
Total Freight Revenue	$2,795,000,000
Total Gross Revenue	$3,165,000,000
Way & Structures Expense	$485,000,000
Equipment Expense	$401,000,000
Transportation Expense	$861,000,000
General & Administrative Expense	$441,000,000
Other Expense	$455,000,000
Total Railway Operating Expense	$2,616,000,000
Operating Income	$620,000,000
Capital Road Expenditures	$150,000,000
Current Liabilities	$1,013,000,000
Total Assets	$6,166,000,000
Long-Term Debt	$1,913,000,000
Equipment Investment	$473,000,000
Road Investment	$1,245,000,000
Other Investment	$307,000,000
Supervisory Compensation Paid	$202,000,000
Non-supervisory Compensation Paid	$697,000,000
Total Annual Compensation Paid	$899,000,000
Total Man-hours Worked	48,000,000

1993-1995 INDUSTRY PROFILE

This section presents selected results from the first three years of the Annual Data Profile survey, 1993 through 1995. Figure 1 and Figure 2 describe the number of small railroads that participated in the survey as well as the participants' railroad type.

Figure 1: Number of Participating Small Railroads 1993-95

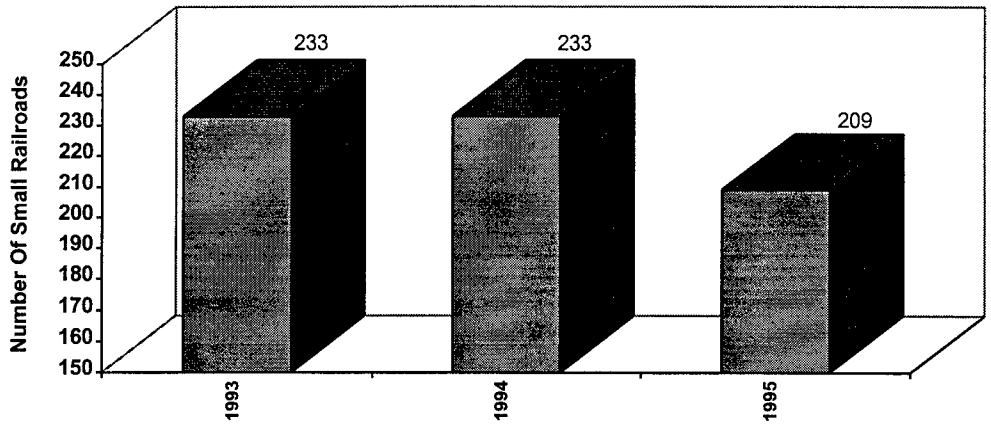


Figure 2: Number of Participating Small Railroads by Railroad Type,1993-95

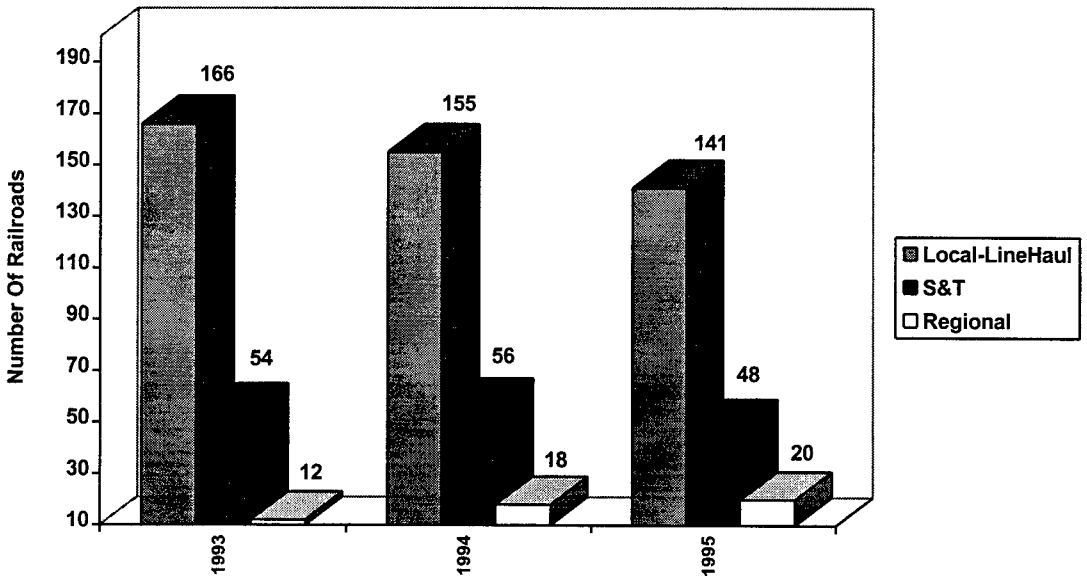


Figure 3: Average and Median Number of Customers per Small Railroad, 1993-95

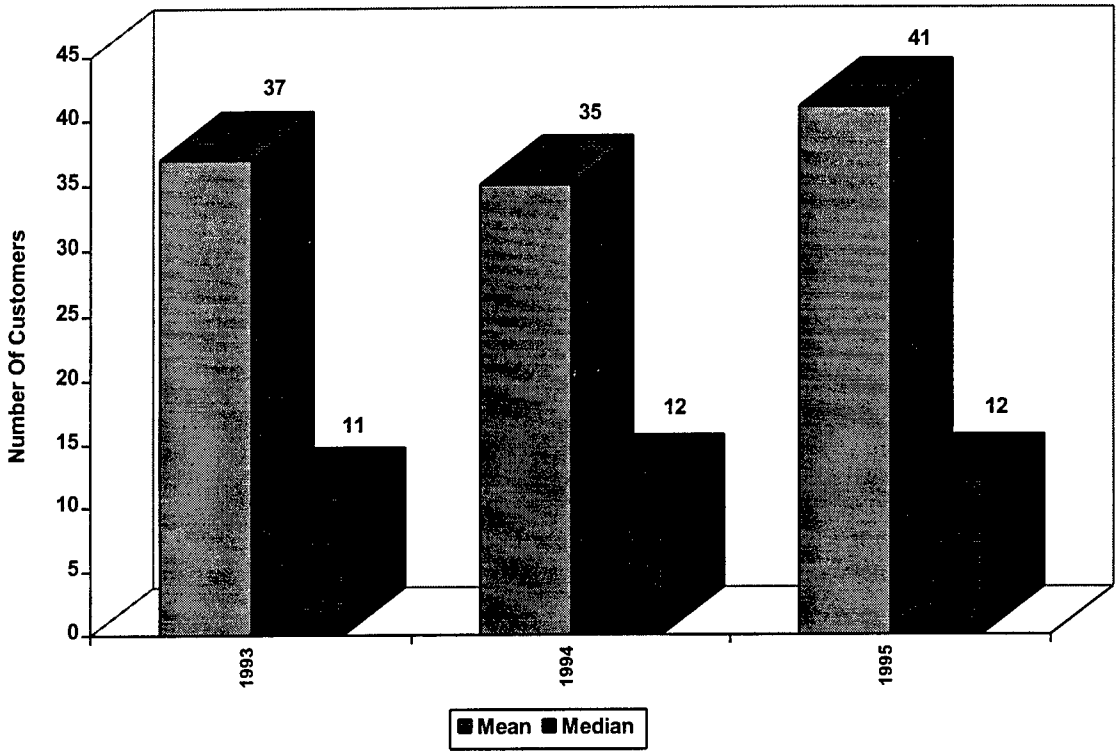


Figure 3 displays the average and median number of customers for small railroads participating in the 993-1995 Annual Data Profile. As shown in the figure, the average number of customers per small railroad was reatest in 1995 at 41.

Table 3 presents the small railroad movement mix for the three years of the ASLRA database. The ırgest percentage of movement type for all three years is the Carload Originated and Terminated Online ategory.

Table 3. Small Railroad Movement Mix, 1993-1995

Movement Type	1993	1994	1995
Bridge Traffic	15%	16%	15%
Interline Carloads Terminated Online	28%	25%	24%
Interline Carloads Originated Online	27%	27%	30%
Carloads Originated & Terminated Online	30%	32%	31%

The next two tables display route mileage characteristics. Table 4 outlines the percent of route miles operated that is owned by small railroads on a regional basis. As shown in Table 5, the percentage of 90-pound rail on the owned route mileage is greatest in the East region for all three years of the survey.

Table 4. Percent of Operated Route Mileage Owned by Small Railroads by Region, 1993-1995

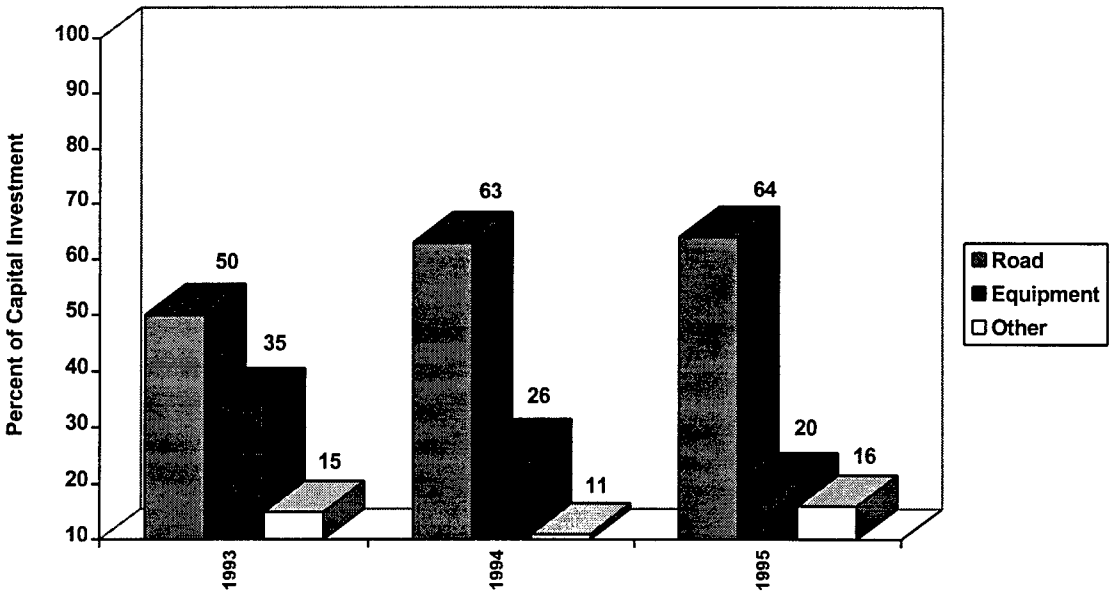
Region	1993	1994	1995
East	81%	71%	78%
South	88%	96%	94%
West-Southwest	87%	84%	84%
Pacific	60%	63%	70%

Table 5. Percent of 90-Pound Rail of Owned Route Mileage by Small Railroads by Region, 1993-1995

Region	1993	1994	1995
East	92%	77%	93%
South	77%	71%	71%
West-Southwest	68%	79%	78%
Pacific	60%	70%	66%

Figure 4 shows that the majority of projected capital investment for the next five years will be in the road category followed by the equipment category.

Figure 4 Projected Capital Investment Category for Next 5-Year Period, 1993-95



Tables 6 and 7 report the number of grade crossings by region and the percentage of grade crossing with automatic warning devices. The East region has the highest percentage of automatic warning devices while the West-Southwest has the largest number of grade crossings.

Table 6. Number of Reported Grade Crossings by Region, 1993-1995

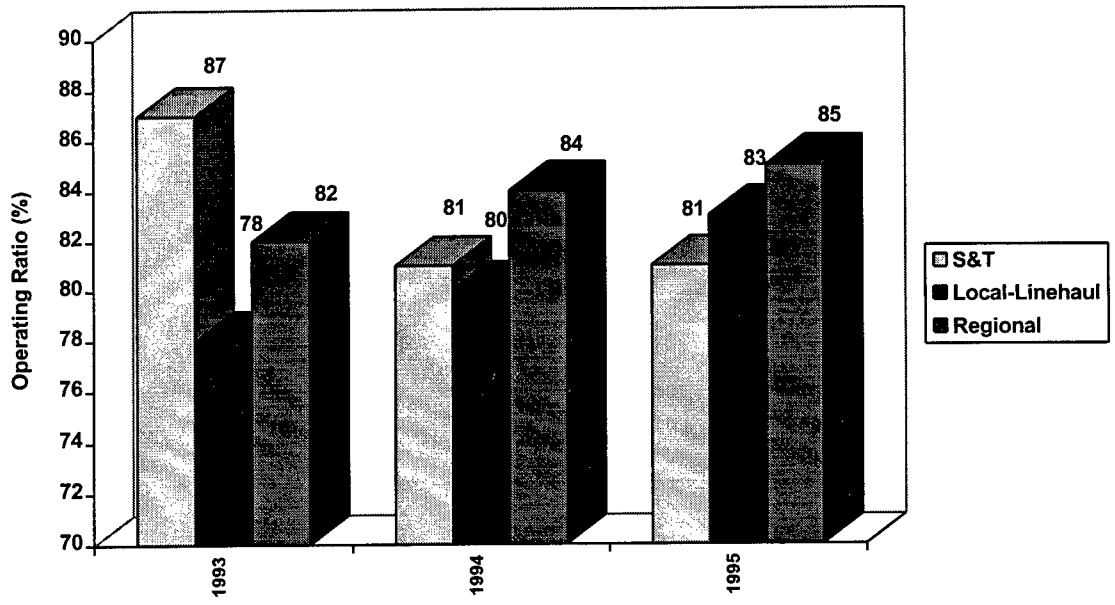
Region	1993	1994	1995
East	4,925	7,156	5,166
South	4,521	4,307	4,471
West-Southwest	16,406	19,993	18,547
Pacific	3,693	4,726	4,182

Table 7. Percent of Grade Crossings with Automatic Warning Devices by Region, 1993-1995

Railroad Type	1993	1994	1995
East	27%	25%	26%
South	17%	18%	20%
West-Southwest	19%	18%	18%
Pacific	26%	17%	18%

The operating ratio for small railroads by railroad type is shown in Figure 5. The figure displays the operating ratio for each railroad type for each year of the survey.

Figure 5: Operating Ratio by Railroad Type, 1993-95



Tables 8 and 9 show railroad equipment age distribution. As shown in the figures, less than three percent of the locomotives and less than eight percent of the freight cars are reported as being less than 10 years old for each of the years, 1993-1995.

Table 8. Small Railroad Locomotive Age Distribution, 1993-1995

Locomotive Age	1993	1994	1995
Less than 10 years old	2%	2%	1%
10-20 years old	13%	12%	12%
More than 20 years old	85%	86%	87%

Table 9. Small Railroad Freight Car Age Distribution, 1993-1995

Freight Car Age	1993	1994	1995
Less than 10 years old	6%	6%	7%
10-20 years old	55%	50%	38%
More than 20 years old	39%	44%	55%

Table 10 displays small railroad expenses by expense category. As shown in the table, Transportation expense comprises the largest expense for each of the reported three years.

Table 10. Small Railroad Expenses, 1993-1995

Expense Category	1993	1994	1995
Equipment	15%	15%	22%
General Administration	21%	20%	17%
Transportation	39%	36%	33%
Way & Structures	16%	19%	18%
Other	9%	9%	10%

Figures 6 through 8 display the average and median number of employees for Local Line-haul, Regional, and Switching & Terminal railroads.

Figure 6: Average and Median Number of Employees Local Line-haul Railroads, 1993-95

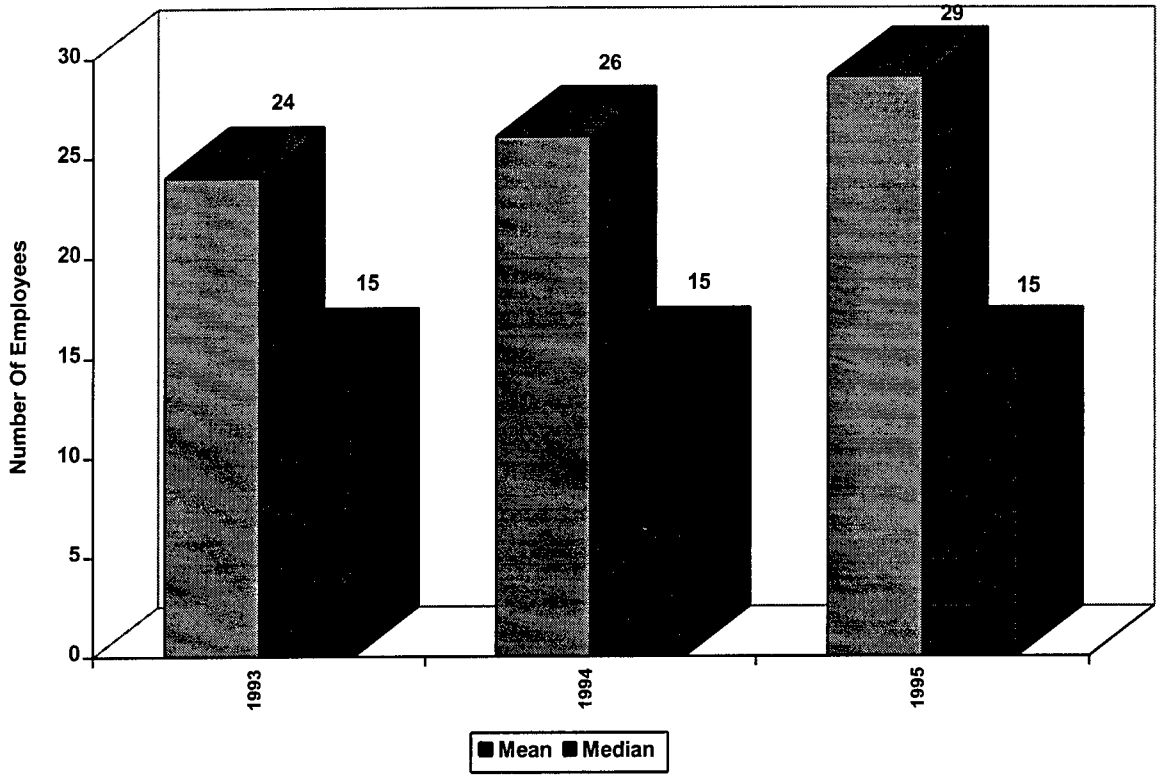


Figure 7: Average and Median Number of Employees Regional Railroads, 1993-95

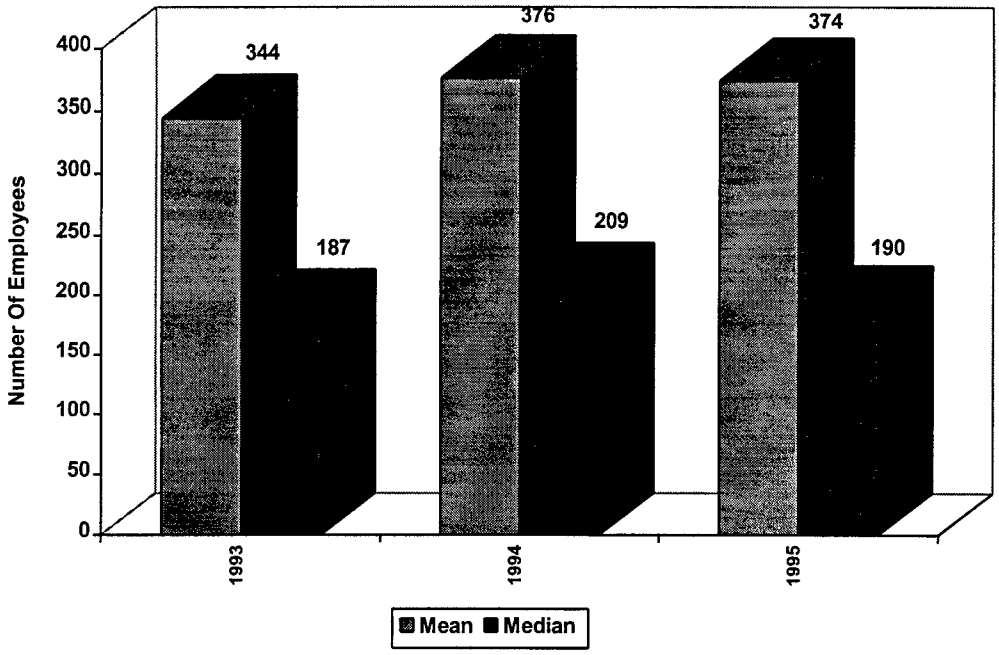


Figure 8: Average and Median Number of Employees Switching & Terminal Railroads, 1993-95

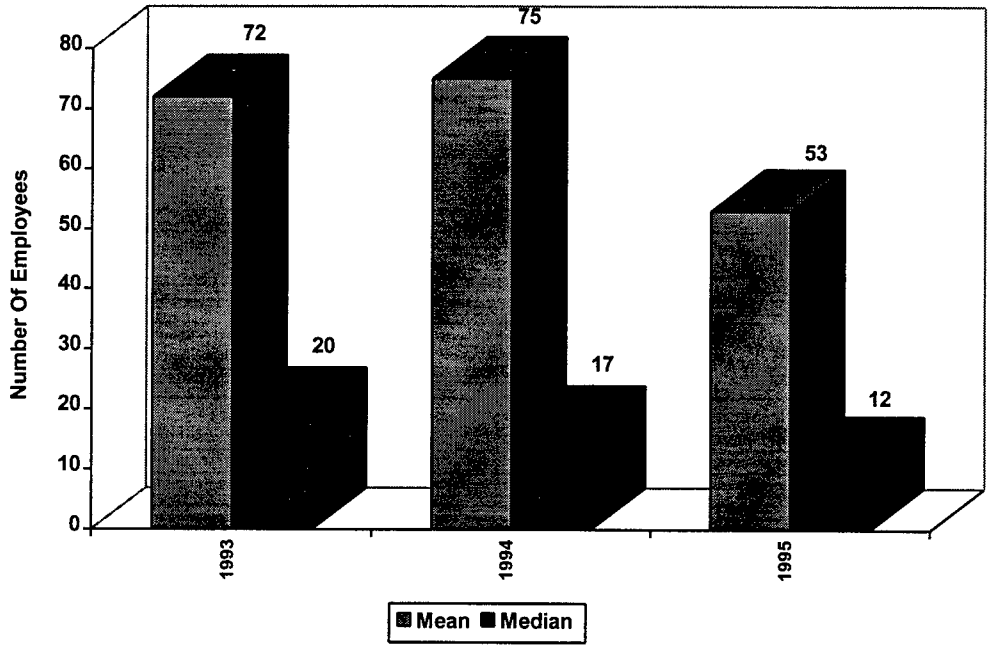


Figure 9 shows the average and median gross railway operating expense per employee for small railroads, 1993-1995. Figures 10 through 12 display the same expense statistic for the Regional, Local Line-haul, and Switching & Terminal railroads responding to the surveys for 1993-1995.

Figure 9: Average and Median Gross Railway Operating Expense per Employee, Small Railroads, 1993-95

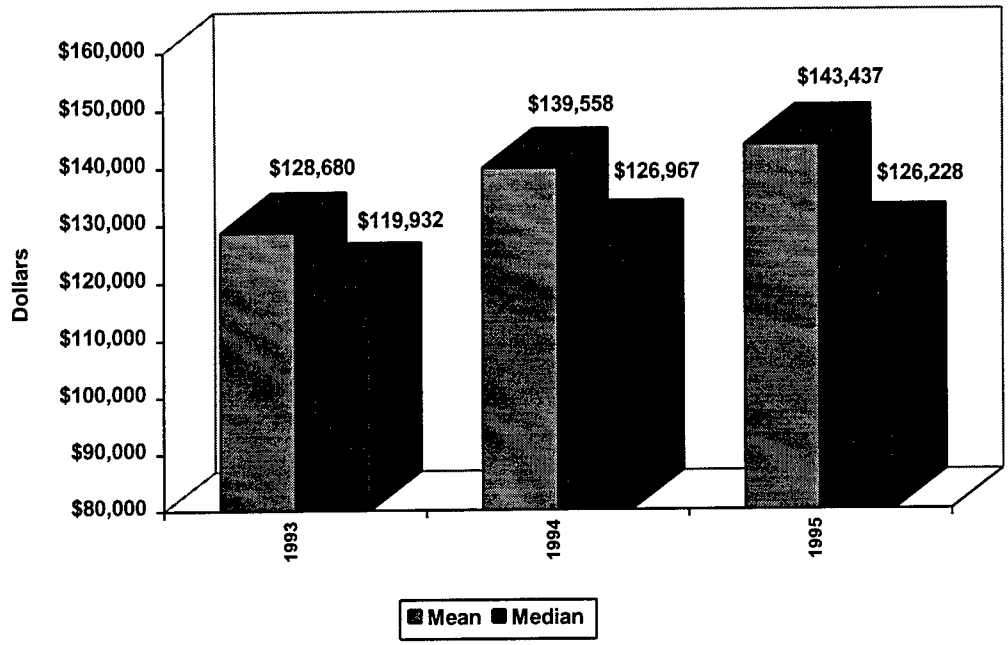


Figure 10: Average and Median Gross Railway Operating Expense per Employee, Local Line-haul Railroads, 1993-95

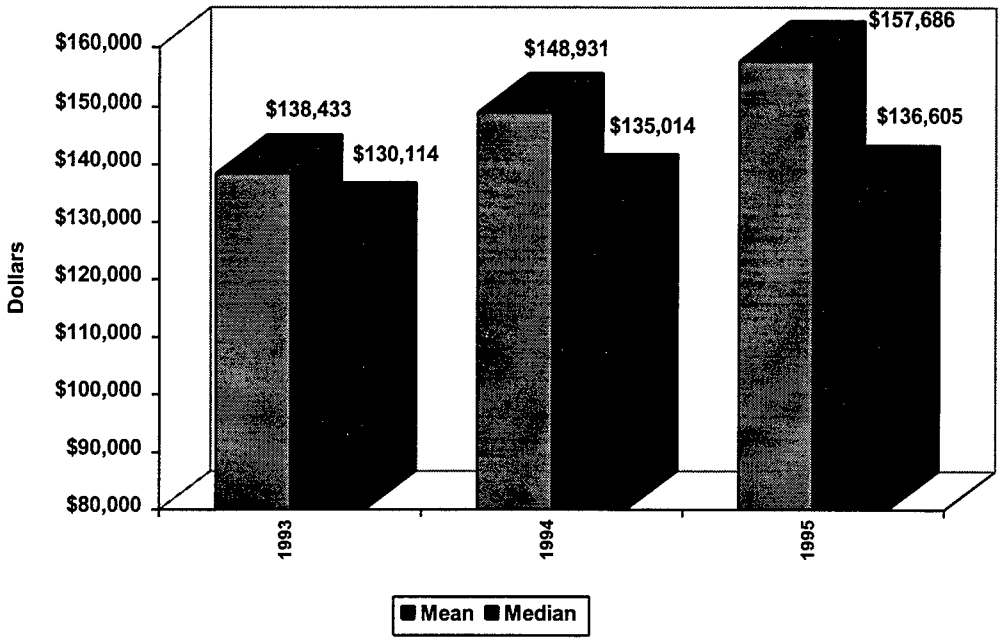


Figure 11: Average and Median Gross Railway Operating Expense per Employee, Regional Railroads, 1993-95

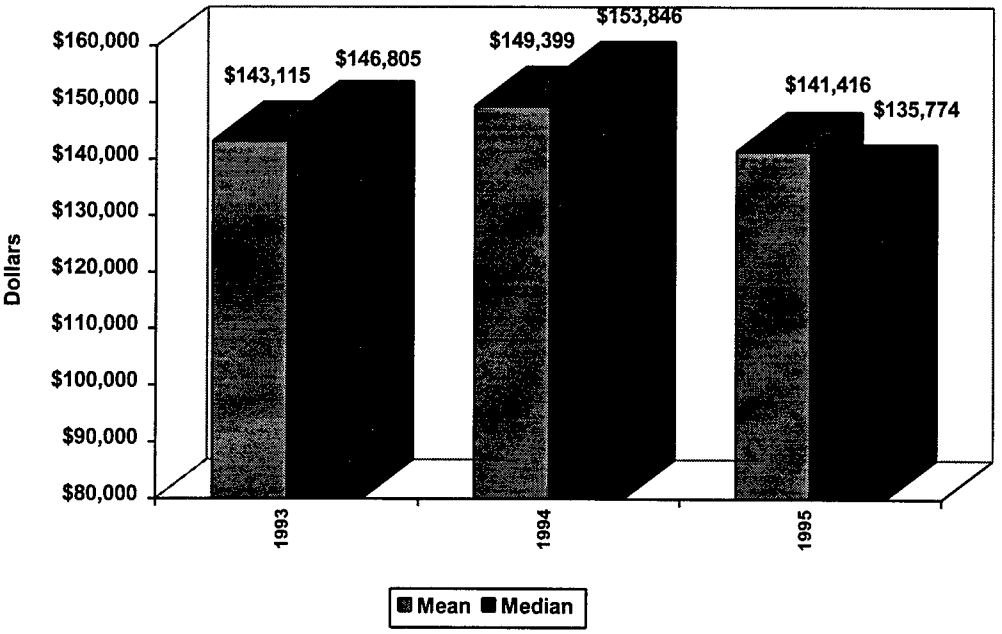
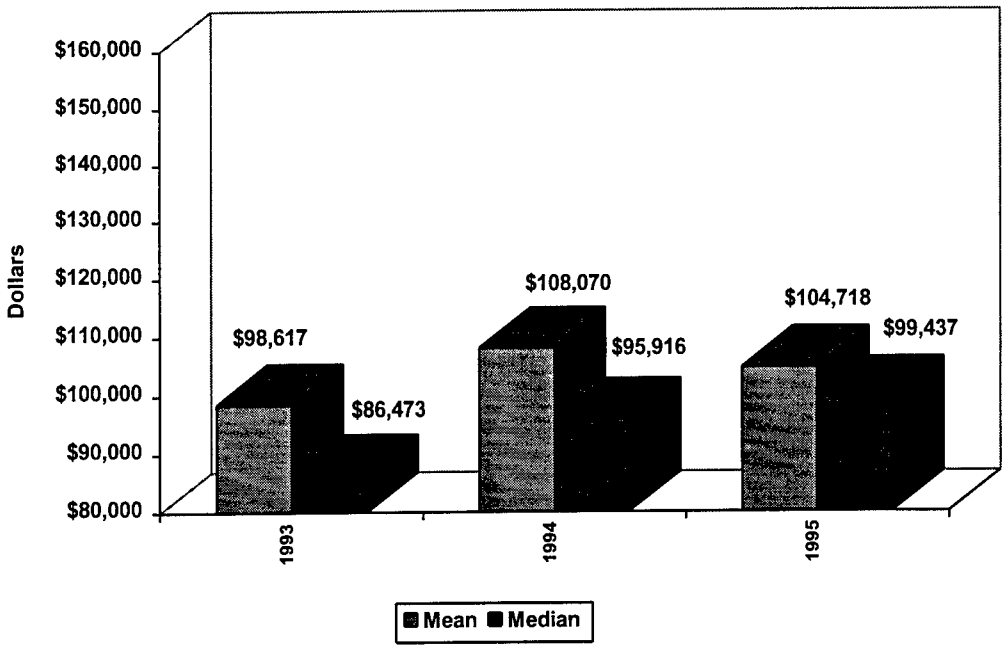
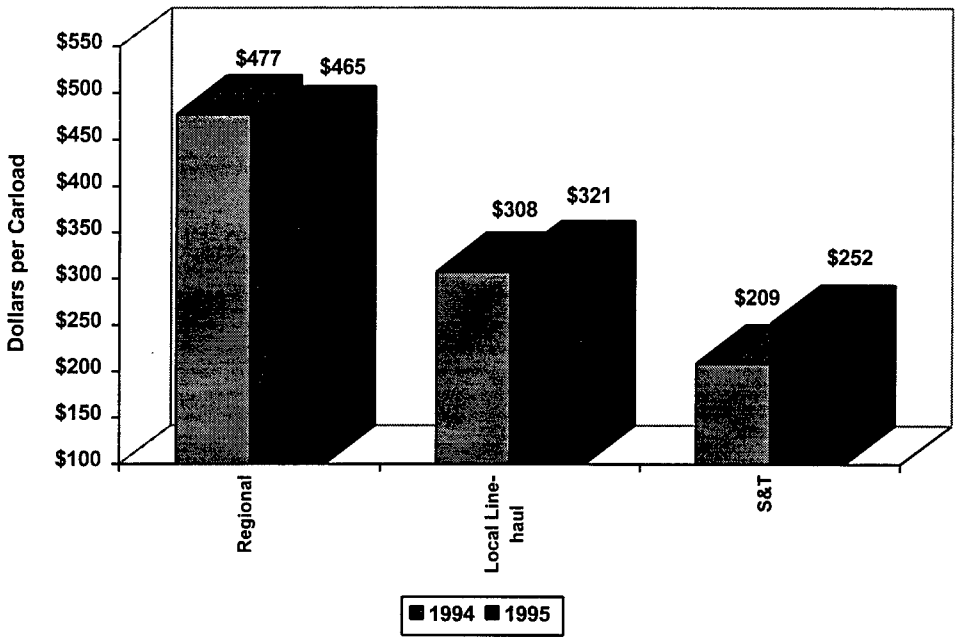


Figure 12: Average and Median Gross Railway Operating Expense per Employee, S&T Railroads, 1993-95



Average Revenue per Carload by railroad type for the years 1994 and 1995 is displayed in Figure 13. Regional railroads had the highest average revenue per carload for both years. The data for 1993 is unavailable.

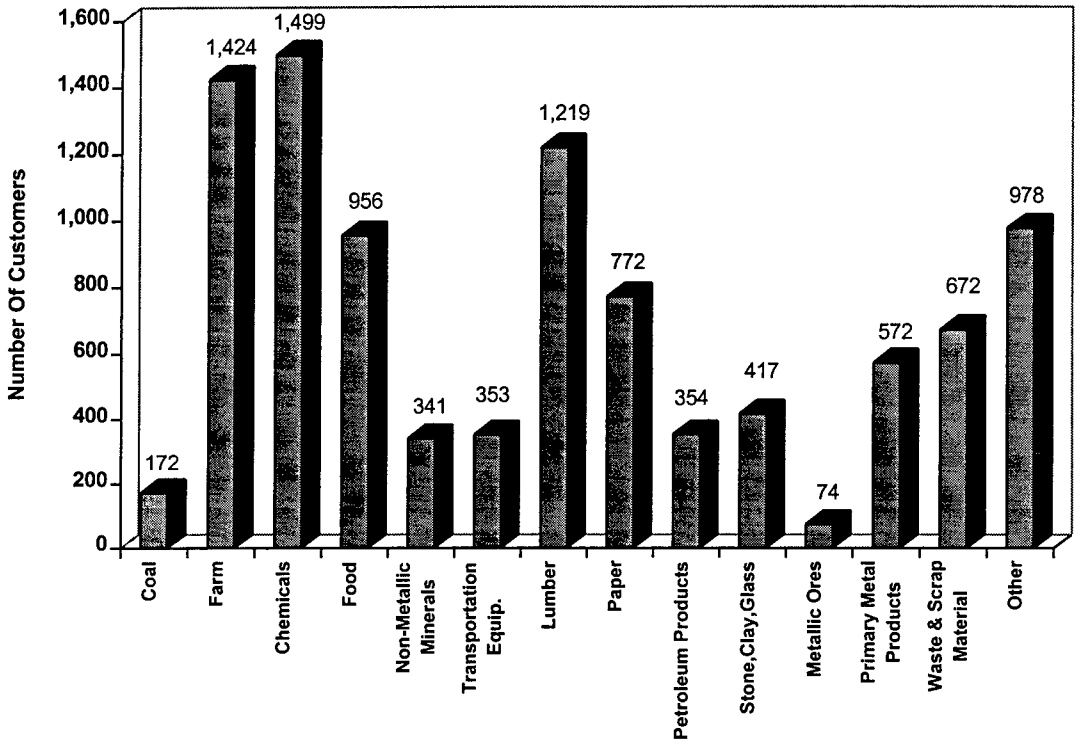
Figure 13: Average Revenue Per Carload by Railroad Type, 1994-95



CUSTOMER PROFILE

Figure 14 shows the number of customers served by commodity for the short line railroads responding to the 1995 survey. The total number of customers served by the small railroads participating in the survey was 7,958. Five commodities account for nearly 6,000 of the customers served by the short line carriers. These commodities are chemicals and allied products, farm products, lumber, food and kindred products and pulp paper and allied products.

Figure 14: Small Railroad Customers Served By Commodity



The next three figures separate the customers served by railroad type. Figure 15 shows the number of customers served by commodity type for the responding Regional railroads for 1995. The Regional railroads' largest number of customers served appear in the farm, chemicals, lumber, food, and paper commodity groups. Figure 16 displays the number of shippers served by commodity for Local Line-haul railroads responding to the 1995 survey. Local line-haul railroads' largest number of customers served fall in the chemicals, farm, food, lumber, and waste & scrap material commodity groups. Figure 17 displays the number of shippers served by commodity for Switching and Terminal railroads responding to the 1995 survey. S & T railroads' largest number of customers served fall in the chemicals, primary metal products, lumber, and waste and scrap material commodity groups.

Figure 15: Regional Railroad Customers Served By Commodity

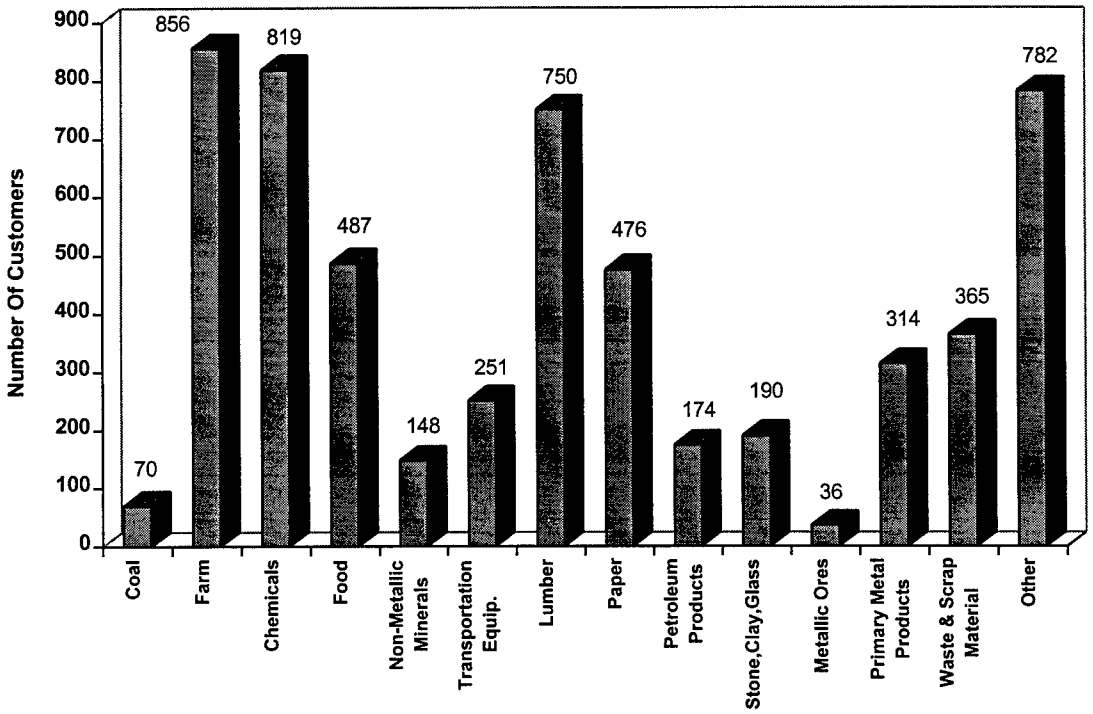


Figure 16: Local Line-haul Railroad Customers Served By Commodity

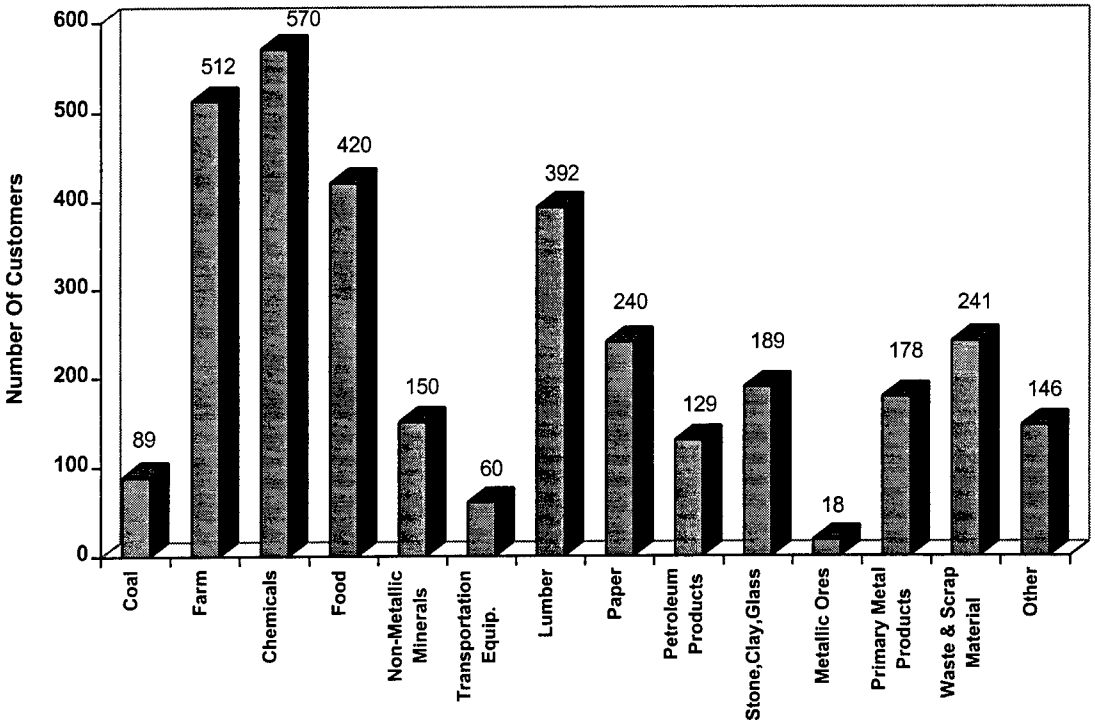
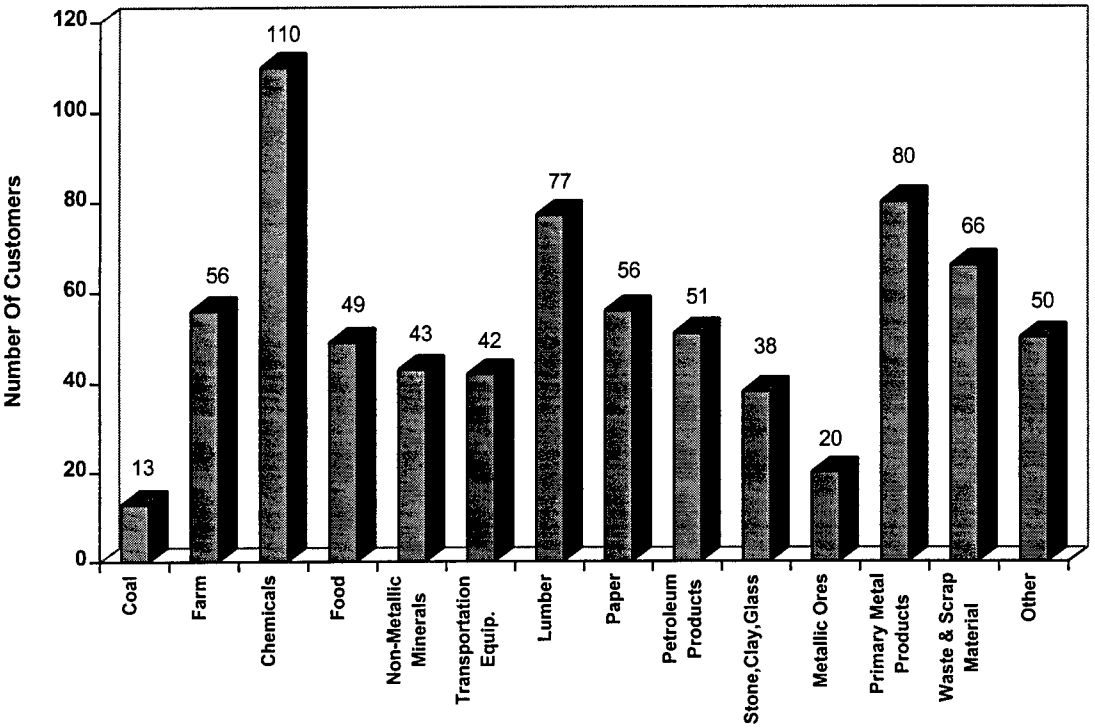


Figure 17: S & T Railroad Customers Served By Commodity



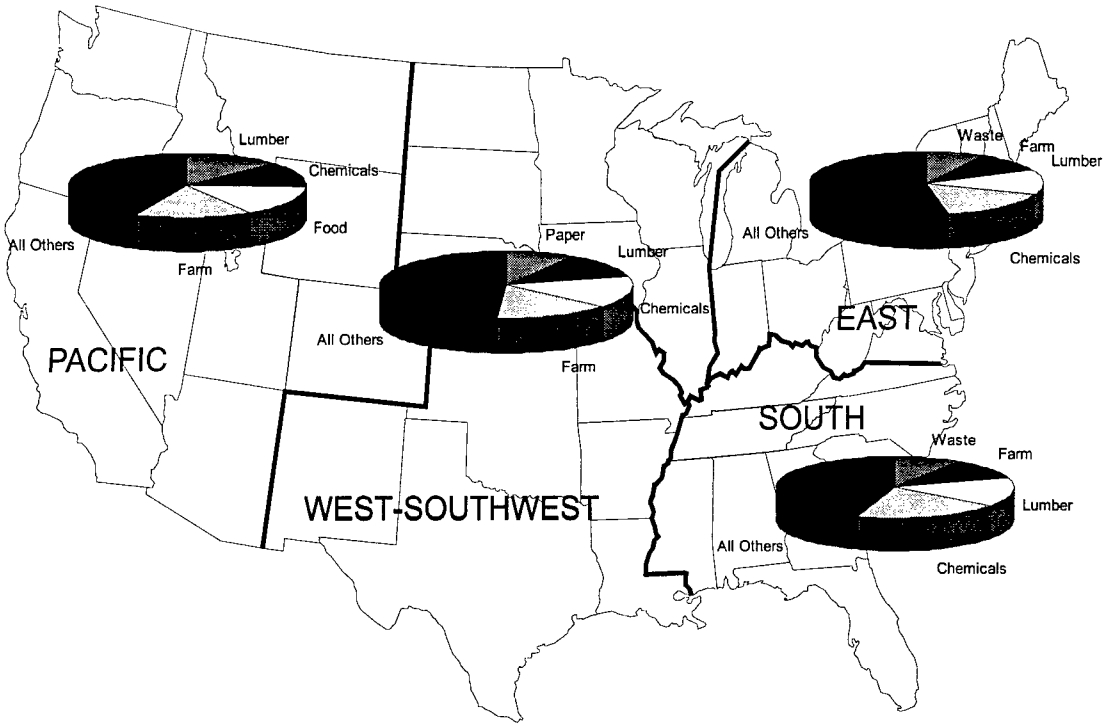


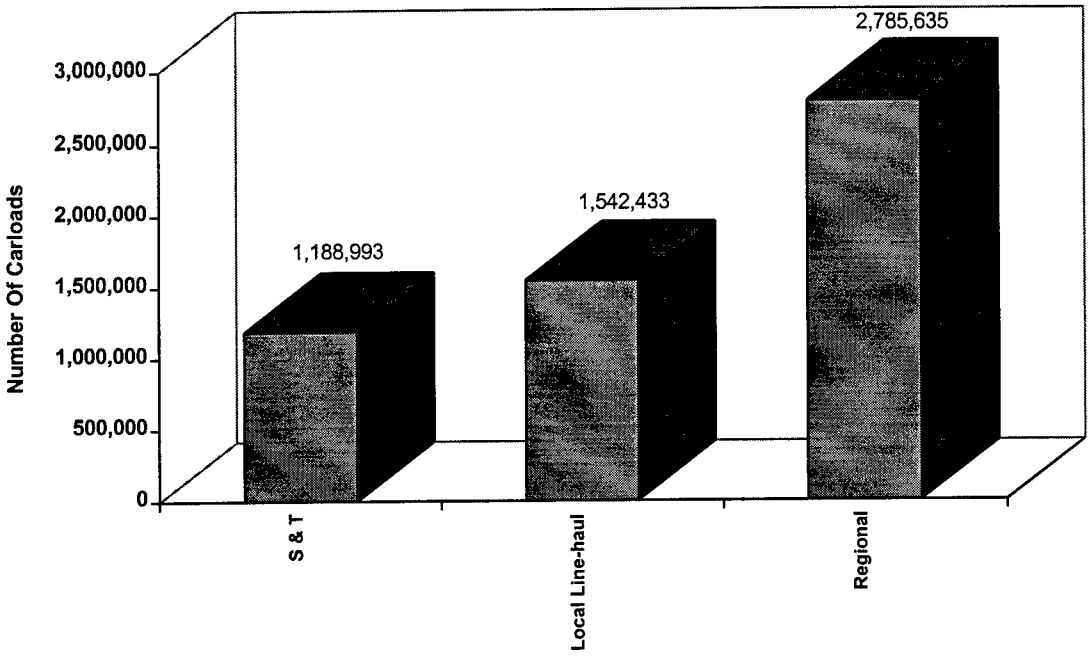
Figure 18: Small Railroad Customer Mix
By Region

Figure 18 displays the customer mix by region for small railroads. Lumber, chemicals, and farm products are among the top four commodities, by number of customers served, for each region. Food, paper products, and waste and scrap material are the other major commodities served, by number of customers. The four largest commodity groups account for over 50 percent of the small railroad's customers in three regions - the South, West-Southwest, and Pacific.

TRAFFIC PROFILE

A total of 5,517,061 carloads were handled in 1995 by short lines responding to the survey. Switching and terminal railroads accounted for 1,188,993 carloads handled. Local line-haul railroads handled 1,542,433 carloads. The responding Regional railroads handled 2,785,635 carloads.

Figure 19: Total Carloads By Railroad Type



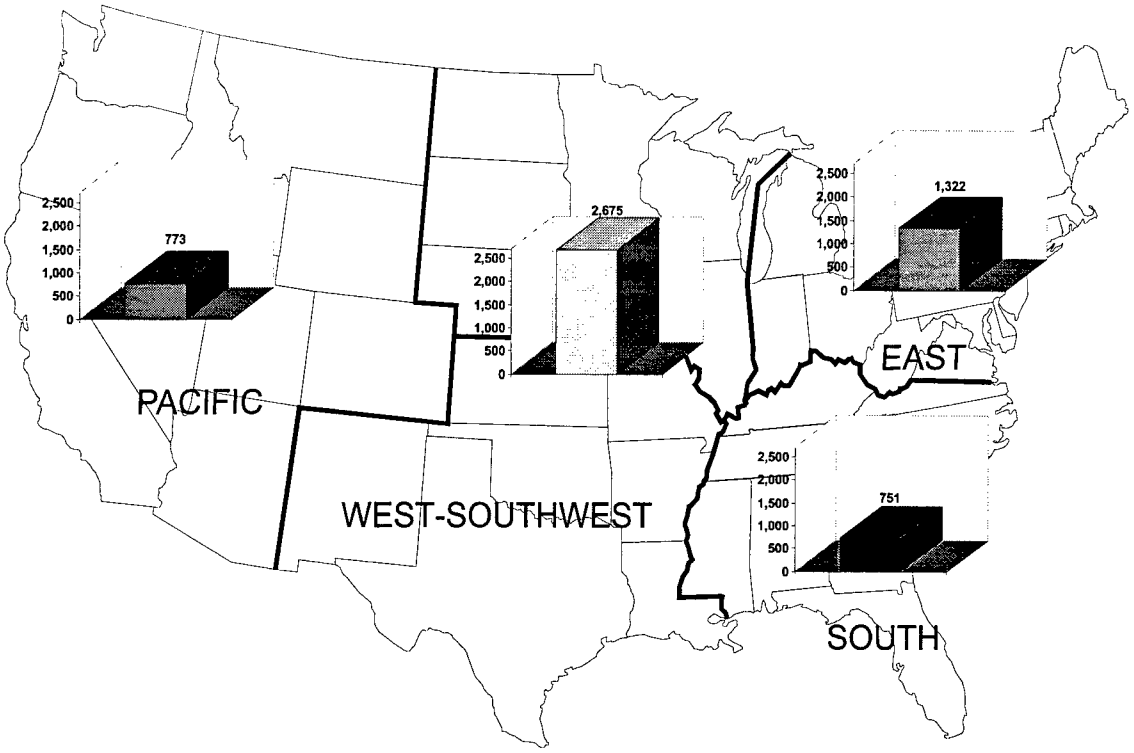


Figure 20: 1995 Total Carloads Handled(in thousands)
For Responding Small Railroads

Figure 20 shows 1995 traffic volumes by region for responding railroads. The largest volume of traffic was in the West-Southwest region with over 2.6 million carloads handled. The East region handled over one million carloads, while the Pacific and South regions handled approximately 750,000 carloads each.

The small railroad traffic mix is shown in Figure 21. The five top commodities, by carloads handled, are shown as a percentage of total carloads handled. The top five are metallic ores, coal, primary metal products, farm products, and petroleum products with these commodities accounting for 54 percent of the carloads handled. The remaining commodities are combined into the 'all others' category.

The traffic mix for the Class I railroads is shown in Figure 22. Coal and farm products are both major commodities handled by Class I and small railroads.

Figure 21: Small Railroad Traffic Mix

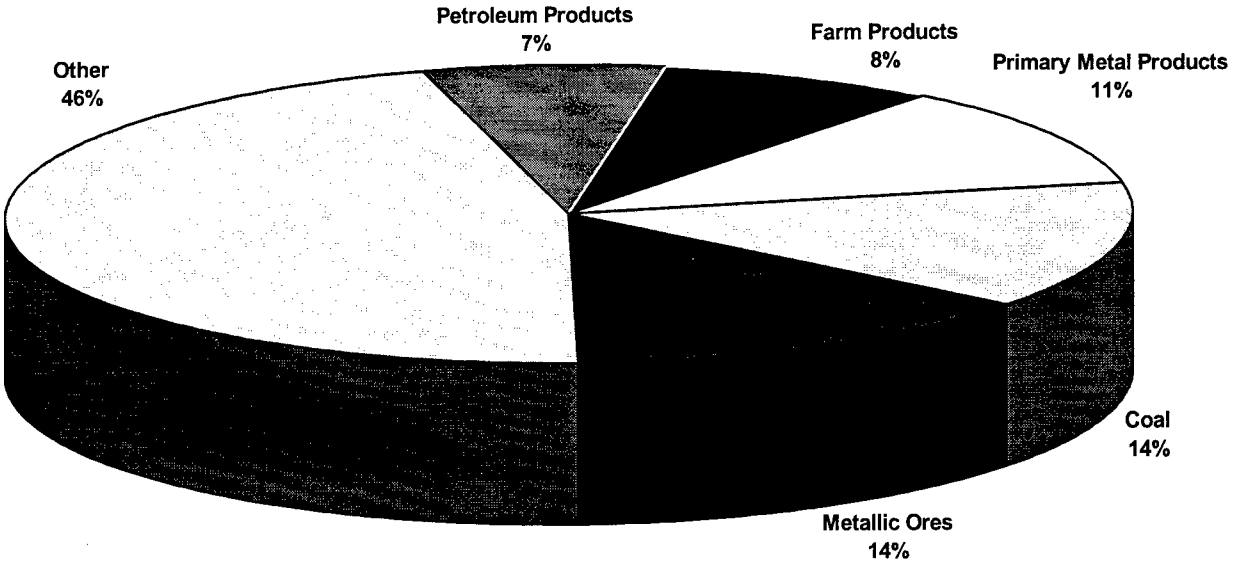


Figure 22: Class I Railroad Traffic Mix

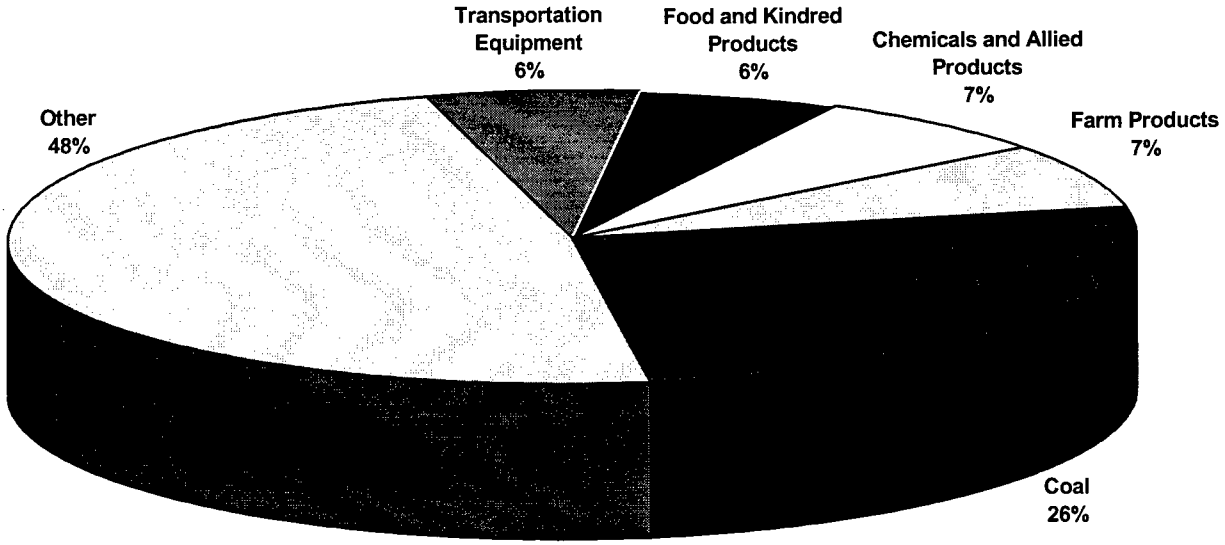
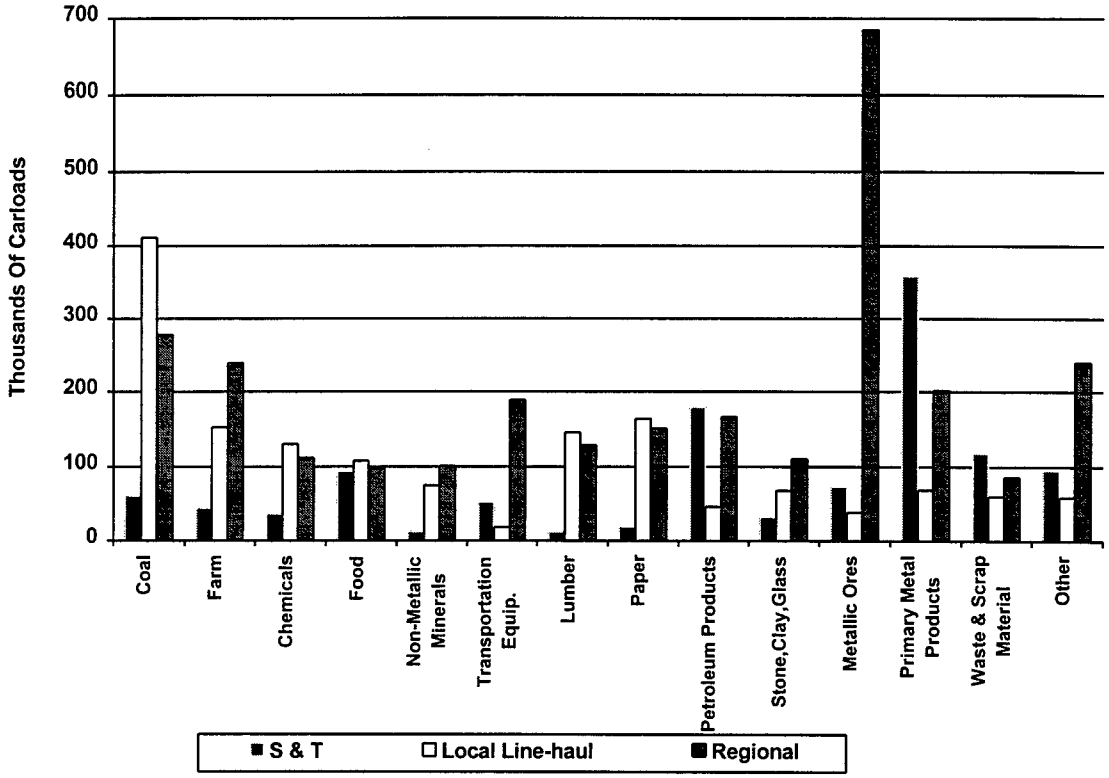
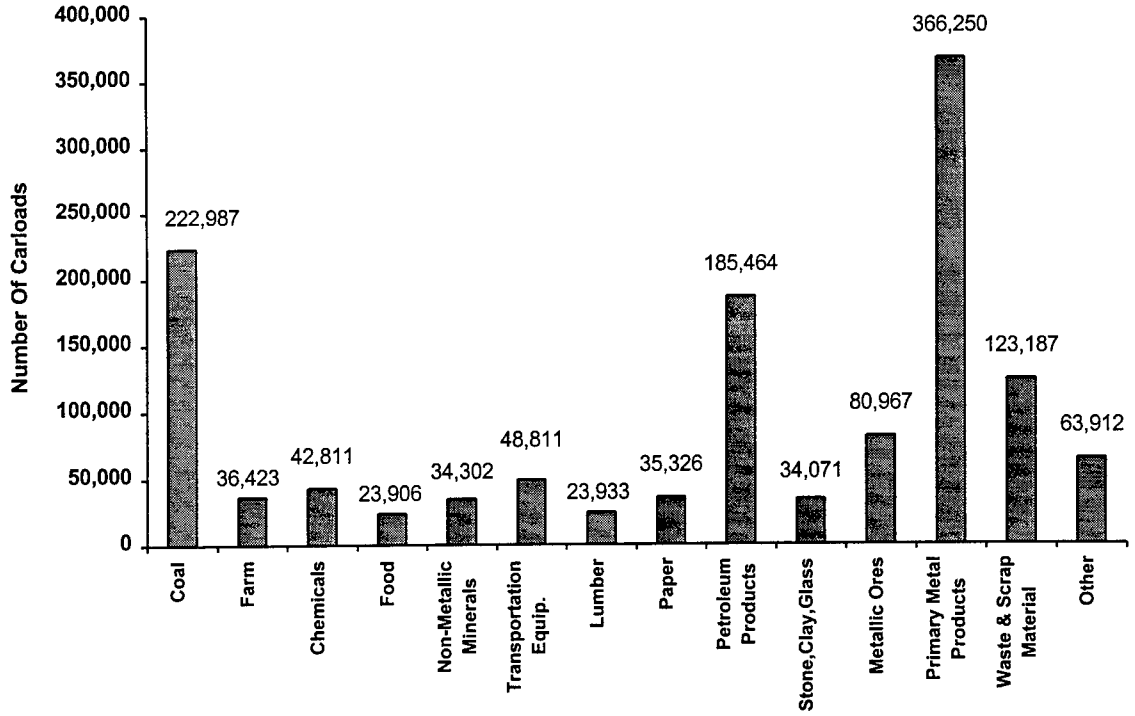


Figure 23: Carloads By Railroad Type



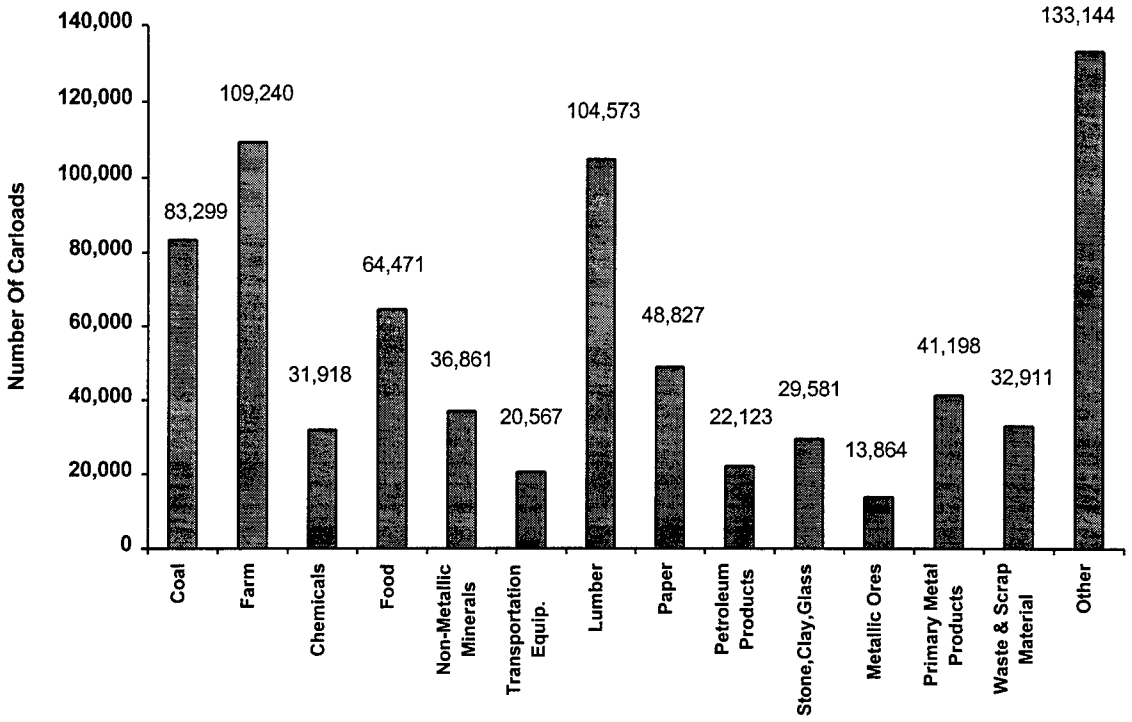
The traffic base for S & T, Local Line-haul, and Regional railroads are shown in Figure 23. Switching & Terminal railroad's main traffic commodities are primary metal products, petroleum products, waste and scrap material, and food. Coal, paper, lumber, and farm products make up the primary commodities handled by Local Line-haul railroads. Metallic ores, coal, farm products, and primary metal products make up the largest portion of carloads handled for the Regional railroads.

Figure 24 Eastern Region Carload Distribution



The Eastern region carload distribution is shown in Figure 24. Primary metal products, coal, petroleum products, and waste and scrap material commodities account for the largest traffic volume among the major commodities. By comparison, as shown in Figure 18, the largest number of customers served by commodity in the Eastern region are the chemicals and lumber commodities. Lumber and chemical commodities however, represent a small percentage of the Eastern region traffic base.

Figure 25: Pacific Region Carload Distribution



The Pacific region carloads handled distribution is displayed in Figure 25. Farm products and lumber were the two highest traffic volume commodities in the Pacific region in 1995. There were also a large number of carloads classified in the 'other' commodity group in the Pacific region.

Figure 26 displays the carload traffic volume by commodity type for the Southern region. Coal has, by far, the largest traffic volume of any commodity handled in 1995 in the Southern region despite its small customer base (Figure 18). Other major commodities generating carload traffic were paper, lumber, and chemicals.

The West-Southwest region's traffic base is dominated by the metallic ores category. Small railroads also handled over 180,000 carloads each for the farm, food, and transportation equipment commodities.

Figure 26: Southern Region Carload Distribution

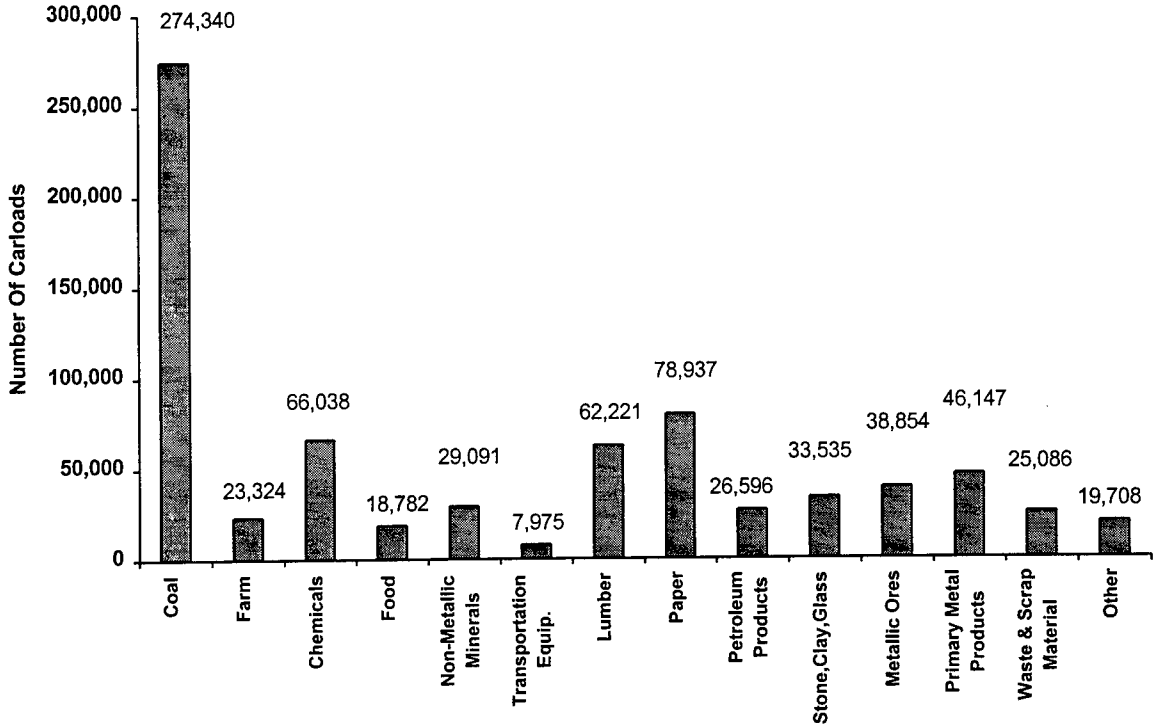


Figure 27: West-Southwest Region Carload Distribution

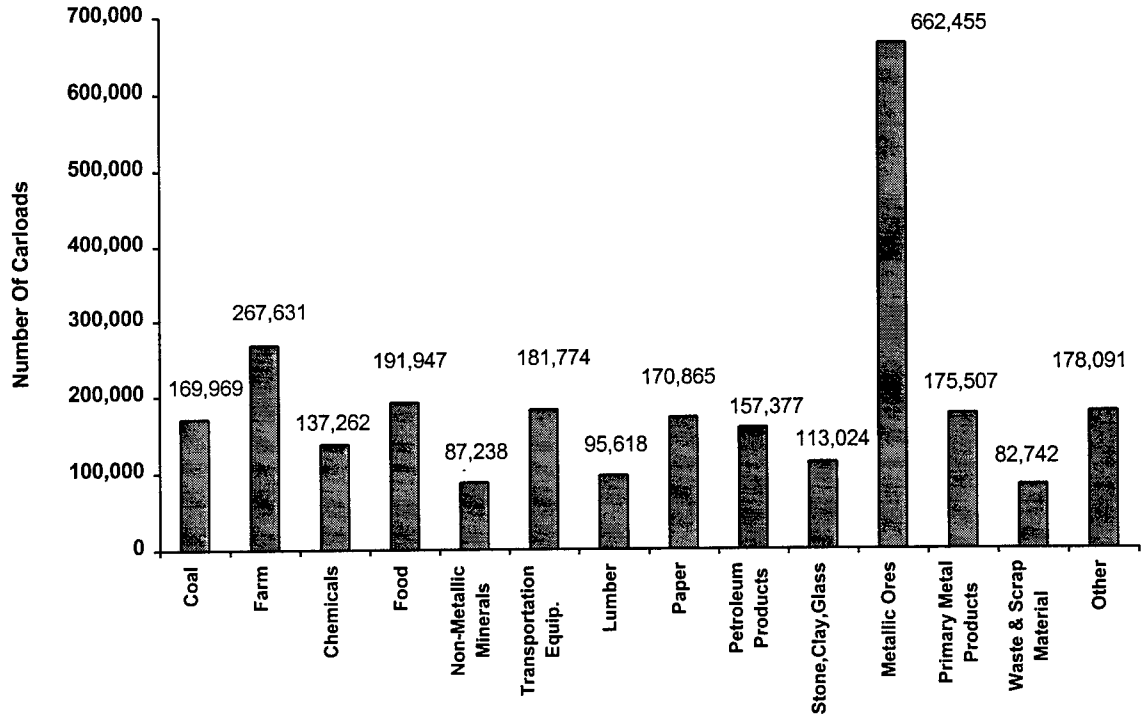


Figure 28: Small Railroad Movement Mix

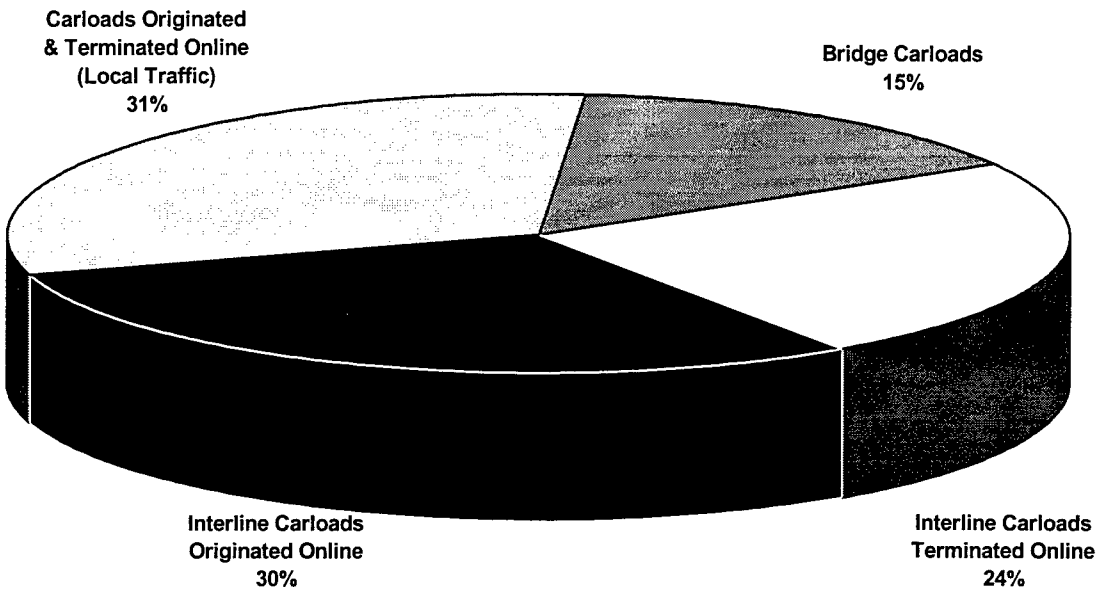
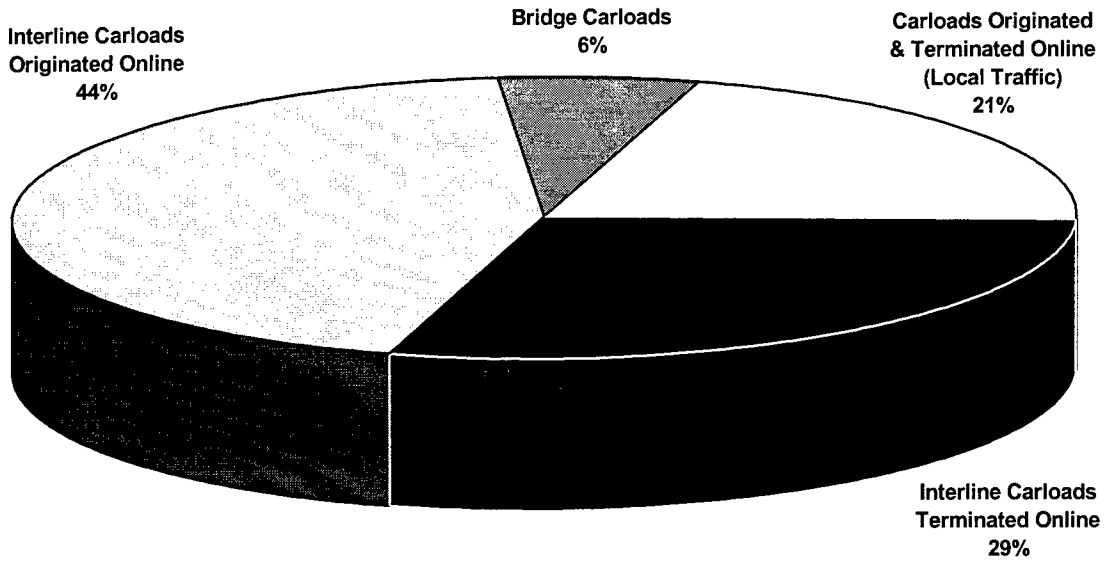


Figure 28 presents the small railroad carload movement mix for 1995. Local traffic and interline carloads originated online represent the largest carload movement types. They each represent about 30 percent of overall carload traffic. The next three figures display the carload movement mix into the three railroad types, Local Line-haul, Regional, and switching & terminal.

Figure 29: Local Line-haul Railroad Movement Mix



In 1995, the Local Line-haul railroads' major carload movement was interline carloads originating online. Figure 29 shows that interline carloads makeup a much higher portion of the Local Line-haul movement mix than for all small railroads as shown in Figure 28. Local cars represent 21 percent of the carloads handled by Local Line-haul railroads in contrast to 32 percent for all small railroads (Figure 28).

Figure 30: Regional Railroad Movement Mix

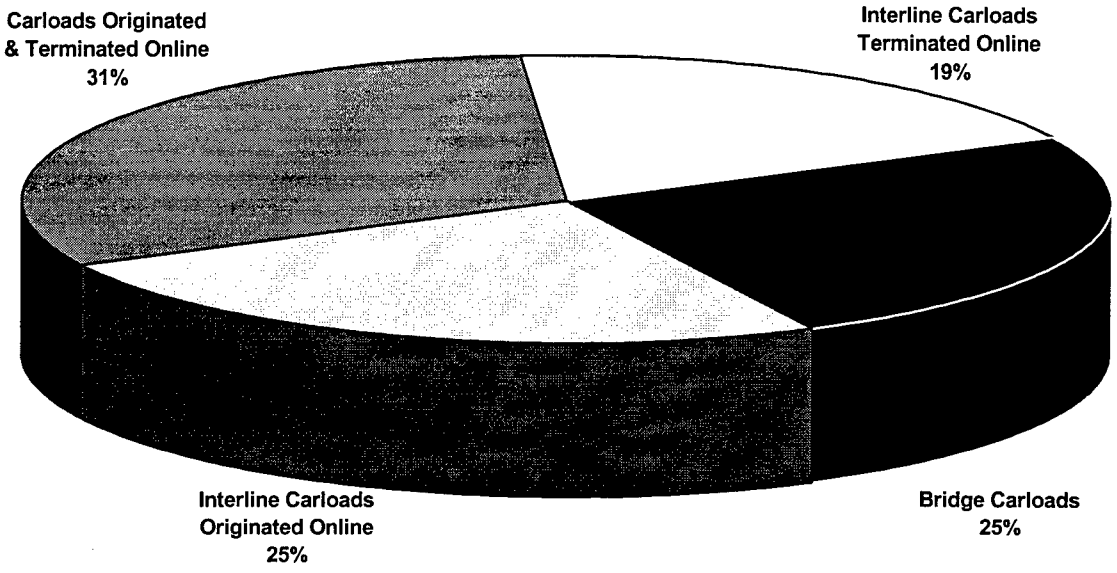
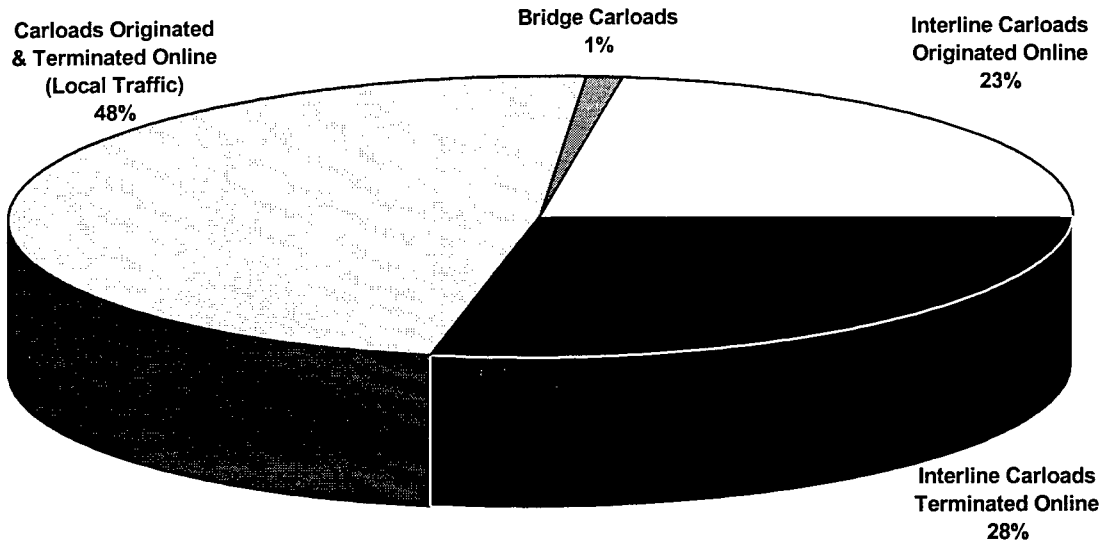


Figure 30 shows that local carloads make up the largest portion of the Regional railroad traffic volume generating 31 percent of the total movement mix. Bridge carloads and interline carloads originated online each makeup one-fourth of the Regional traffic volume, while carloads terminated online account for around 19 percent of the traffic volume. By comparison, local carloads and bridge carloads make up a larger portion of the movement mix for Regional railroads than for Local Line-haul railroads (Figure 29).

Figure 31: Switching & Terminal Railroad Movement Mix



The 1995 switching & terminal railroad respondents show that just under half of their carloads were moved locally. Interline carloads, both originated and terminated, represent 51 percent of the Switching and Terminal traffic volume. Bridge carloads represent only one percent of the Switching and Terminal carload movement as reported by those railroads responding to the 1995 survey.

Figures 32 through 35 display the movement mix on small railroads by the regions specified by the American Short Line Railroad Association. The East region movement consists mainly of carloads originated and/or terminated locally. Bridge traffic makes up only five percent of the East region's movement.

Conversely, Figure 33 shows that bridge traffic makes up nearly one-third of the Pacific region carload movement. Interline carloads originated online represent the largest portion of Pacific region traffic at 36 percent. For the Southern region, Figure 34 shows that the major movement type takes place locally as carloads originated and terminated online make up 44 percent of the South region's carload movement. For the West-Southwest region, traffic movement is more evenly disbursed across the four types of carload movement. Figure 35 shows that bridge carloads make up the lowest percent of West-Southwest region movement, while local carloads are the highest at 34 percent.

Figure 32: Eastern Region Movement Mix

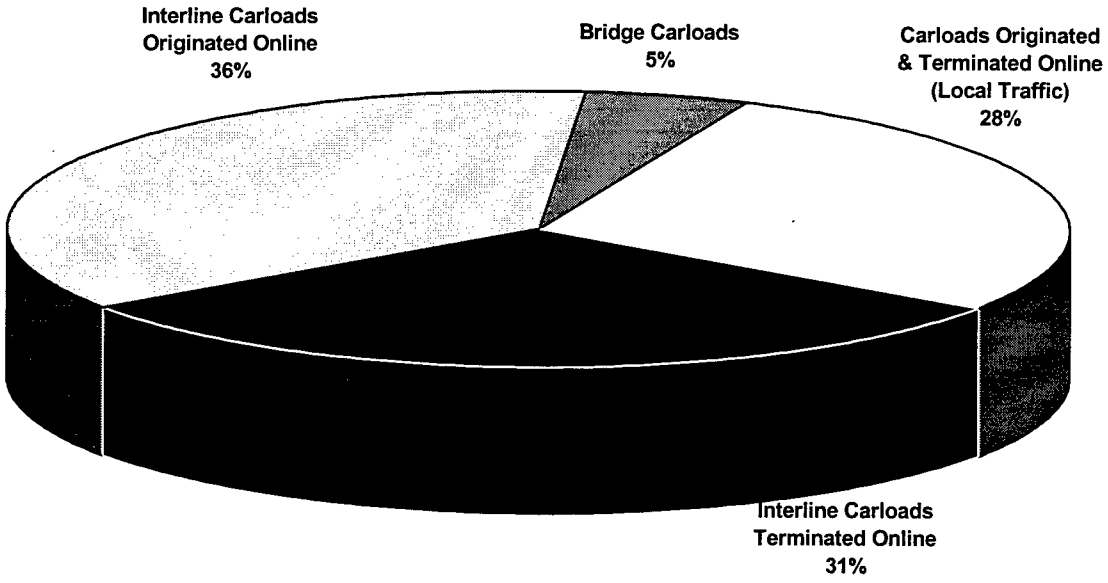


Figure 33: Pacific Region Movement Mix

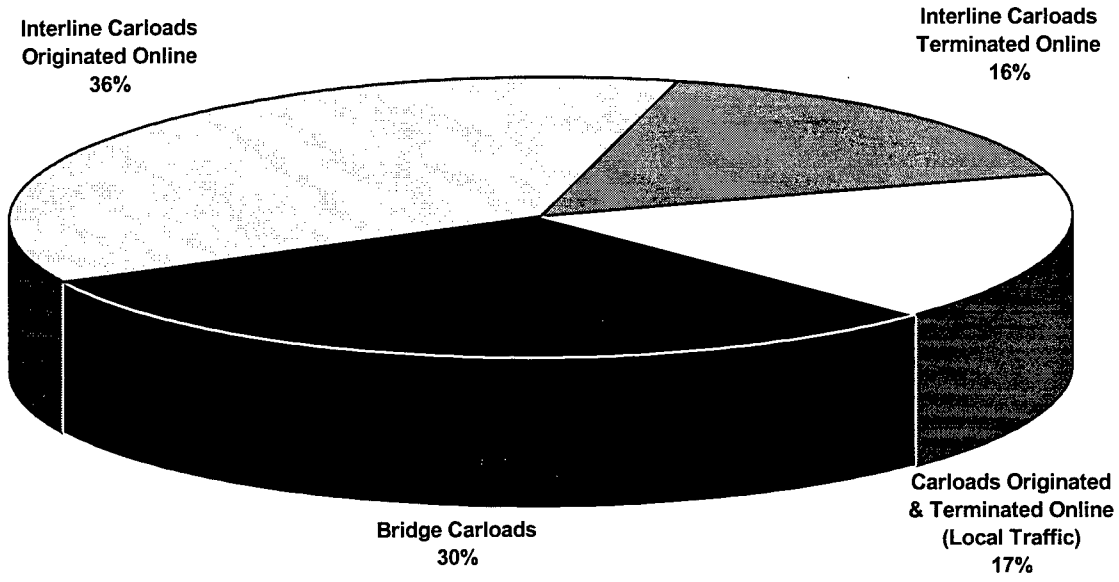


Figure 34: Southern Region Movement Mix

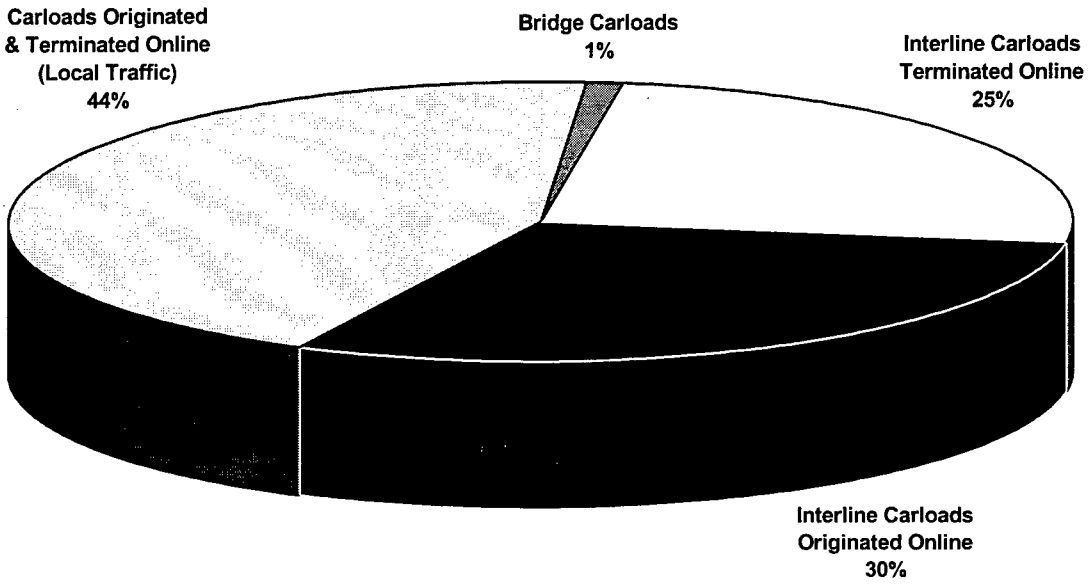
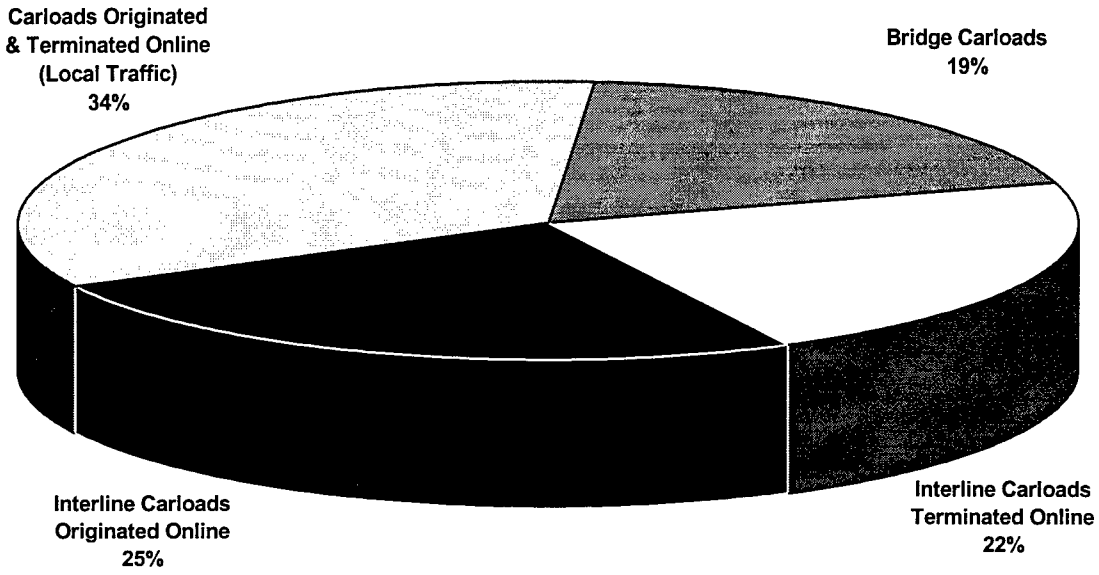


Figure 35: West-Southwest Region Movement Mix



PHYSICAL PROFILE

Railroads responding to the 1995 survey operate 25,059 miles of road in the United States. Eighty-one percent of the miles operated is owned by the railroads. Seventy-eight percent of the miles owned has 90-pound or heavier rail.

Figure 36 compares the miles operated, miles owned, and miles owned with greater than 90-pound rail for each of the four regions. Small railroads responding from the West-Southwest region operate more miles of road than those from the other three regions combined. Results from the 1995 survey indicate that 93 percent of the Eastern road that is owned is greater than 90 pounds. The West-Southwest follows with 78 percent owned greater than 90 pounds, South is next with 71 percent, and the Pacific has 66 percent of owned road greater than 90 pounds.

The Southern region has the highest percentage of owned mileage with 94 percent of the reported mileage being owned.

Figure 36: Small Railroad Mileage By Region

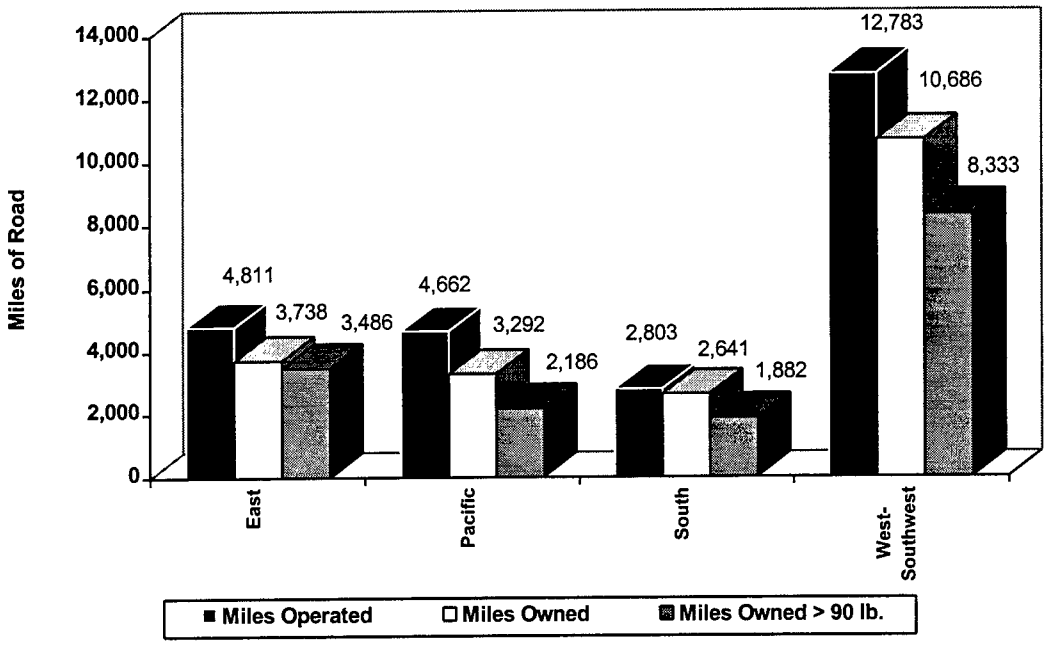


Figure 37: Small Railroad Percent Of Road Owned That Is Greater Than 90 Pounds 1993-95

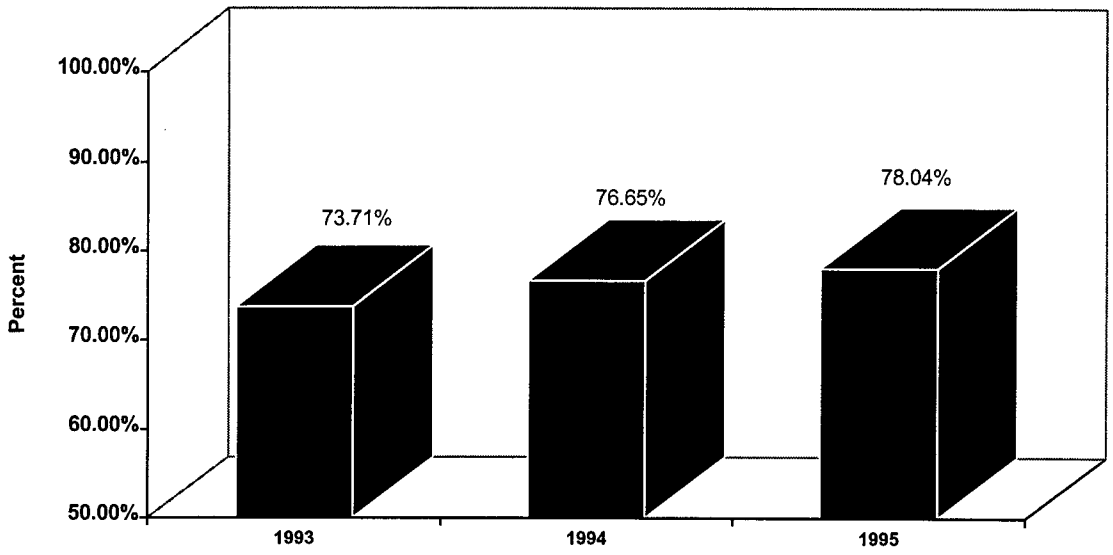


Figure 37 shows the percentage of road owned that is greater than 90-pound rail for the three years of the survey. From 1993 to 1995 there has been an increase in the reported percent of small railroad track that has greater than 90-pound rail.

Figure 38 illustrates the average and median number of miles of road operated per customer served for each of the three survey years (1993-95). There is an increasing trend in the number of miles of road operated per customer served over the three years of the ASLRA survey.

Figure 39 displays the miles of road owned by FRA designated track classes. Nearly 40 percent of the miles owned were reported as being FRA Class 2 type road.

Figure 38: Small Railroad Average And Median Miles Operated Per Customer Served 1993-95

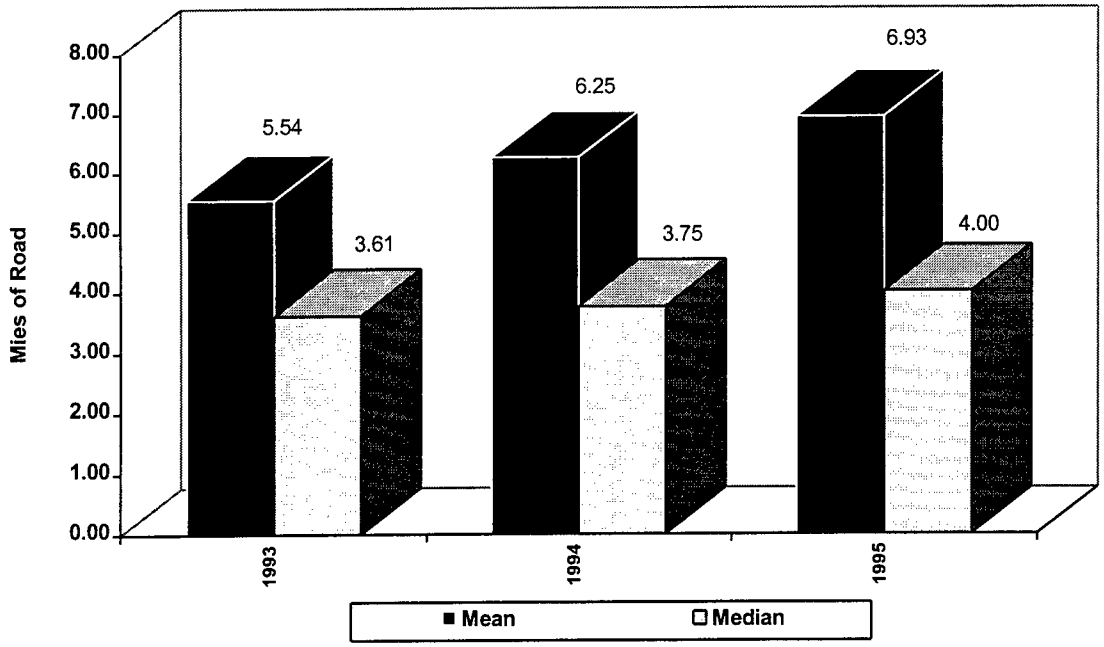


Figure 39: Small Railroad FRA Track Class

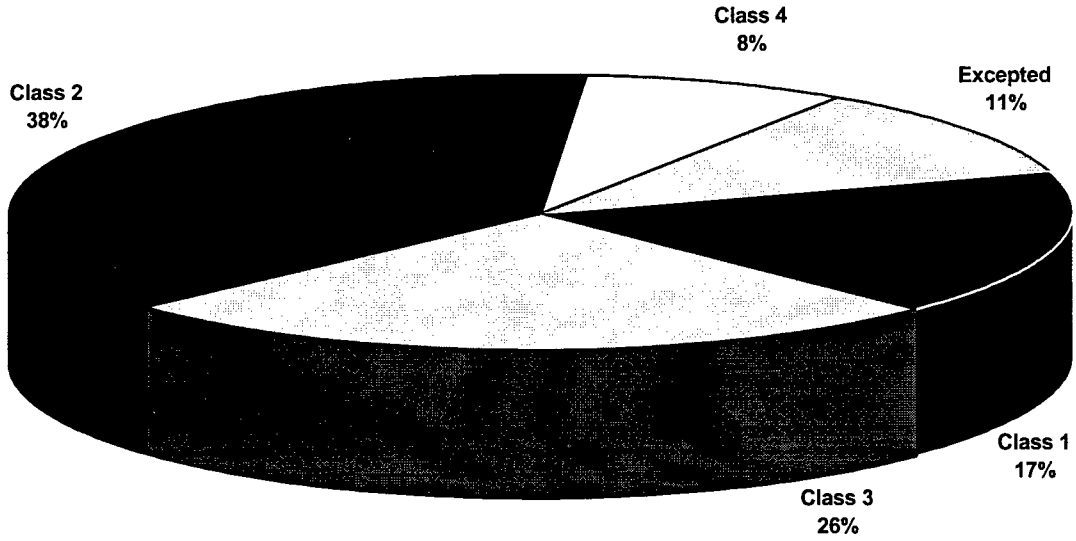
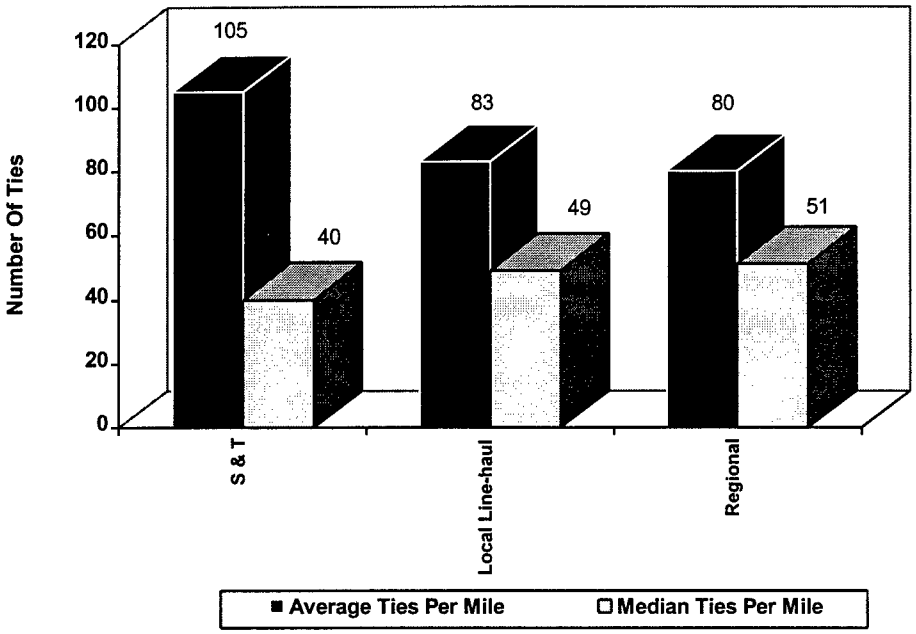


Figure 40 shows the ties replaced (new or used) per mile of road by railroad type. Switching & Terminal railroads had the highest average ties replaced per mile with 105 for 1995. Local line-haul railroads had the second highest ties replaced per mile with 83, followed closely by the Regional railroads at 80. In the median value category, Regional railroads had the highest ties replaced per mile at 51, and Switching & Terminal railroads had the lowest with 40 ties replaced per mile.

Figure 40: Ties Replaced Per Mile Of Road By Railroad Type



The small railroad bridge inventory is shown in Figure 41. Nearly half of the bridges are made of wood on the railroads responding in 1995. Steel bridges make up 28 percent of the bridges, while 12 percent are combination, and 11 percent are concrete.

Table 11 lists the number of small railroad bridges reported by region for 1995. Over 45 percent of the concrete bridges reported were located in the East region. The West-Southwest region reported over 45 percent of each of the remaining bridge types. Overall, 50 percent of the bridges were reported in the West-Southwest region, 21 percent from the East region, 15 percent from the Pacific region, and 14 percent from the South region.

Figure 41: Small Railroad Bridge Inventory

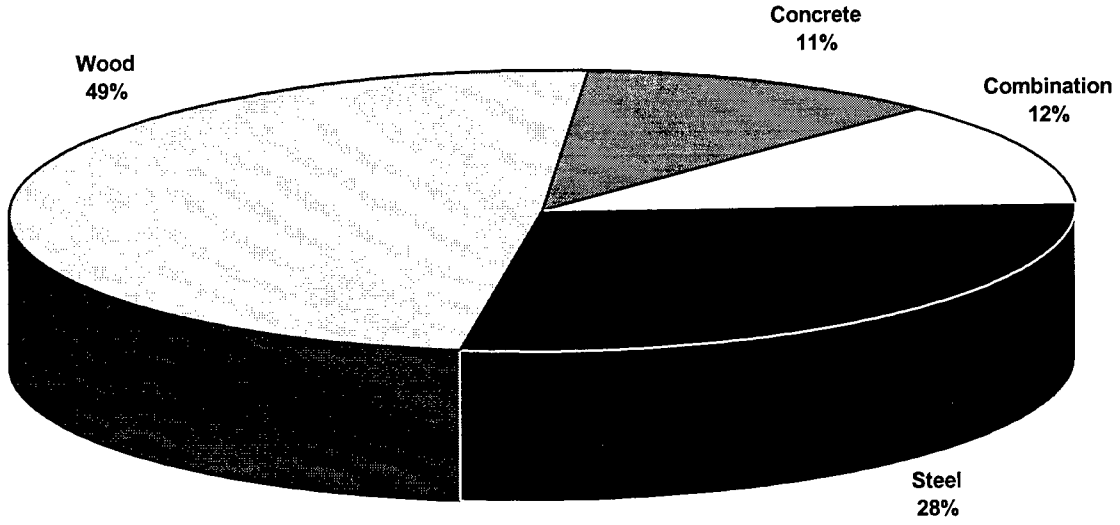


Table 11: Inventory of Bridges

Region	Concrete	Steel	Wood	Combination
East	537	1,197	305	229
West-Southwest	237	1,373	2,950	693
Pacific	315	290	917	47
South	102	100	1,012	266

The number of highway grade crossings reported in the survey are shown in Tables 12 and 13. Table 12 lists the grade crossings by railroad type. Approximately 49 percent of railroad grade crossings reported were by Regional railroads. The percentage of railroad crossings having automatic warning devices was nearly identical for all three railroad types. For 1995 survey respondents, Local Line-haul railroads had 19.74 percent of crossings equipped with automatic warning devices, switching & terminal railroads had 19.34 percent, while Regional railroads were at 19.27 percent.

Table 13 shows railroad grade crossings by region. Fifty-seven percent of railroad grade crossings reported were located in the West-Southwest region. The East region reported the highest percentage of crossings equipped with automatic warning devices at 26 percent.

Table 12 Railroad Grade Crossings By Railroad Type

Region	Public	Private	Automatic Warning Devices
Local Line-haul	8,884	5,601	2,859
Regional	9,809	6,055	3,057
S & T	1,328	709	394

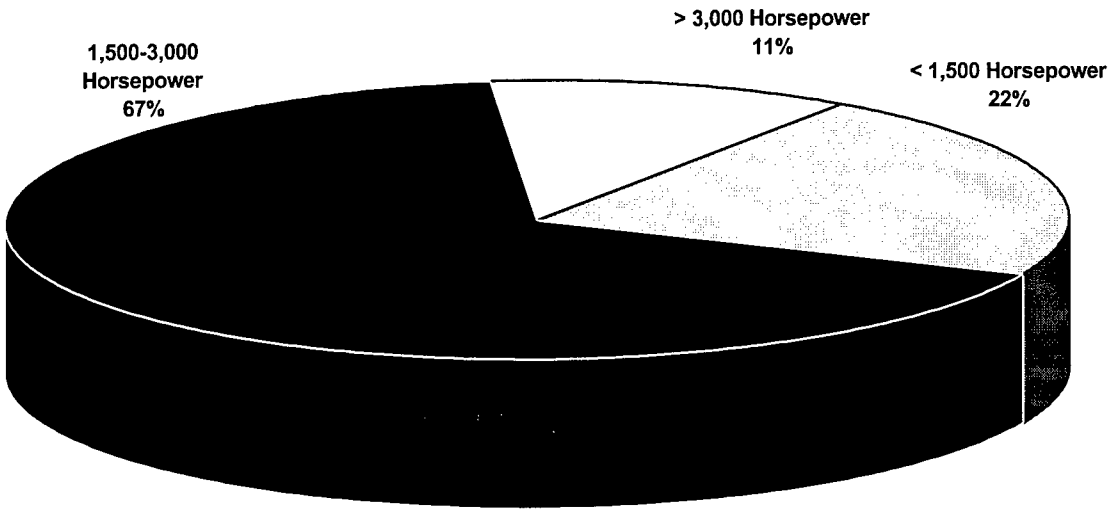
Table 13 Railroad Grade Crossings By Region

Region	Public	Private	Automatic Warning Devices
East	3,179	1,987	1,357
West-Southwest	11,955	6,592	3,296
Pacific	2,032	2,150	753
South	2,838	1,633	904

EQUIPMENT

The locomotive power distribution is given in Figure 42. Approximately two-thirds of all locomotives reported as owned or leased were in the 1,500 to 3,000 horsepower range.

Figure 42: Small Railroad Locomotive Power Distribution



The following two figures show the age distribution of locomotives for small railroads and for Class I railroads. Figure 43 shows that most locomotives owned or leased by small railroads are over 20 years old. Figure 44 shows that Class I railroad locomotives are almost evenly distributed among the three age groups. Only one percent of the reported small railroad locomotives are less than ten years old compared with 31 percent for the Class I locomotives in this age category.

Figure 43: Small Railroad Locomotive Age Distribution

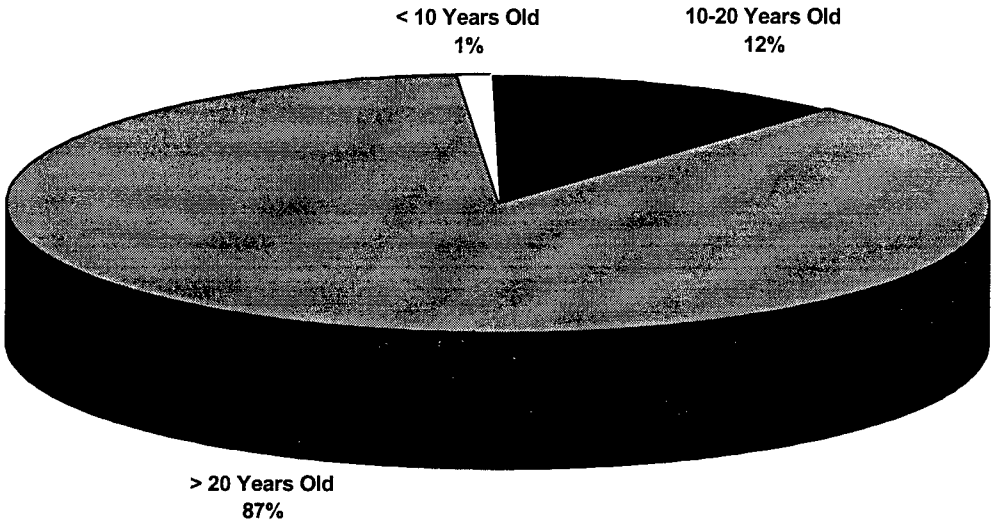


Figure 44: Class I Railroad Locomotive Age Distribution

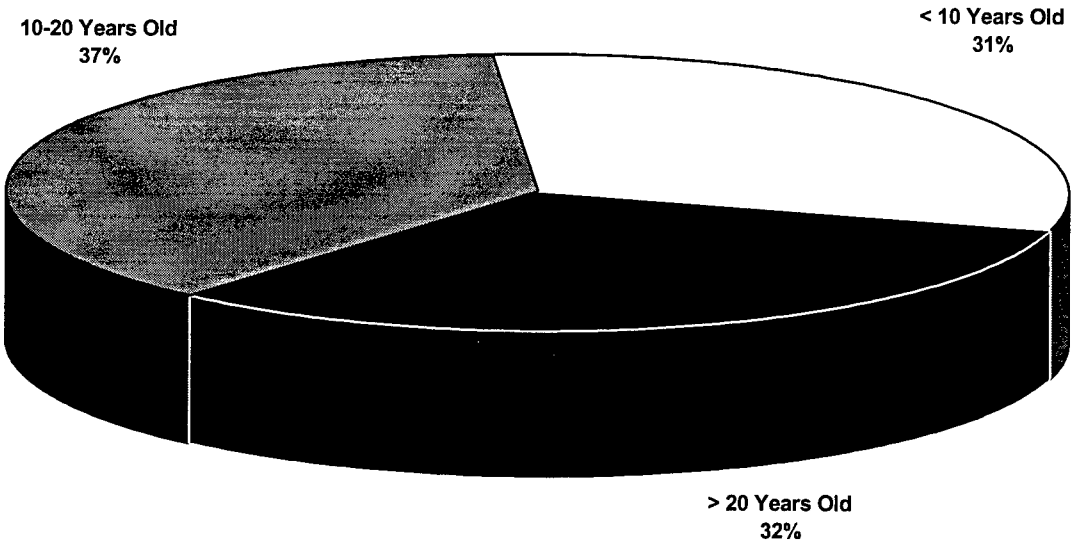


Figure 45: Small Railroad Freight Car Distribution By Age

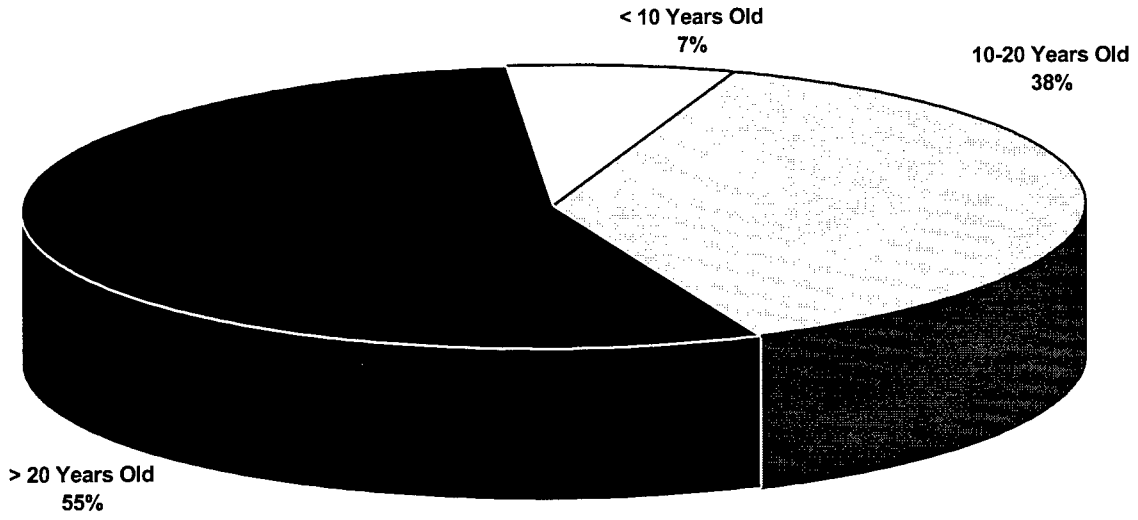


Figure 45 shows the age distribution among railroad freight cars owned or leased by those small railroads responding to the 1995 survey. Over half of the freight cars are greater than 20 years old, while only 7 percent of the small railroad freight cars are less than 10 years old.

Figures 46 and 47 identify the car type distribution for the responding small railroads and Class I railroads. The highest percentage of car types for short lines are the box car and open top hopper types. The highest percentage of car types for Class I railroads are the covered hopper and the open top hopper types.

Figure 46: Small Railroad Car Type Distribution

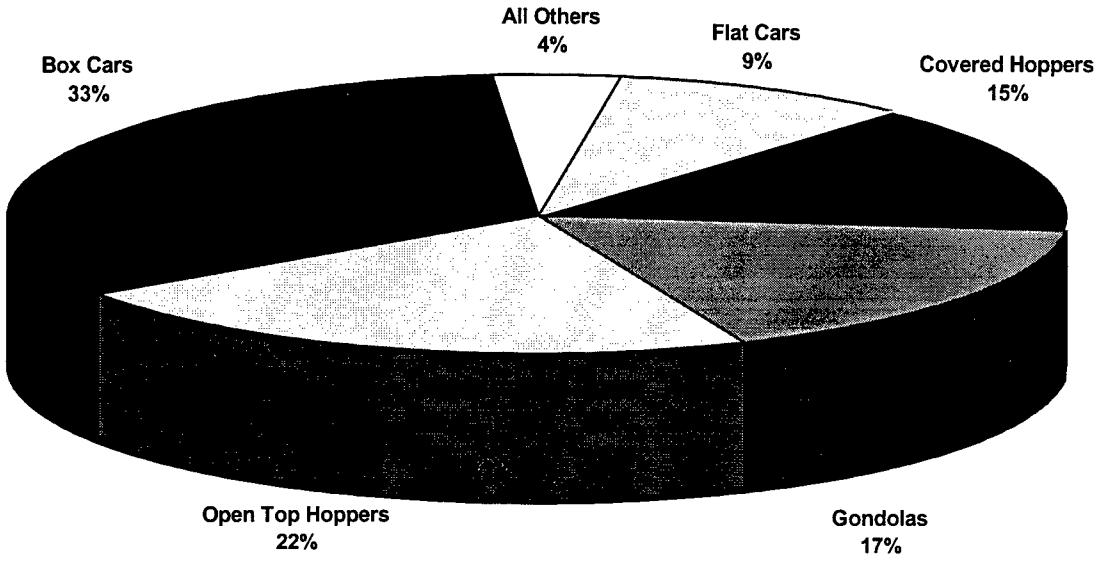
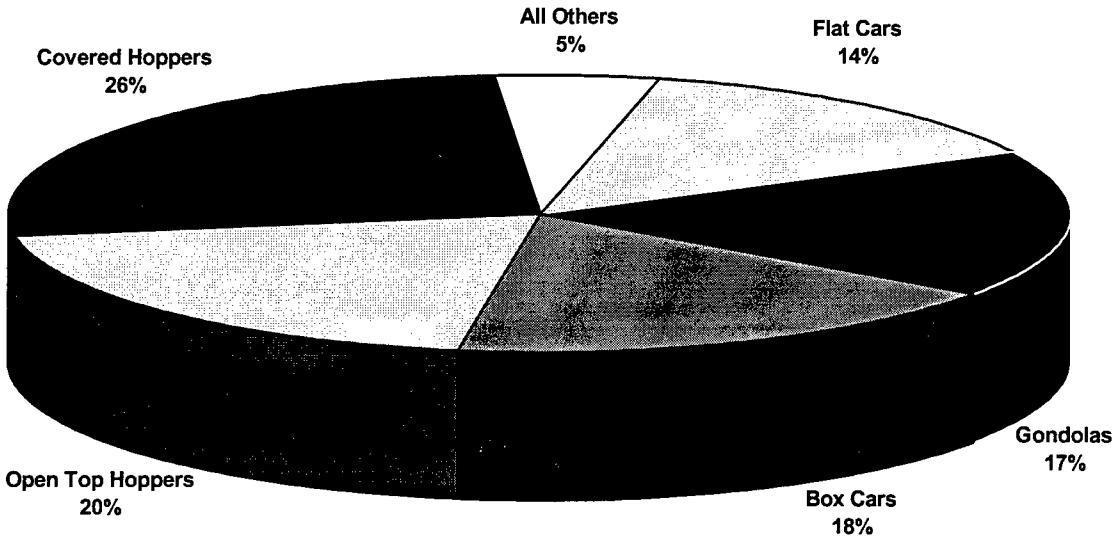


Figure 47: Class I Car Type Distribution



Figures 48 through 50 show the car type distribution by railroad types. The top car types for Regional carriers are open top hoppers, box cars and gondolas. The top car types for Local Line-haul

carriers are box cars, open top hoppers, and covered hoppers. Switching & Terminal carriers top car types are gondolas, box cars, and open top hoppers.

Figure 48: Regional Railroad Car Type Distribution

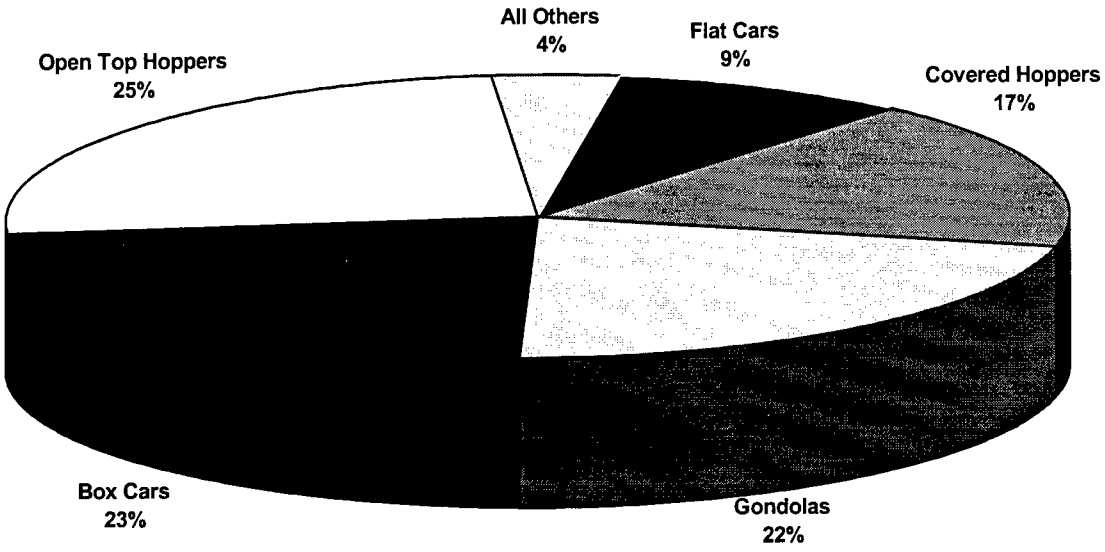


Figure 49: Local Line-haul Car Type Distribution

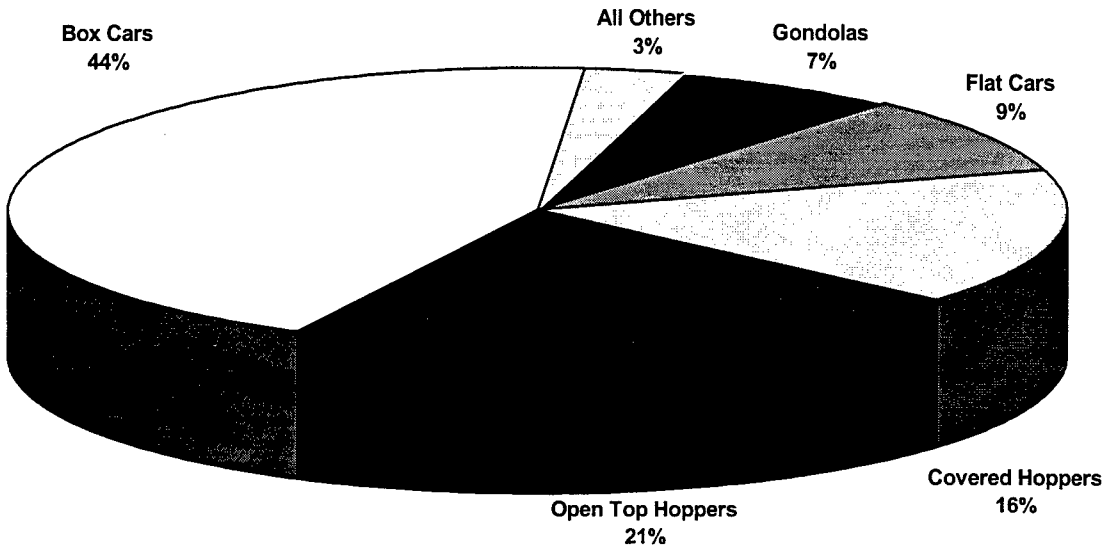
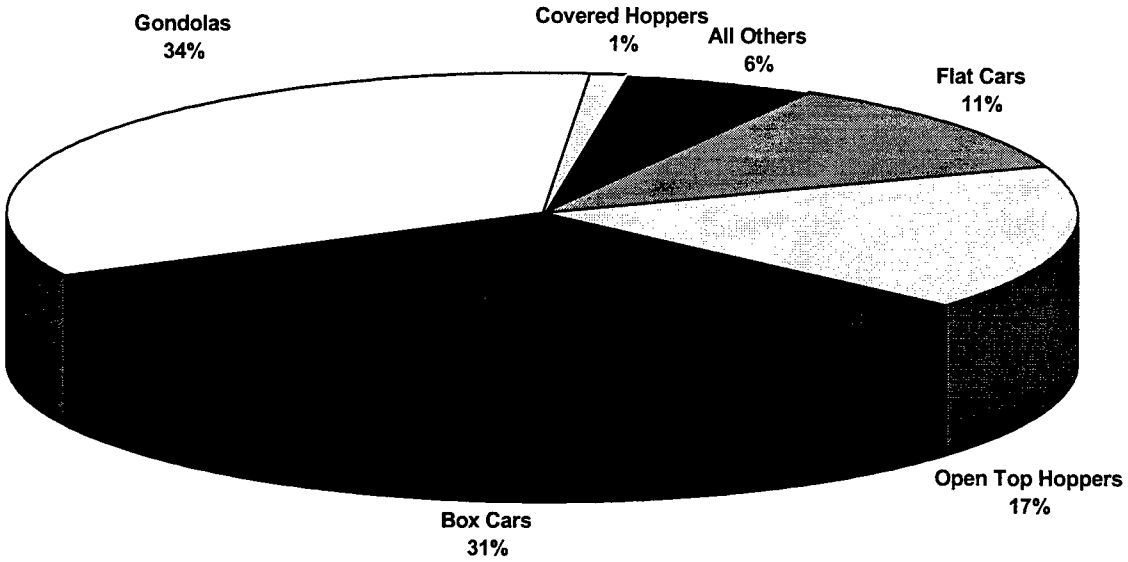


Figure 50: S & T Car Type Distribution



FINANCES

Figures 51 and 52 show the distribution of railroad operating expenses for small railroads and Class I railroads. For both groups, the largest expense is transportation, followed by equipment, way and structures, and general and administrative. General and administrative costs comprise a larger percentage of expenses for small railroads than the Class I railroads. The 'other' category of expenses comprises 10 percent of the small railroad total operating expense. The 'other' expense category is not included in the Class I railroad expense distribution.

Figure 51: Small Railroad Operating Expenses

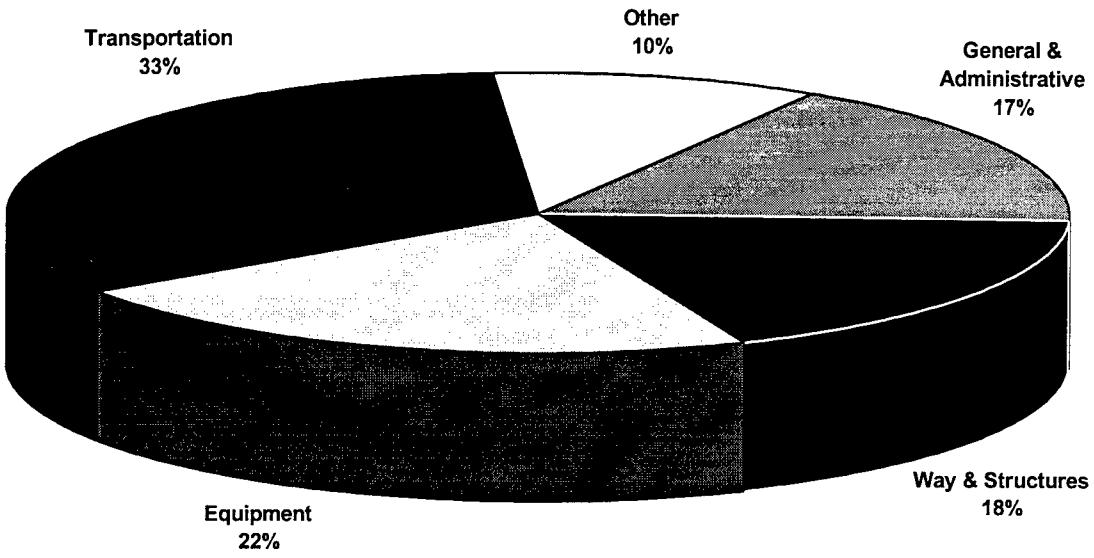
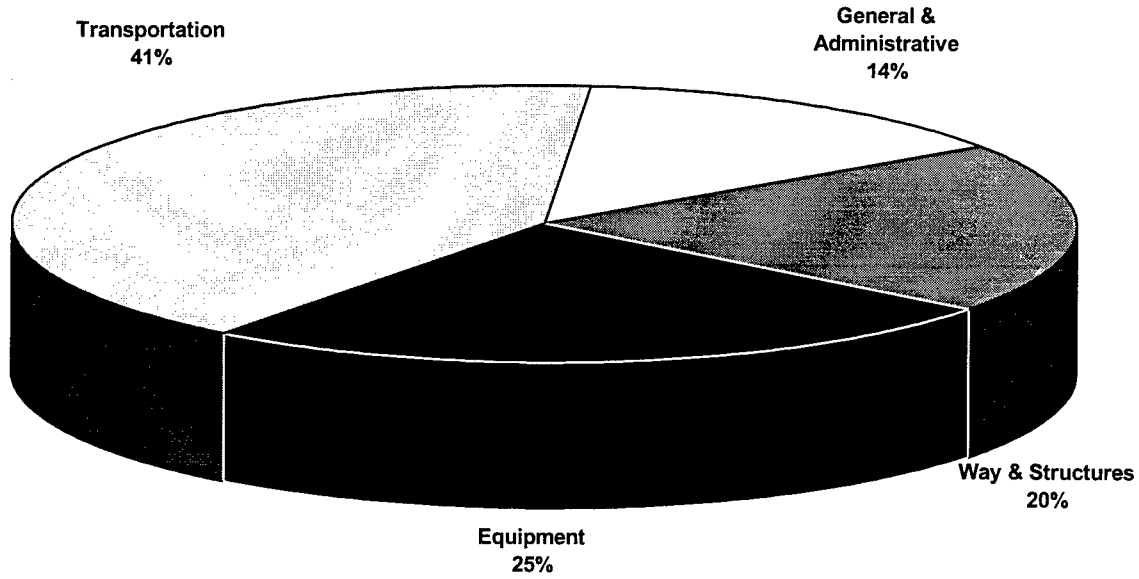


Figure 52: Class I Railroad Operating Expenses



Projected capital investments over the next 5-year period were collected in the 1995 survey. Figures 53 through 56 illustrate the distribution and total dollar amounts of the projected investments. Figure 53 divides the investments into three categories; equipment, road, and other investments. Figure 54 provides greater detail by further subdividing these categories into locomotive, rolling stock, track, structure, and other investments.

The total projected dollar amounts invested for the distribution shown in Figure 53 are illustrated in Figure 55. Figure 56 shows the projected dollar amounts invested for the same investment categories shown in Figure 54.

The percentage of an investment funded internally for each type of capital investment are shown in Figures 57 and 58. Figure 57 illustrates the investment categories displayed in Figure 53 while Figure 58 illustrates the percent funded internally for each investment category shown in Figure 56.

Figure 53: Projected Capital Investment For Next 5-Year Period

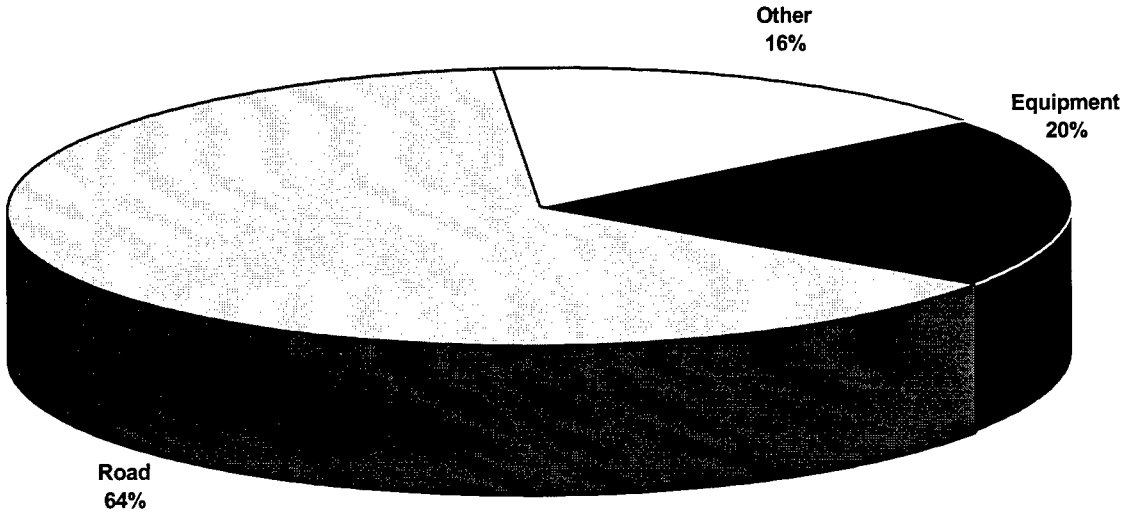


Figure 54: Projected Capital Investment For Next 5-Year Period

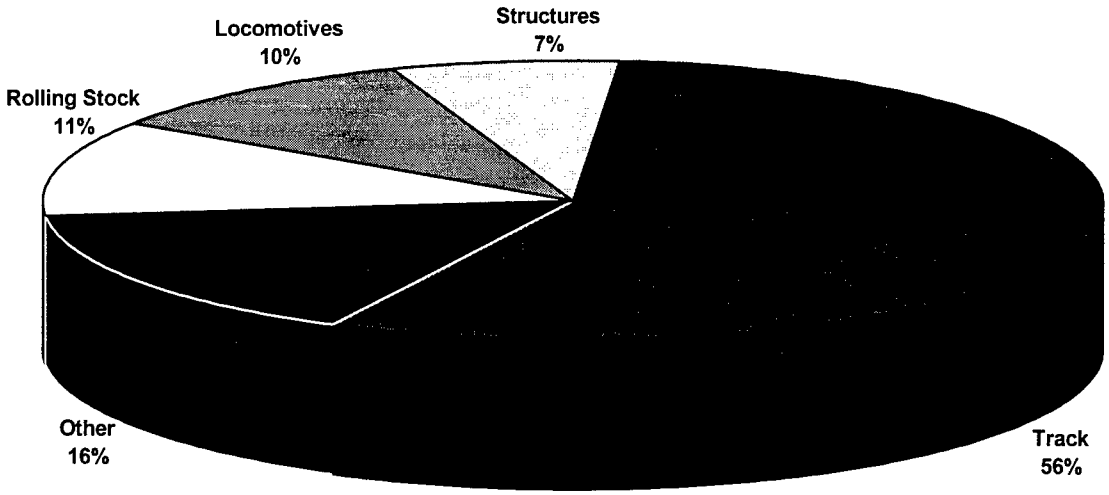


Figure 55: Projected Capital Investment For Next 5-Year Period

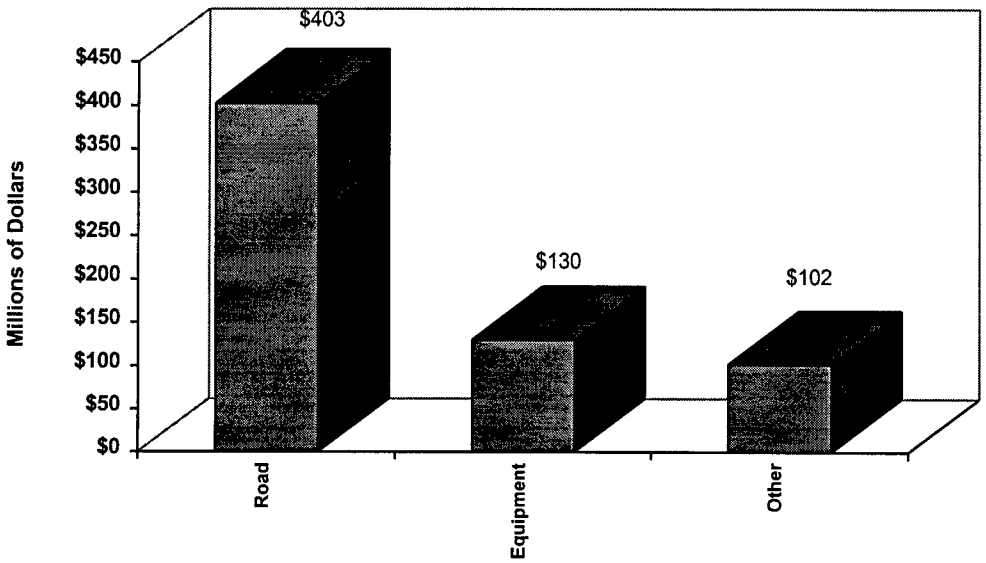


Figure 56: Projected Capital Investment For Next 5-Year Period

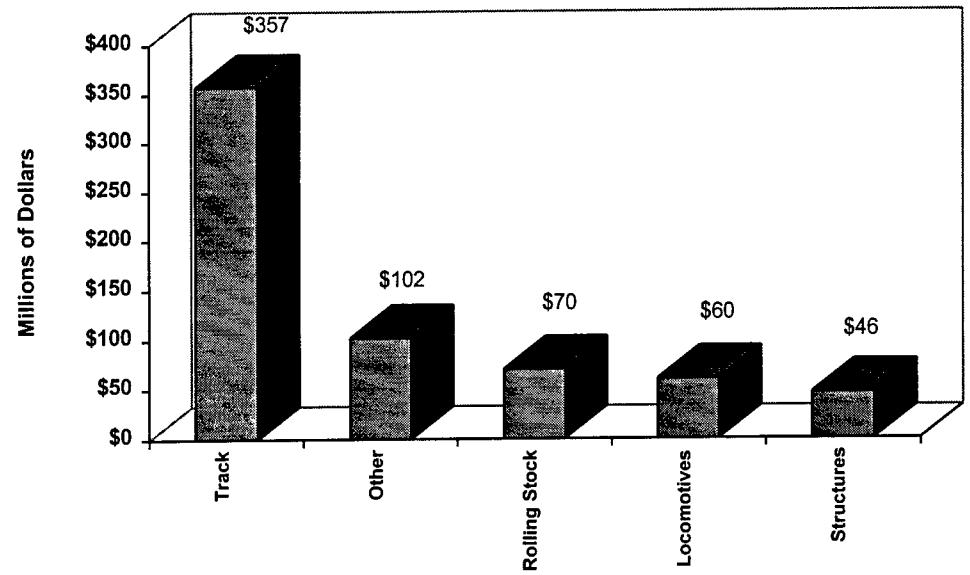


Figure 57: Projected Capital Investment For Next 5-Year Period Funded Internally

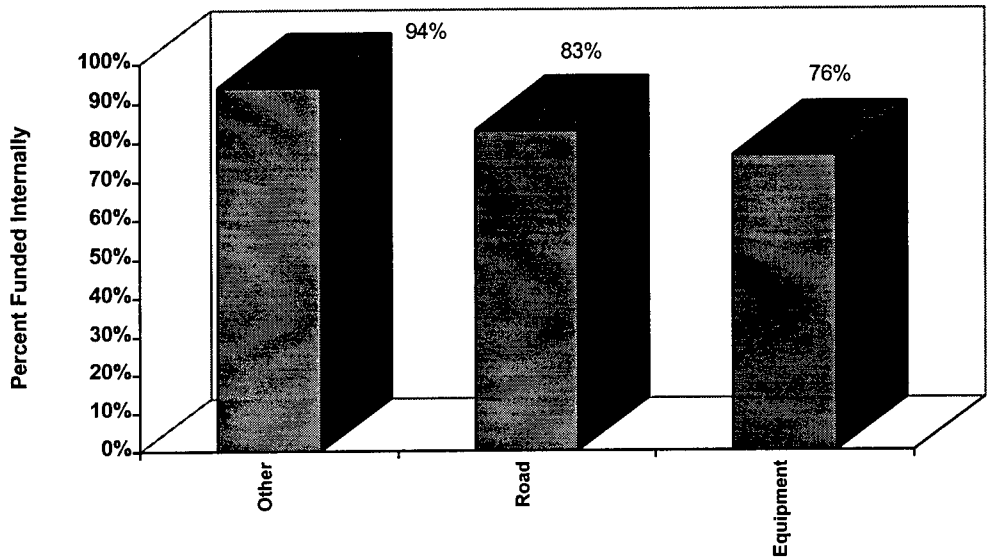
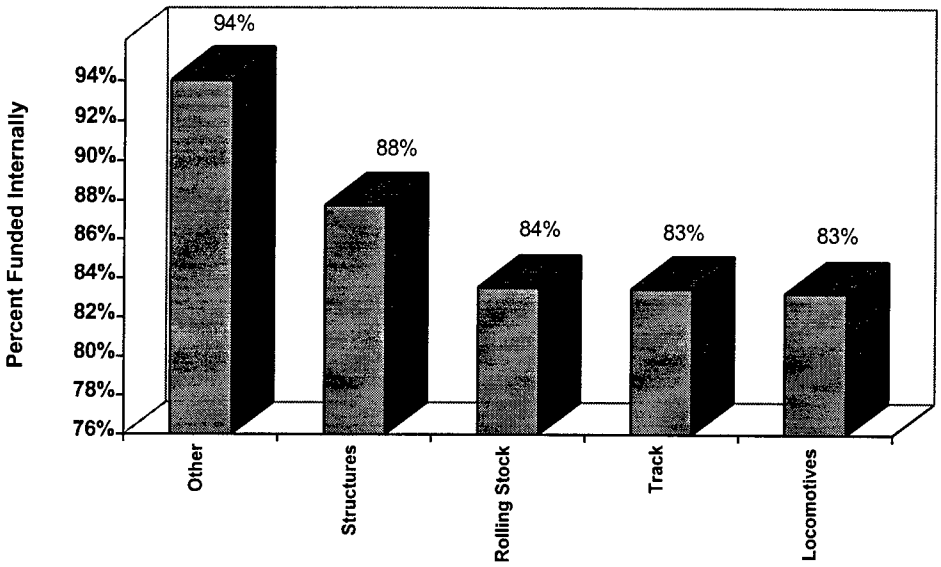
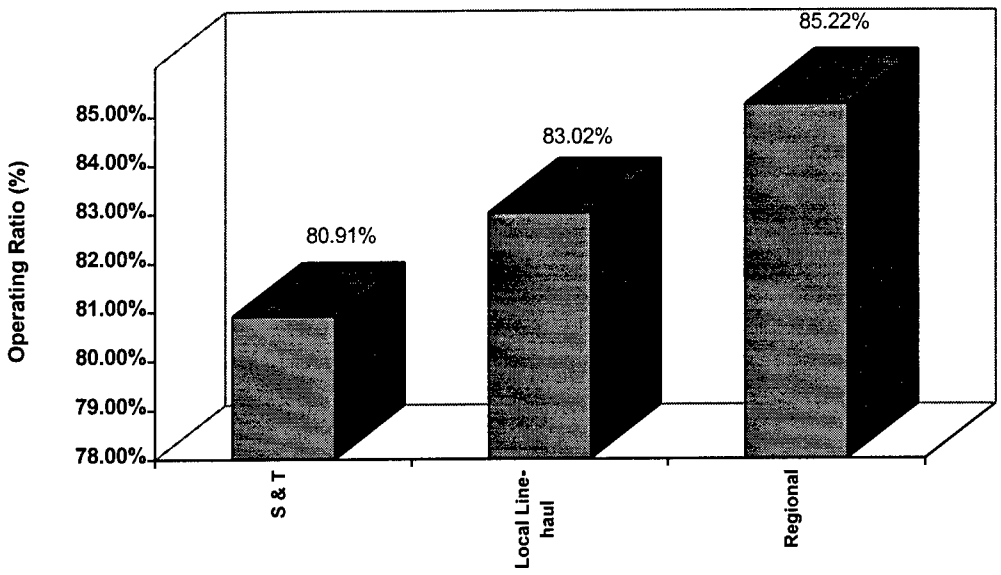


Figure 58: Projected Capital Investment For Next 5-Year Period Funded Internally



The average operating ratio for each type of railroad is illustrated in Figure 59. The highest operating ratio was for Regional railroads at 85.2 percent followed by Local Line-haul railroads at 83 percent and switching & terminal railroads at 80.9 percent. The operating ratio is calculated by dividing the total operating expenses by total operating revenues.

Figure 59: Average Operating Ratio By Type Of Railroad



OPERATING STATISTICS

Small railroads responding to the 1995 survey accounted for 40.12 million train miles and 47.5 million locomotive miles. This corresponds to an average of 1.18 locomotive units per train. Figure 60 shows the distribution of train miles by region. The majority of the train miles reported were in the West-Southwest region, with over 30 million train miles. Figure 61 illustrates the average number of locomotive units per train for each type of railroad. The highest number of locomotive units per train was 2.66 for the Regional railroads. The Regional railroads used about one more locomotive unit per train than the Local Line-hauls and about 1.5 more locomotive units per train than the Switching & Terminal railroads.

Figure 60: Train Miles By Region

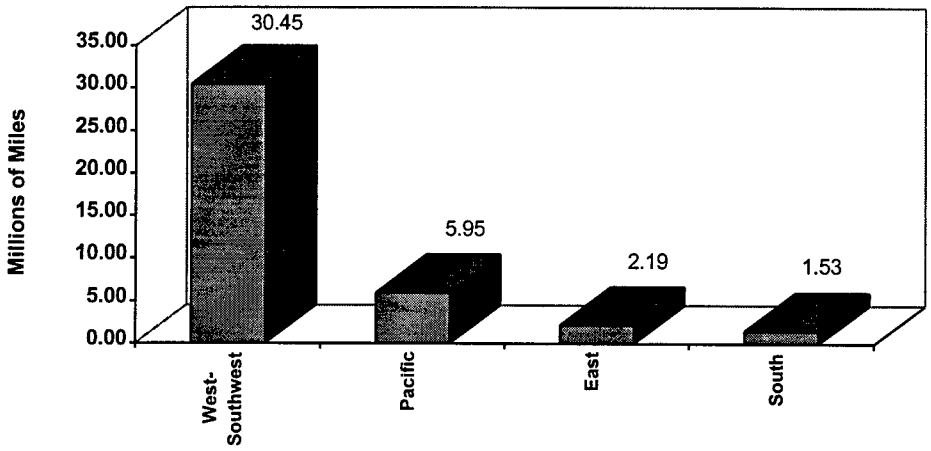


Figure 61: Locomotive Units Per Train By Railroad Type

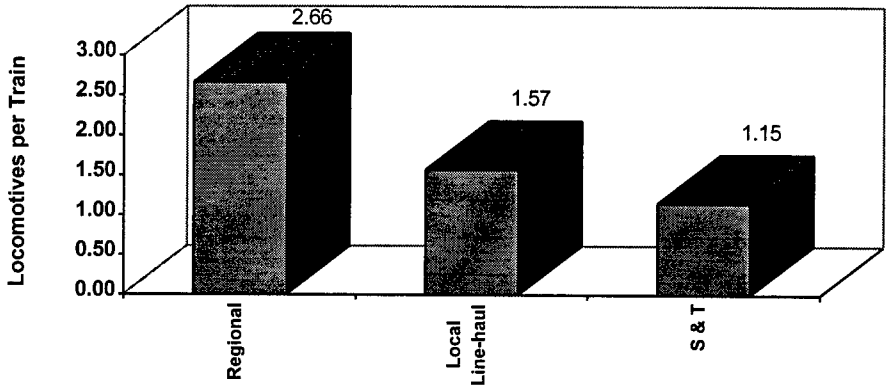


Figure 62 illustrates the average length of haul by type of railroad. Of the small railroads, the Switching & Terminal railroads have the shortest average length of haul at 13 miles, while Regional railroads have the longest average length of haul at 167 miles. The Class I railroads' average length of haul was 843 in 1995, which is more than five times the average length of haul for Regional railroads.

Figure 63 illustrates the average length of haul by region of railroad operation for the small railroads responding to the 1995 survey. The Pacific region had the longest length of haul at 61 miles.

Figure 62: Average Length Of Haul By Type Of Railroad

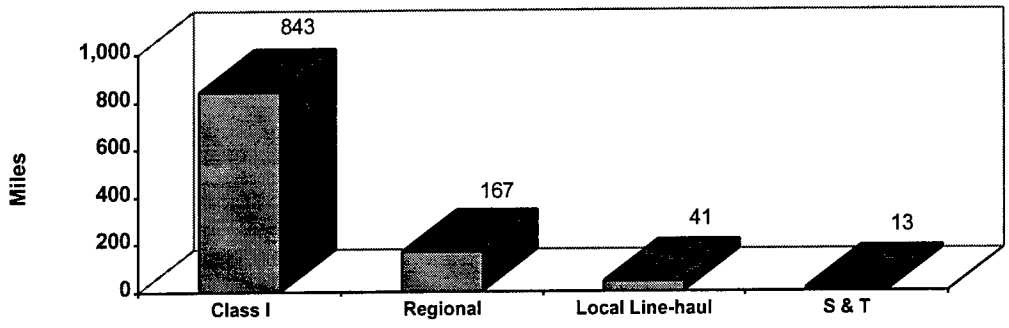


Figure 63: Average Length Of Haul By Region

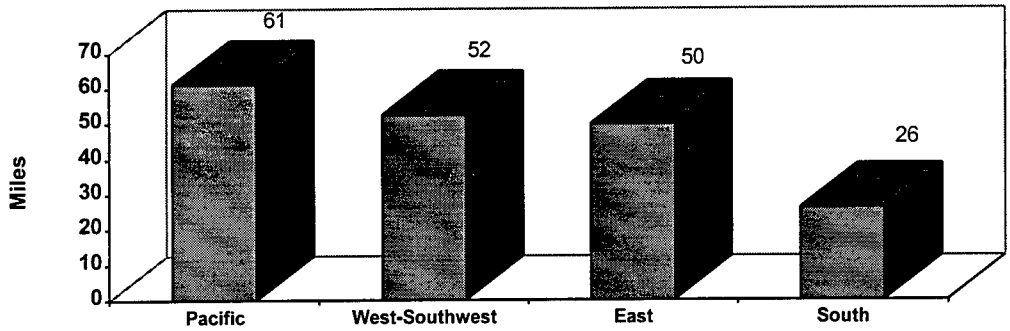


Figure 64 shows the average revenue per carload for each railroad type. The Regional railroads had the highest average revenue per carload at $465 followed by Local Line-haul railroads at $321 and Switching & Terminal at $252.

As shown in Figure 65, Switching & Terminal railroads had the highest average weight per carload, 86.5 tons. Regional railroads had the lowest average weight per carload with 84.2 tons while Local Line-haul railroads had an average weight per carload of 84.8 tons.

Figure 66 shows the average cost per gallon of diesel by region for the years 1993 through 1995. In 1995, reporting railroads consumed a total of 119.33 million gallons of diesel fuel at an average cost of $0.6797 per gallon.

Figure 64: Average Revenue Per Carload By Type Of Railroad

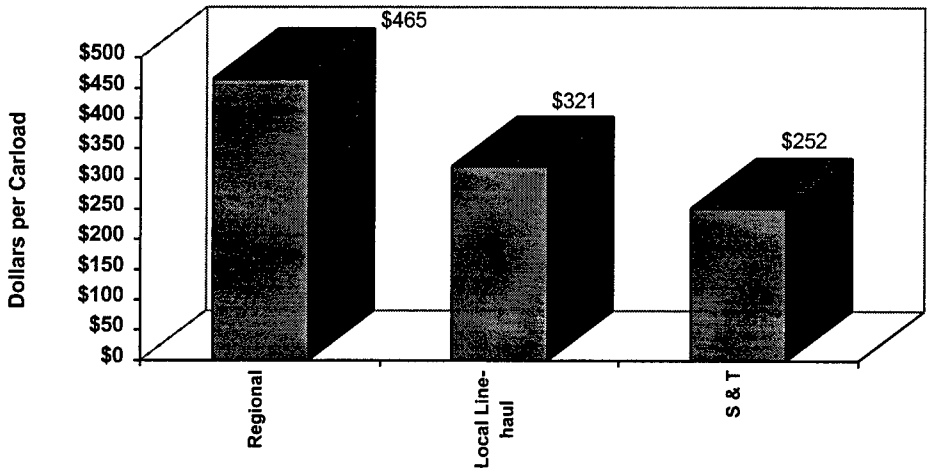


Figure 65: Average Weight Per Carload By Type Of Railroad

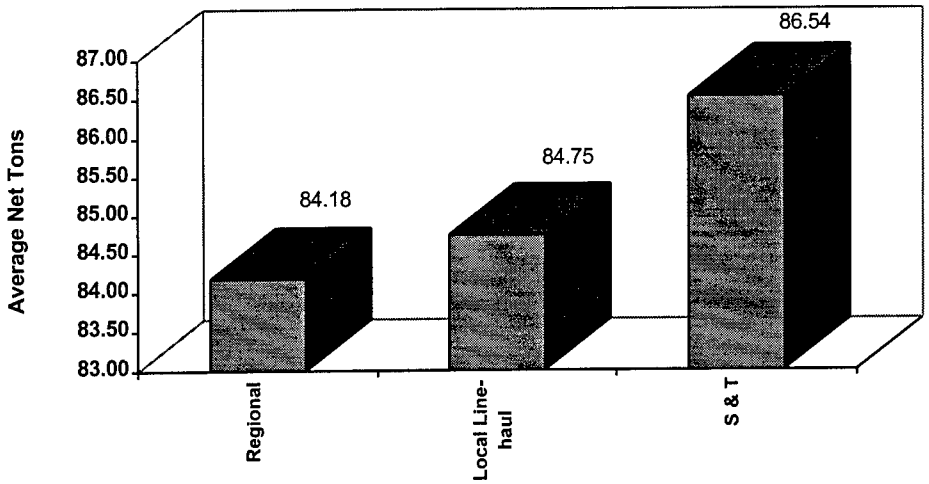
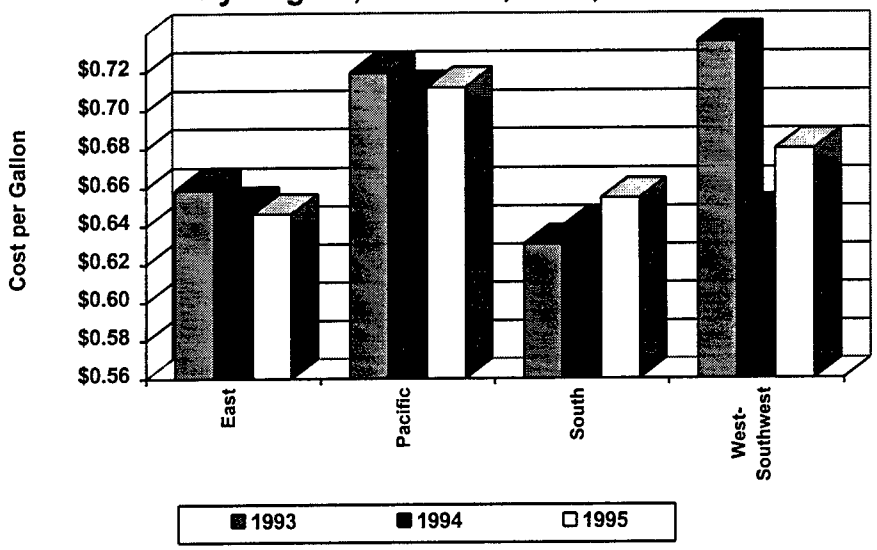


Figure 66: Average Cost Per Gallon Of Diesel Fuel By Region, For 1993, 1994, and 1995

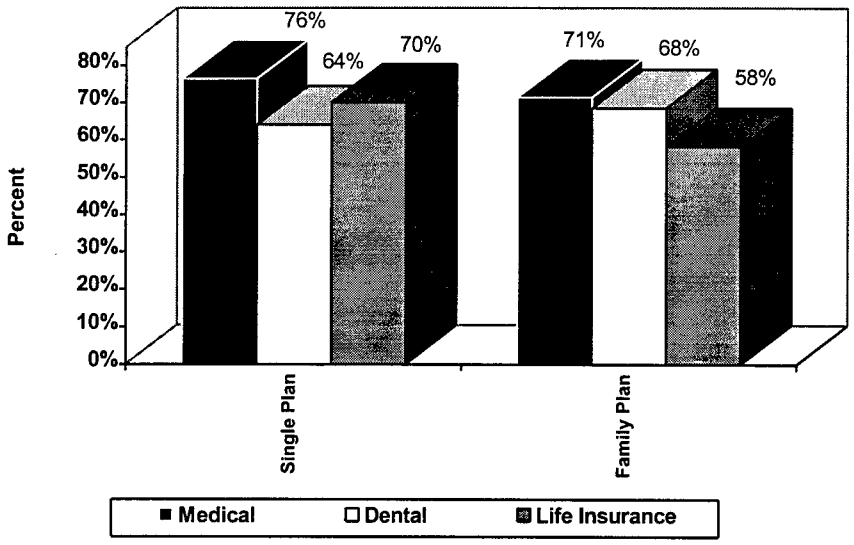


BENEFITS

This section presents a series of graphs illustrating the employee compensation benefit characteristics for the reporting railroads in 1995. The graphs represent the percentage of small railroads offering benefit plans and the percent of employee contribution towards these plans.

Figure 67 shows the percent of reporting railroads who provide benefit plans for their employees. A slightly higher percentage of railroads contribute to single plans than to family plans.

Figure 67: Percent Of Small Railroads Reporting Employee Benefit Plans



Figures 68 through 70 show the percent of small railroads reporting medical, dental, and insurance plans for each railroad type. Figure 68 shows the percent of small railroads reporting single and family medical benefits. A slightly higher percentage of small railroads reported offering single medical plans than family medical plans.

Figure 69 shows the percent of small railroads reporting dental plans by railroad type. A lower percentage of small railroads reported dental plans than medical plans for each railroad type.

Figure 70 displays the percent of small railroads reporting life insurance plans for each railroad type.

Figure 68: Percent Of Small Railroads Reporting Employee Medical Plans By Railroad Type

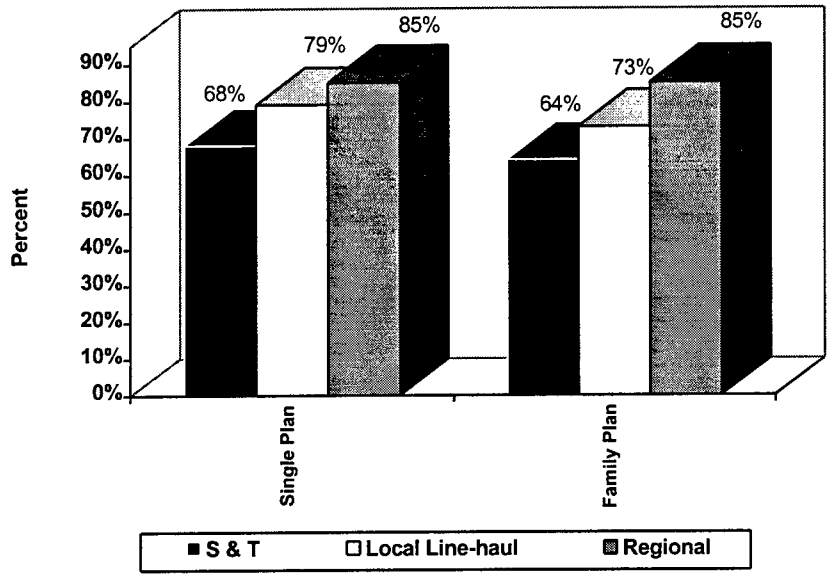


Figure 69: Percent Of Small Railroads Reporting Employee Dental Plans By Railroad Type

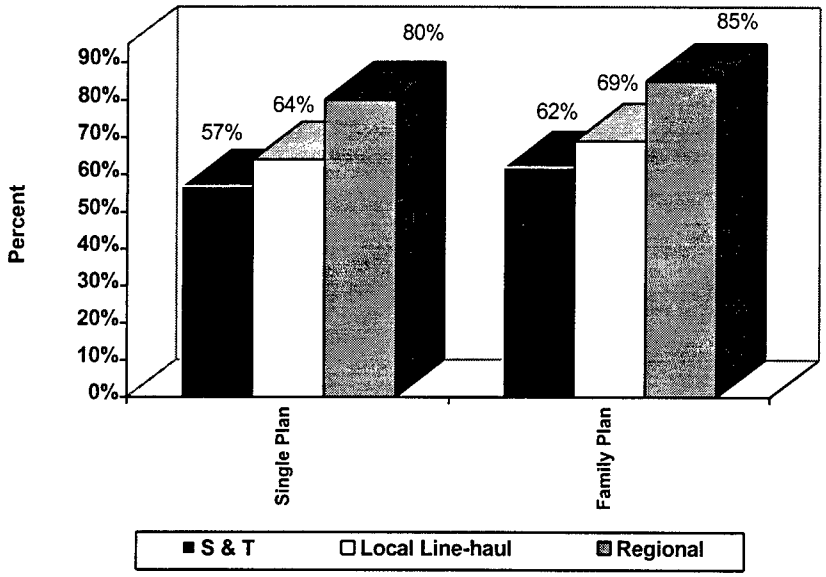
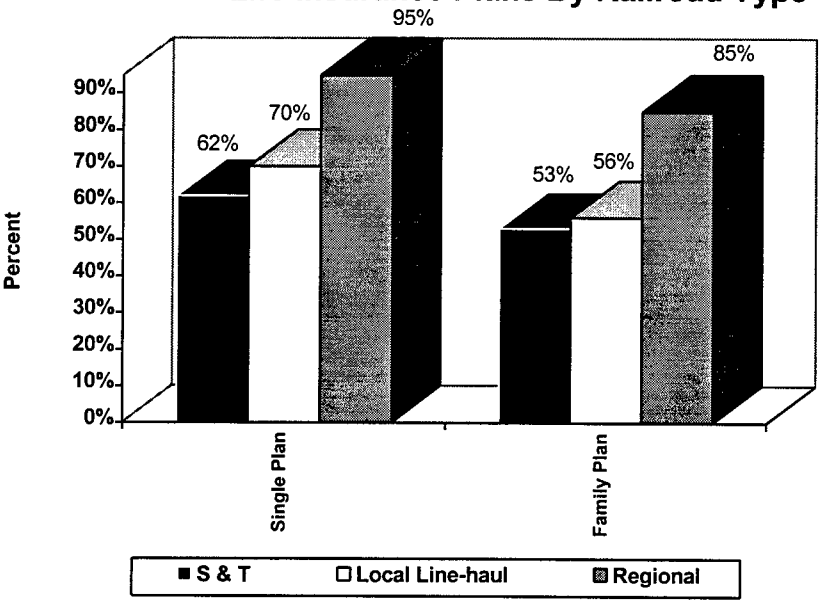


Figure 70: Percent Of Small Railroads Reporting Employee Life Insurance Plans By Railroad Type



Figures 71 through 73 show the average employer contribution to medical, dental, and life insurance plans for the three railroad types. The average employer contribution for medical, dental, and life insurance plans was over 90 percent for each of the three railroad types, except for the Switching & Terminal railroad contribution to single life insurance plans.

Figure 71: Average Employer Contribution Percentage to Medical Plans

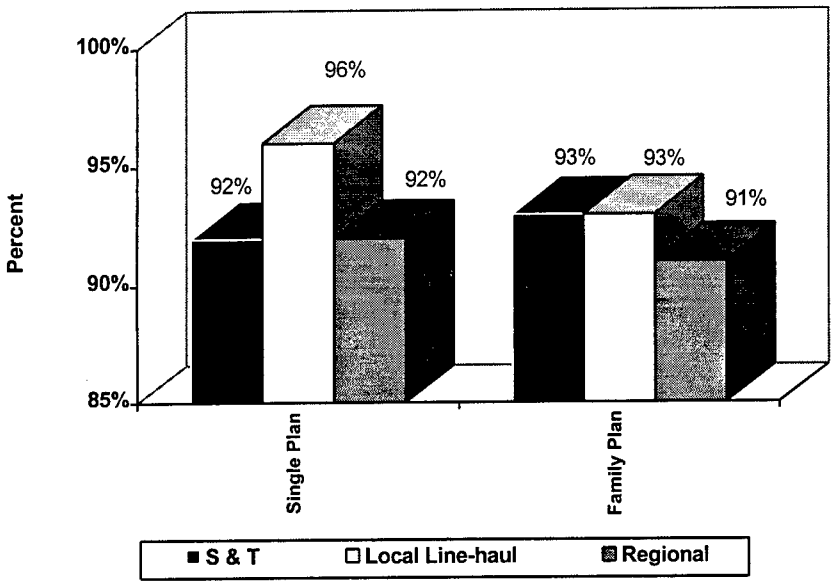


Figure 72: Average Employer Contribution Percentage To Dental Plans

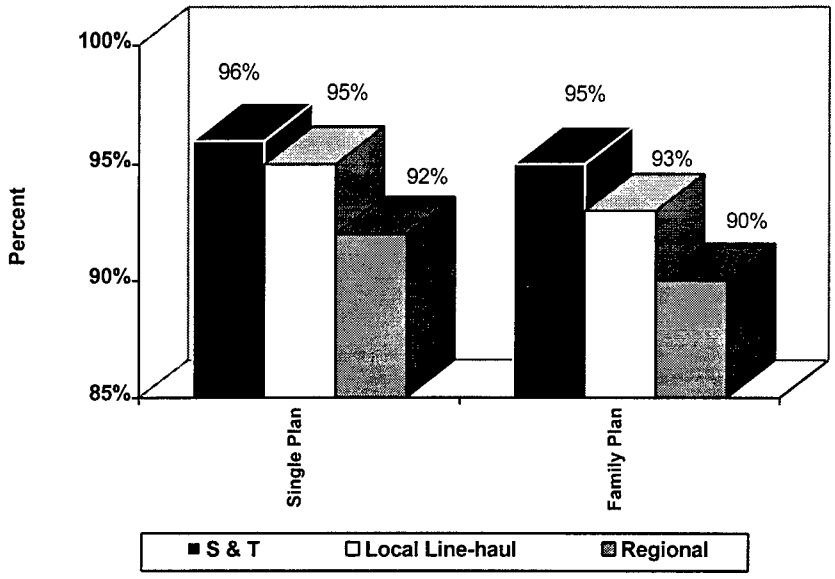
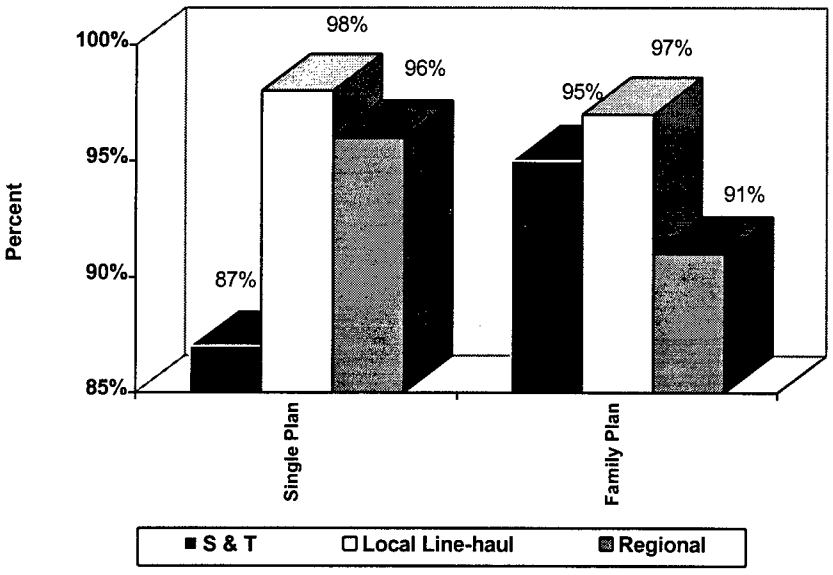


Figure 73: Average Employer Contribution Percentage To Life Insurance Plans



Computer Systems

Figure 74 compares the percentage of small railroads using different types of computer systems for 1994 and 1995. The most common computer in 1994 and 1995 was the 486 computer. There was a noticeable increase in railroads using Pentium computers, an increase from 20 percent to 44 percent from 1994 to 1995. Also noted in the graph is a decrease in use of 286 and 386 computers.

Figure 74: Types of Computers Used By Small Railroads

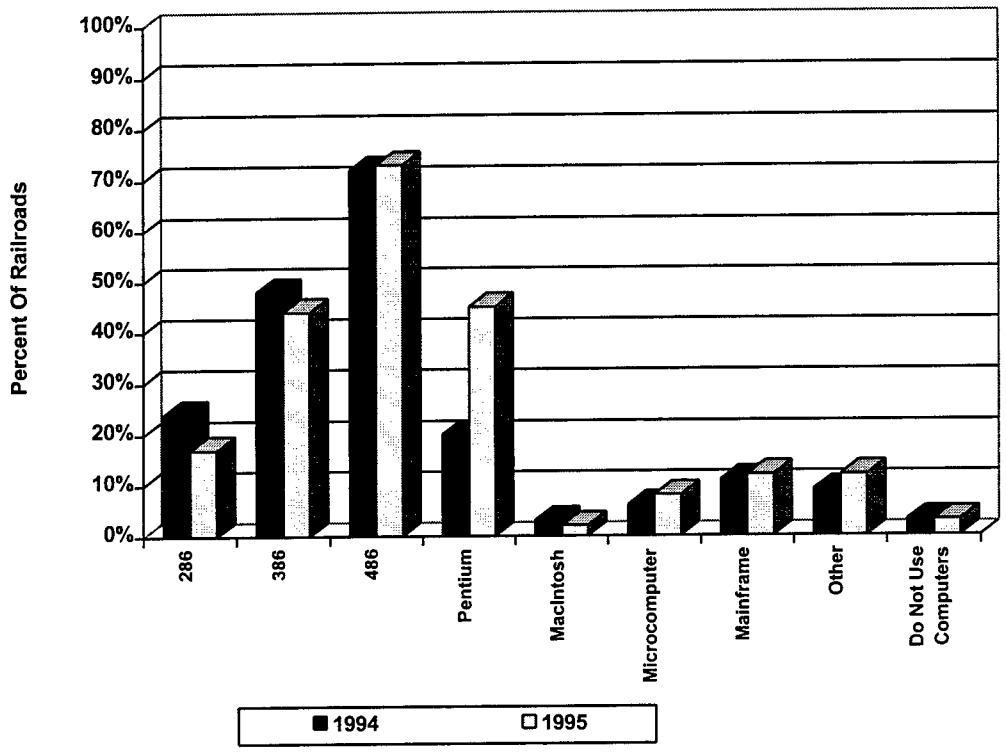


Figure 75 shows the percent of small railroads using certain types of computer applications. Electronic Data Interchange was used by 72 percent of responding small railroads in 1995. Other major applications used by small railroads included accounting/payroll, waybills, car hire, traffic statistics, and inventory control. Car orders and FRA safety reporting applications were used by less than a quarter of responding small railroads.

Figure 75: Types of Applications Used On Small Railroad Computer Systems

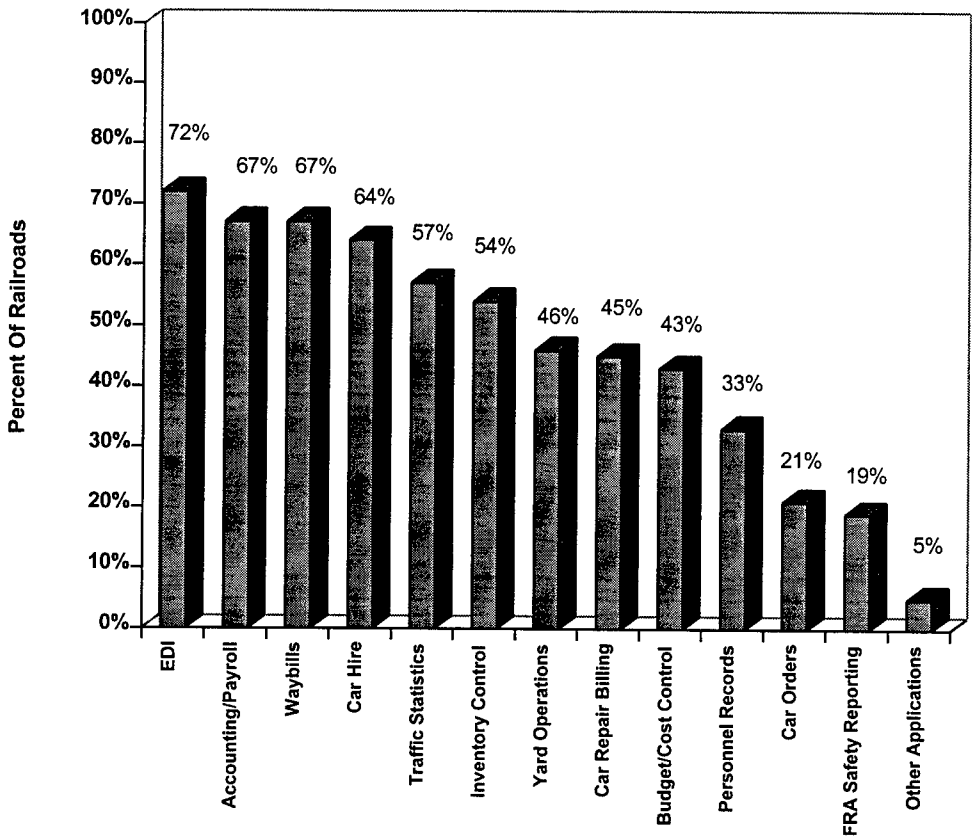
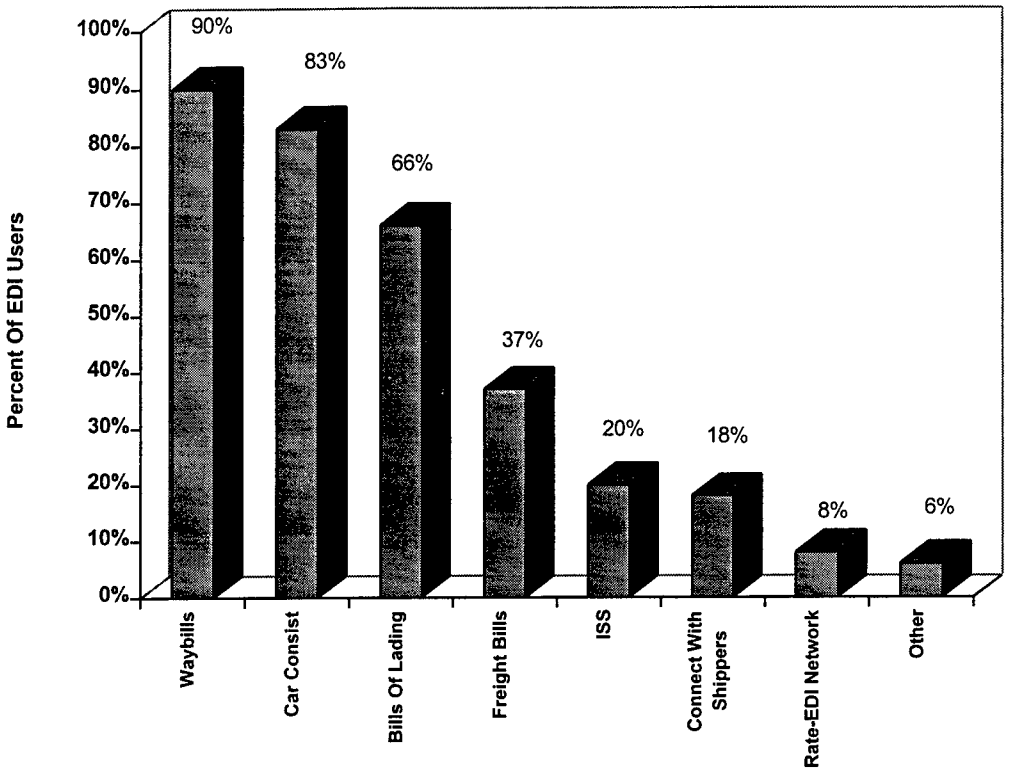


Figure 76 shows types of EDI applications used by small railroads. The values represented in the graph are taken as a percent of those small railroads reporting the use of EDI technology. Nine out of ten EDI users stated that waybills was one of the EDI functions utilized by their railroad. Car consist and bills of lading functions were also used by a majority of the railroads that use EDI functionality.

Figure 76: EDI Functions Used By Small Railroads Employing EDI



PARTICIPATING RAILROADS

Organization	Survey Contact Person
A. T. & L. Railroad Company	Linda L Price
Aberdeen Carolina & Western Railway	Sandra L. Darnell
Alaska Railroad	Robert Kooren
Alexander Railroad Co.	B.I. Zachary
Allegheny & Eastern Railroad, Inc.	John Craft
Amador Central Railroad Company	P Schueth
Angelina & Neches River Railroad Co.	David M. Perkins
Apache Railway Co.	K.A. Rank
Apalachicola Northern Railroad Co.	Mr. Gene Mccroan
Appanoose County Community Railroad Inc.	Darrel M. Morrow
Arizona & California Railroad	W. A. Frederick
Arizona Eastern Railway Company	Don Tolle
Arkansas & Missouri Railroad Company	James F. Tator
Arkansas Louisiana, & Mississippi Railroad	P Schueth
Arkansas Midland Railroad Co.	M.P. Silver
Atlantic And Gulf Railroad	K.V. Douglas
Austin And Northwestern Railroad Co.	Robert M. Frelich, Jr.
Batten Kill Railroad Company, Inc.	Ronald E. Crowd
Bauxite And Northern Railway Co.	Clifton Sheridan
Bay Line Railroad	Doug Davis
Belfast & Moosehead Lake Railroad	Jim Pepe
Bessemer & Lake Erie Railroad Company	John F. Marteeny
Birmingham Southern Railroad Company	John F. Marteeny, Director Acctg.
Brownsville & Rio Grande Int'l R.R.	L. E. Cantu
Buckingham Branch Railroad	Mark Bryant
Buffalo & Pittsburgh Railroad, Inc.	John Craft
Buffalo Southern Railroad	Bert Feasley/Jane Franz
California Northern Railroad	Thomas L. Schlosser
Canton Railroad Company	John Handley
Carolina Coastal Railway, Inc.	Jonathan R. Wasson
Carolina Piedmont Division - SCRF	Robert M. Frelich, Jr.
Carolina Rail Service, Inc.	Paul Meyer
Cedar Rapids And Iowa City Railway	Jeffrey Happel
Central Indiana & Western R.R. Company	Mark A. Brown
Central Kansas Railway	Patrick Worrall
Central Michigan Railway	William A. Salter
Central Montana Rail, Inc.	Carla R. Allen
Central Oregon And Pacific Railroad, Inc	Robert M. Frelich, Jr.
Central Railroad Co. Of Indiana	R. Scott Morgan
Champagne Railroad, Inc.	D.R. Hankins
Chesapeake And Albemarle Railroad Co.	Robert M. Frelich, Jr.
Chestnut Ridge Railway Co.	Wilbur O. Smith
Chicago Southshore & South Bend Railroad	H.T. Hearst
City Of Prineville Railway	J.L Price
Claremont Concord Railroad Corp.	Lori Barnes
Colonel's Island Railroad	Robert D. Prescott

Colorado & Wyoming Railway	Robert E. Porter
Columbia & Cowlitz Railway Company	William Ellings
Columbia Terminal Railroad	Christian Johanningmeier
Columbus And Greenville Railway Company	Roger D. Bell
Commonwealth Railway, Inc.	Jonathan R. Wasson
Connecticut Central Railroad Co., Inc.	Robert A. Bass
Cumbres & Toltec Scenic Railroad	Joe C. Vigil
Dakota Rail, Inc.	R.L. Ripley
Dakota, Minnesota & Eastern Railroad	Lynn A Anderson Vp-Marketing & Pa
Dakota, Missouri Valley & Western RR	Jeff Wood
Dallas, Garland & Northeastern Railroad	Robert M. Frelich, Jr.
Delta Valley & Southern Railway Co.	Robert H. Fuller
Duluth, Missabe & Iron Range Railway Co.	W.A. Anderson
East Camden & Highland Railroad Company	Jeff Lindsey
East Cooper And Berkeley Railroad	W.D. Mcdaniel
East Erie Commercial Railroad	Ronald D. Haise
East Jersey Railroad And Terminal Company	Joseph R. Iadanza
East Tennessee Railway, L. P.	Kieth A. Holley
Eastern Alabama Railway	Larry Nordquist
Eastern Idaho Railroad	Michael Klaus
Eastern Shore Railroad, Inc.	Larry E. Lemond, Vice President & GM
Elgin, Joliet, And Eastern Railway Co.	J. C. Franke
Everett Railroad Co.	A.W. Maples
Farmrail System, Inc.	R.S. Shaw, C.O.O
Florida Central Railroad Co.	M.P. Silver
Florida Midland Railroad Co.	M.P. Silver
Florida Northern Railroad Co.	M.P. Silver
Fordyce & Princeton Railroad Company	P Schueth
Galveston Railroad L.P.	Herb Strange
Genesee & Wyoming Railroad Company	John Craft
Georgia And Alabama Division - SCRF	Robert M. Frelich, Jr.
Georgia Northeastern Railroad Co., Inc.	Keith Douglas
Georgia Southwestern Division - SCRF	Robert M. Frelich, Jr.
Georgia Woodlands Railroad	Patrick Worrall
Gloster Southern Railroad Company	P Schueth
Golden Triangle Railroad	Patsy Gorum
Grand Canyon Railway	Robert Lacivita
Grand Rapids Eastern Railroad, Inc.	Robert M. Frelich, Jr.
Great River Railroad - Rosedale-Bolivar Co. Port Commission	David Work
Great Walton Railroad	Dave Bishop
Green Mountain Railroad Corp	J.M. Hebda
Greenville And Northern Railway	M. P. Silver
Gulf, Colorado & San Saba Railway Corp	Kathy
Hampton & Branchville Railroad Co.	Norris L. Laffitte
Hollis & Eastern Rail Road Co.	Danny Pence, Doyle Ramsey
Hoosier Southern Railroad	Gary V. Hunter
Houston Belt Terminal Railway Co.	Ed Stovall
Indiana & Ohio Central Railroad	D.M. White/D. Dawson
Indiana & Ohio Railway Company	D.M. White/D. Dawson
Indiana Harbor Belt Railroad	K.E. Braatz
Indiana Ohio Railroad, Inc.	D.M. White/D. Dawson

Indiana Rail Road Company	Sandra M. Stockman
Indiana Southern Railroad, Inc.	Robert M. Frelich, Jr.
Iowa Interstate Railroad, Ltd.	Rob Finley
Iowa Northern Railway Company	Mark A. Sabin
K.W.T. Railway, Inc.	W. E. Anderson, G. M.
Kansas Southwestern Railway	Patrick Worrall
Kiamichi Railroad Co. L. L. C.	Jim Shaffer
Kyle Railroad Company	Dan Lovelady
Lake Terminal Railroad Company	John F. Marteeny, Director Acctg.
Lancaster & Chester Railway Company	Norman Causey
Landisville Railroad	Mark Shipe
Little Rock & Western Railway L.P.	Alan Wagoner
Little Rock Port Railroad	Willa Pinkerton
Longview, Portland & Northern Railway Co	Sandra Jarmain
LTV Subsidiary Railroad Companies	William Kuhn
Madison Railroad	Cathy Hale
Manufacturers Railway Co.	Randall J. Weitzel
Maryland And Pennsylvania Railroad Company	G. Robert Gotwols
Maryland Midland Railway	David W. Bordner
McKeesport Connecting Railroad Company	John F. Marteeny, Director Acctg.
Meridian & Bigbee Railroad Co	Keith Logan
Michigan Shore Railroad, Inc.	Robert M. Frelich, Jr.
Mid-Michigan Railroad, Inc.	Robert M. Frelich, Jr.
Mississippi & Skuna Valley Railroad	E.L. (Pete) Stiles
Mississippi Export Railroad Company	M. W. Bagwell
Missouri And Northern Arkansas Railroad	Robert M. Frelich, Jr.
Modesto & Empire Traction Co	Tom L. Nielsen
Mohawk, Adirondack & Northern RR	Peter Gores
Montana Rail Link	Ollie Munier
Moscow, Camden & San Augustine	Doyle Chandler
Mt. Hood Railroad Co.	Dan Reynolds
New England Central Railroad, Inc.	Robert M. Frelich, Jr.
New Hampshire North Coast Corporation	Robert S. Fennerty
New Orleans & Lower Coast Railroad, Inc.	Robert M. Frelich, Jr.
New York, Susquehanna & Western Railway	Mr. Robert Pierce
Norfolk And Portsmouth Belt Line	J. M. Donnelly
North Carolina & Virginia Railroad, Inc.	Robert M. Frelich, Jr.
Northeast Kansas & Missouri Div. - MMRR	Robert M. Frelich, Jr.
Old Augusta Railroad	P Schueth
Ontario Central RR	Don R. Brown
Otter Tail Valley Railroad	William Roufs
Paducah & Louisville Railway, Inc.	Terry B. Outland
Panhandle Northern RR	Patrick Worrall
Patapsco And Back Rivers Railroad Co.	Matthew Smith
Pend Orielle Valley Railroad	Cliff Robbins
Peoria And Pekin Union Ry Co.	Jack B. Reeser
Phila. Bethlehem And New England RR Co.	Matthew Smith
Point Comfort & Northern Railway	David Besio
Port Bienville Railroad	Robert Tomb
Port Jersey Railroad Company	Robert Bailey
Port Royal Railroad	W.D. Mcdaniel

Port Terminal Railroad	W.D. Mcdaniel
Port Utilities Commission	W.D. Mcdaniel
Railroad Switching Service Of Missouri	Jeffery C. Woods
Rarus Railway Company	W.T. Mccarthy
Red River Valley And Western RR	Daniel L. Zink
Rochester & Southern Railroad Inc.	John Craft
Rockdale Sandow & Southern RR	Kathy C. Johnston
Sabine River & Northern	David Kleinknecht
Salt Lake City Southern Railroad Co.	Robert M. Frelich, Jr.
Salt Lake Garfield & Western	Don Hogle
San Diego & Imperial Valley Railroad	Robert M. Frelich, Jr.
San Joaquin Valley Railroad Co.	Fred L. Krebs/General Manager
San Manuel Arizona Railroad Co.	Jan Peoble
Santa Maria Valley Railroad Company	Sue J. Sword
Semo Port Railroad	Dav Overby
Sheffield Station Junction Railway	D.J. Roberts
Shenandoah Valley Railroad	Mark Bryant
South Buffalo Railway Company	Matthew Smith
South Carolina Central Railroad, Inc.	Robert M. Frelich, Jr.
South Central Florida Express, Inc.	Sally Conley
South Central Tennessee Railroad	Dale Burlison
St Lawrence & Atlantic Railroad Co.	Charles D. Hunter
St. Maries River Railroad	Gerald Allen
St. Marys Railroad Company	G.L. Allen
Steelton And Highspire Railroad Co.	Matthew Smith
SWKR Operating Company, Inc. DBD San Pedro & Southwestern	Tanya Cooley
Tacoma Municipal Belt Line	Barb Johnston/ Admin. Secretary
Tennessee Southern Railroad Co., Inc.	Tony Brunson
Tennken Railroad Co., Inc.	Henry G. Hohorst
Texas And New Mexico Division - AUNW	Robert M. Frelich, Jr.
Texas And Northern Railway	John W. Wallace
Texas Mexican Railway Company	Zaragoza Solis, Iii, V-P F&C
Texas North Western Railway Co.	Mike Wilborn
Texas Northeastern Division - MMRR	Robert M. Frelich, Jr.
Texas South - Eastern Railroad	Mike Smith
Tomahawk Railway, Limited Partnership	Susan Klinger
Tulsa - Sapulpa Union Railway Co., L.L.C.	Russel Crosby
Turtle Creek Industrial Railroad Inc.	Wayne Norris
Twin Cities & Western Railroad	Craig Glaeser
Union Railroad Company	John F. Marteeny, Director Acctg.
Utah Railway Company	Harry Swensen
Valdosta Railway, L. P.	Ed Clark
Ventura County Railway Company	Carmen S. Crandall
Virginia Southern Division - NCVA	Robert M. Frelich, Jr.
Warren & Saline River	T.N. York, Jr.
Washington Central Railroad Co.	Todd Leinbach
WCTU Railrway Company	John M. Kieras
West Tennessee Railroad Corp	Henry G. Hohorst
Western Kentucky Railway, L.L.C.	Mike Wheatley
Western Plant Services Inc	Robert F. Schuette
Wichita Tillman & Jackson Railway Co.	Stephanie Corrigan

Willamette Valley Railway Co.	David P. Root
Winchester & Western Railroad	P.M. Williams
Wisconsin Central Limited	Walter C. Kelly
Yorkrail, Inc.	G. Robert Gotwols

Appendix B:

1995 Selected Survey Totals

PART I. RAILROAD AND CUSTOMER PROFILE

Railroad Profile

Railroad Name **Survey Totals - 209 Railroads** **Note: Not all railroads completed every data item.**

Railroad Type (Regional/Local - Line-haul/S&T) **20 Regionals, 141 Local-Line-haul, 48 S&T**

Name of Principal Owner _____

Survey Contact Person _____

Year established as a Short Line _____

Region _____

Customer Profile

Total Number of Customers Served **7,958**

Number of Customers Served by Commodity Group

Commodity Group	
Coal	**172**
Farm Products	**1,424**
Chemicals and Allied Products	**1,499**
Food and Kindred Products	**956**
Non-metallic Minerals	**341**
Transportation Equipment	**353**
Lumber and Wood Products	**1,219**
Pulp, Paper and Allied Products	**772**
Petroleum/Coke Products	**354**
Stone, Clay and Glass Products	**417**
Metallic Ores	**74**
Primary Metal Products	**572**
Waste and Scrap Material	**672**
Other (Please list commodities below)	
Please list the Other Commodities	**978**

PART II. INVENTORY OF ROADWAY, TRACK, AND STRUCTURES

Miles of Road Owned and Operated, by State			
State	Total Route Miles Owned	Route Miles Owned with 90 Pound Rail or Greater	Total Route Miles Operated under Trackage Rights
	20,356	**15,887**	**3,953**

Miles of Road, By FRA Track Class	
Class	Miles of Road
1	**3,806**
2	**8,189**
3	**5,595**
4	**1,814**
Excepted	**2,486**

Number of Bridges

- Concrete **1,194**
- Steel **2,960**
- Wood **5,194**
- Combination **1,235**

Ties Laid in Replacement

- New ties **1,184,293**
- Used ties **336,213**

Rails Laid in Replacement (in Track feet)

- 90 Pounds or Greater - track feet **1,038,810**
- Less than 90 Pounds - track feet **170,138**

Rail laid in new lines, extensions, or sidings (in Track feet)

- 90 Pounds or Greater - track feet **114,817**
- Less than 90 Pounds - track feet **2,620**

Number of Highway Grade Crossings

- Public **20,021**
- Private **12,365**
- Equipped with Automatic Warning Devices **6,310**

Grade Crossing Improvements

- New Automatic Warning Devices Installed **194**
- Automatic Warning Devices Improved **241**
- Number of Grade Crossings Resurfaced **769**

Intermodal Terminal Facilities

- Number of Facilities **38**
- Type of Facilities:
  - Number of Circus Ramps **16**
  - Number of Top Pickup **30**
  - Number of Bottom Pickup **17**

Transloading Facilities

- Number of Facilities **260**
- Type of Facilities:
  - Number of Rail to Truck **204**
  - Number of Truck to Rail **183**
  - Number of Rail to Water **39**
  - Number of Water to Rail **38**

PART III. EQUIPMENT INVENTORY

Freight Cars Owned and Leased					
Car Type	Total Units Owned	Total Units Leased	Units <10 Years Old	Units 10-20 Years Old	Units >20 Years Old
Box Cars	**5,239**	**15,949**	**984**	**11,178**	**7102**
Gondolas	**6,502**	**4,361**	**550**	**3,414**	**6,678**
Covered Hoppers	**3,167**	**6,798**	**2,229**	**3,717**	**2,972**
Open Top Hoppers	**11,091**	**3,368**	**80**	**3,269**	**11,024**
Flat Cars	**3,474**	**2,608**	**255**	**1,190**	**4,525**
All Others	**1,560**	**813**	**50**	**70**	**1,601**

Locomotives Owned And Leased, by Age and Horsepower					
Locomotive Type	Total Units Owned	Total Units Leased	Units <10 Years Old	Units 10-20 Years Old	Units >20 Years Old
Less than 1,500 HP	**442**	**38**	**4**	**28**	**331**
1,500 - 3,000 HP	**1,046**	**385**	**9**	**185**	**1,058**
Greater than 3,000 HP	**213**	**23**	**8**	**21**	**207**

PART IV. ANNUAL OPERATING STATISTICS

Carloads Handled by Commodity Code					
STCC	Commodity Code	Carloads Originated and Terminated on-line (local)	Interline Carloads Originated	Interline Carloads Terminated	Bridge Carloads
11	Coal	**175,091**	**212,070**	**322,867**	**40,567**
01	Farm Products	**69,587**	**167,670**	**84,495**	**114,866**
28	Chemicals and Allied products	**45,317**	**94,595**	**103,485**	**34,632**
20	Food and Kindred products	**85,745**	**102,920**	**51,412**	**59,029**
14	Non-metallic Minerals	**86,762**	**61,361**	**24,515**	**14,854**
37	Transportation Equipment	**16,147**	**39,593**	**20,348**	**183,039**
24	Lumber and Wood products	**72,287**	**94,296**	**74,403**	**48,359**
26	Pulp, Paper and Allied products	**53,395**	**128,691**	**87,203**	**64,666**
29	Petroleum products	**100,516**	**157,477**	**116,111**	**17,456**
32	Stone, Clay, and Glass products	**43,102**	**64,555**	**66,403**	**36,151**
10	Metallic ores	**538,773**	**116,116**	**82,016**	**59,235**
33	Primary Metal products	**280,598**	**246,231**	**80,785**	**21,488**
40	Waste and Scrap Material	**108,925**	**61,227**	**74,180**	**19,594**
	Other	**76,231**	**107,187**	**111,791**	**99,646**

Of the carloads listed in the table above, how many moved with hazardous materials commodity code (STCC 49)? **250,997**

If you ship intermodally, how many trailers or containers did you ship? Trailers **89,871**
Containers **193,178**

Annual Line-Haul Operating Statistics

Train Miles	**40,119,928**
Yard Miles	**3,961,644**
Locomotive Miles	**47,475,063**
Average Length of Haul	**42.95**
Average Revenue per Carload	**$ 323.36**
Average Weight per Carload	**85.11**
Revenue Ton-Miles	**34,290,000,000**

What End of Train Devices do you employ in Road Train Service?

❑ Caboose	❑ One-Way End of Train Device	❑ Two-Way End of Train Device (Telemetry)
18	**58**	**27**

❑ Other
39

Annual Fuel Consumption

Total Gallons of Locomotive Diesel Fuel Consumed	**119,326,056**
Average Cost per Gallon ($)	**$ 0.7418**

PART V. FINANCIAL DATA

Note: If no money has been expended for a category, enter 0.

Items From Income Statement

Gross Railway Operating Revenue		
Freight	**$ 1,126,000,000**	
Other	**$ 167,363,636**	
Total: Gross Railway Operating Revenue		**$ 1,294,000,000**
Railway Operating Expenses		
Way and Structures		
Way	**$ 72,778,488**	
Bridges	**$ 4,118,806**	
Facilities	**$ 13,803,632**	
Other	**$ 23,600,760**	
Total: Way and Structures		**$ 178,571,093**
Equipment		
Freight Cars	**$ 49,340,853**	
Locomotives	**$ 57,086,758**	
Maintenance of Way	**$ 4,178,879**	
Other	**$ 16,891,508**	
Total: Equipment		**$ 222,291,665**
Transportation	**$ 342,791,072**	
General & Admin.	**$ 169,164,043**	
Other	**$ 100,815,064**	
Total: Railway Operating Expenses		**$ 1,023,000,000**
Net Railway Operating Income		**$ 248,881,612**

Capital Expenditures

Road	**$ 19,819,919**
Equipment	**$ 11,966,010**
Other	**$ 11,040,327**

Items From Balance Sheet

Current Assets	**$ 634,415,503**	
Current Liabilities	**$ 446,427,313**	
Net Working Capital		**$ 161,796,444**
State and Federal Grants/Loans		**$ 34,612,431**
Total Assets		**$ 2,129,000,000**
Long-Term Debt (Non-Current Liabilities)		**$ 878,528,442**
Stockholders Equity		**$ 638,914,922**

Application of Funds

Capital Expenditures	**$ 118,884,051**
Depreciation/Amortization and Retirement	**$ 304,187,101**
Other Expense	**$ 506,416,114**

Projected Capital Investment for Next Five-Year Period (1996-2000)

Note: If no money has been expended for a category, enter 0.

	Projected Five-Year Investment	Percentage Funded Internally from Cash Flow
Equipment		
Locomotive	**$ 60,333,788**	**83 %**
Rolling Stock	**$ 69,329,597**	**84 %**
Road		
Track	**$ 357,107,604**	**83 %**
Structures	**$ 45,914,695**	**88 %**
Other		
Other	**$ 101,651,028**	**94 %**

PART VI. EMPLOYEE AND BENEFIT DATA

Employee Data

Total Employees (average mid-month count for 1995)

Supervisory	**2,142**
Non-Supervisory	**11,364**

Total Annual Compensation Paid

Supervisory	**$ 95,809,391**
Non-Supervisory	**$ 351,123,593**

Number of Employees Covered by Labor Agreement **7,196**

Total Man-Hours Worked **26,438,808**

Benefit Plans

Does your company provide health and insurance plans? ❑ Yes ❑ No **186**

If yes, please answer the following questions.

What is the percentage of the Employer contribution for the following health and insurance plans?
(ie., 100%,75%,etc.)

	Single	Family
Medical	**93.05 %**	**84.09 %**
Dental	**80.29 %**	**76.28 %**
Life Insurance	**86.18 %**	**71.87 %**

Does your company provide a 401(k) pension plan? ❑ Yes ❑ No **116**

Does your company also contribute to the employee 401(k) pension plan? ❑ Yes ❑ No **73**

Does your company provide a defined pension plan? ❑ Yes ❑ No **47**

Please list any other pension plans except Railroad Retirement. **33**

Total annual cost of health/pension/benefit plans **$ 90,129,588**

PART VII. PASSENGER SERVICES

Is passenger or excursion train service operated over your track? ❑ Yes ❑ No **29**

Type of services

Seasonal excursion	❑ Yes ❑ No	**21**
Dinner train	❑ Yes ❑ No	**5**
Other	❑ Yes ❑ No	**12**

Annual Revenues from Services **$ 15,299,064**

Total (Annual) Number of Revenue Passengers **815,236**

PART VIII. COMPUTER SYSTEMS AND APPLICATIONS

Computer Systems

Please indicate the types of computers used by your railroad.

❑	286	**34**	❑	Minicomputer	**16**
❑	386	**90**	❑	Mainframe	**25**
❑	486	**149**	❑	Other _____	**20**
❑	Pentium	**91**	❑	Do Not Use Computers	**6**
❑	MacIntosh	**5**			

What personal computer operating systems do you use?

148	❑	DOS	❑	Unix	**5**
142	❑	Windows 3.0/3.1	❑	Apple	**5**
36	❑	Windows 95	❑	Other _____	**4**
3	❑	OS/2			

Do your computers have any of the following?

118	❑	Fax/Modem	**69**	❑	CD-ROM

Does your railroad connect your computers through a local area network? ❑ Yes ❑ No **81**

Does your railroad subscribe to an online service?

32	❑	CompuServe	❑	Prodigy	**3**
17	❑	Internet	❑	Other _____	**17**

Computer Applications

What applications are performed by your computer system?

147	❑	EDI	❑	Car Orders	**42**
110	❑	Inventory Control	❑	Car Hire	**130**
137	❑	Accounting/Payroll	❑	Yard Operations	**94**
136	❑	Waybills	❑	Traffic Statistics	**116**
92	❑	Car Repair Billing	❑	Budget/Cost Control	**87**
68	❑	Personnel Records	❑	Other _____	**7**
38	❑	FRA Safety Reporting			

What EDI functions does your railroad use?

97	❑	Bills of Lading (404)	❑	Connect with Shippers	**27**
55	❑	Freight Bills (410)	❑	Rate-EDI Network (REN)	**12**
132	❑	Waybills (417)	❑	Other _____	**7**
122	❑	Car Consist (418)	❑	Do Not Use EDI	
29	❑	ISS			

Does your railroad develop its own computer programs and applications? ❑ Yes ❑ No **80**

Please list any areas into which your railroad plans to expand its computer applications. **42**

Appendix C:

1996 Dentry 3.0 User's Guide

Chapter 1 - Getting Started

This chapter explains how to install and start the Dentry on your system.

Before You Begin

Before installing Dentry, you must have an IBM compatible computer with a 486 or better processor, Microsoft Windows version 3.0 or higher, Windows for Workgroups, or Windows95, a 3.5" floppy drive, a mouse, and a VGA or super VGA monitor. You will also need to have 5MB to 11MB of free disk space on your hard drive in order to install Dentry on your computer.

Installing Dentry

1. To install Dentry, insert program disk #1 into the appropriate floppy drive. Please close all applications before you begin installing Dentry.
2. In the program manager, select ***file*** menu, and select ***run*** command from that menu.
3. In the ***run*** dialogue box type:
   a:\setup
   (if the disk drive is A:)
   b:\setup
   (if the disk drive is B)

*[**WARNING:** When the installation procedure prompts you for a directory to install the program to, **DO NOT CHANGE IT FROM C:\DENTRY3!!** The program will not work correctly if it is installed in another directory.]*

Installing 1995 Data

If you sent in a survey response for the 1995 data profile, you will receive a fifth disk in the mail. On this disk will be one file, ***slrd95.mdb***. This file should be copied to ***c:\dentry3***.

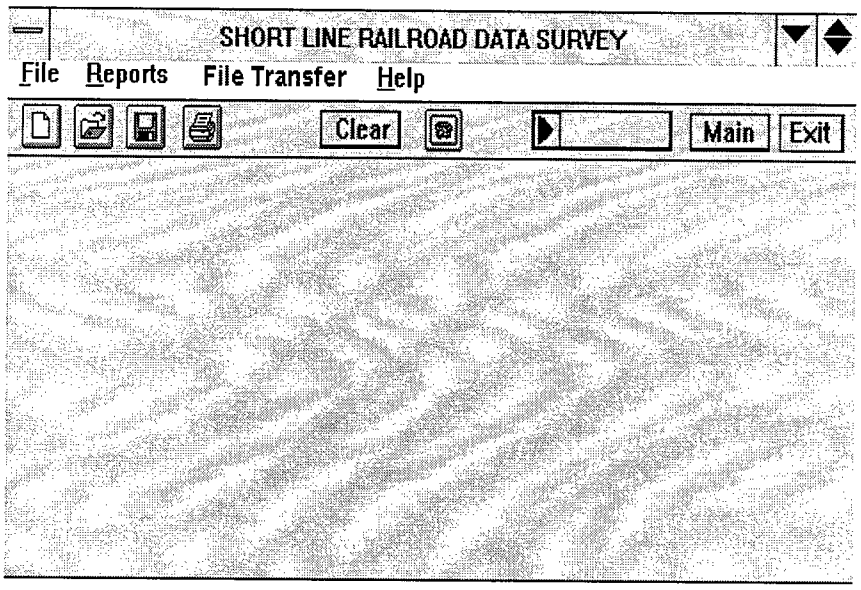
1. To install the 1995 data, insert the database disk into the appropriate floppy drive.
2. In the file manager, select ***file*** menu, and select ***copy*** command from that menu.
   If you are using Windows95, you can use the Windows Explorer to copy the file.
3. In the ***copy from*** dialogue box type:
   a:*.*
(if the disk drive is A:)
   b:*.*
(if the disk drive is B)
4. In the ***copy to*** dialogue box type:
   c:\dentry3
5. Then click on OK with the mouse.

Dentry will now allow you to view and print 1995 data. If you did not respond to the 1995 data survey, the 1995 data option in the program will not function.

Starting Dentry

Once the program is installed, you will need to start the program using one of several options.

1. If you are using Windows 3.0 or 3.1, you can use the ***File Run*** menu command in program manager. In the text box labeled Command Line, type: **c:\dentry3\dentry3.exe** - then click OK. The program should start if the installation process was successful.
2. File Manager can be used if you are using Windows 3.0 or 3.1 or Windows95. First, find the File Manager icon and click on it. Look for a directory folder called **dentry3** on the c: drive. Double-click on the **dentry3** folder to open it. In the list box on the right there should be a file called **dentry3**. Click on this file to run the program.
3. If you are using Windows95, the Windows Explorer can be used to start the program. Go to Start, then to Programs. The Windows Explorer folder should be located here. Once you find it, click on it. Look for the **dentry3** directory on the c: drive. Click on this folder to open it. In the list box on the right you should find a file called **dentry3**. Click on this to start the program.
4. If you are familiar with the Windows environment, you can create your own program group or shortcut to the program.



(Dentry's Main Window)
the Menu bar appears just below the title bar.
the Tool bar appears just below the Menu bar.

The Menu Bar

Each option in the Menu bar calls up a drop down menu of commands that you can use to create, modify, save, and print the database.

File This menu includes the commands to create a new record, open and close an existing one, save a record, and save the record to a different drive. The exit command exits the Dentry program. These commands can be enabled either using a mouse click or a keyboard stroke. The keyboard strokes are activated with a ALT and the underlined letter in the file menu.

Reports The report menu allows you to print the entire survey or just a section of the survey. If you responded to the 1995 survey, and have properly installed the 1995 data, the option to print the 1995 data response will also be available.

File Transfer This menu allows you to transfer completed surveys to us through a modem.

About Displays information about your copy of Dentry, including the version number.

The Toolbar

Command buttons exist on the toolbar for some of the more commonly used functions of Dentry. Each command button displays a graphic that visually describes the command. You can activate the toolbar commands by clicking on the center of the appropriate button one time with the left mouse button. After running the program, you will notice that certain commands are not always available. When they are not available to the user, they will either be invisible or they will have a dimmed appearance and will not function when pressed.

The buttons on the button bar perform the following functions:

New Record:

A new, blank record is created by a click on this button. A new record must be created for each railroad you are filling out a survey for.

Open Existing Record:

Clicking on this button opens an existing record. A dialogue box will appear showing the list of existing records you can choose from to view or edit. You can select a particular record by double clicking on the corresponding railroad name in the list.

Save:

Saves changes made to the current record onto the database in the c:\dentry2 directory.

Print:

To print a hard copy of the survey or parts of the survey, click on this button. When clicked, a dialogue box prompts the user to select a survey. Then you can choose whether you want to print a specific section of the survey or print the entire survey by clicking on the corresponding button. To exit from print, click on the ***exit*** button at the bottom.

File Transfer:

To transfer all of the surveys you have completed to us electronically, click on this button. You will be requested to fill in some information about your modem, and then be able to dial into our server. Once connected with our server, the rest of the file transfer process is automatic.

Clear:

Clears the fields in the current form.

Scrollbar:

Allows the user to scroll through the various pages of the survey (the quickest way to move through the survey).

Main:

Brings you back to the main survey page.

Exit:

Exits the Dentry program.

1995 Button:

Displays the 1995 data for the current form, if available. When the 1995 data is displayed, a 1996 button appears. The 1996 button brings back the 1996 information. This allows you to make changes to the 1995 data, and save them to the 1996 survey. Remember, the changes made to the data in the form are not permanent until you use the save command button, or File Save menu.

Chapter 3 - Filling Out Parts of the Survey

Please fill out the survey as accurately as possible. If you leave a question blank, it is assumed that information is not available. If your response is 0, please fill in the corresponding text box with a 0. At any stage you can clear all the fields of the current form using the ***clear*** button. No changes to the survey are permanent until the ***save*** button or the ***save menu*** command are used.

Moving Around the Survey

There are several ways you can move between the fields and pages of Dentry. After you enter data in one field, you can use the ***Tab*** key or the ***Enter*** key to continue to the next field. If you want to go to a previous field, hold the ***shift*** button down while pressing the ***tab*** button. To go to the next survey page, click the left mouse button while the pointer is over the right arrow of the scrollbar. To go to the previous survey page, click the left mouse button while the pointer is over the left arrow of the scrollbar. To move more than one page at a time, click and hold the left mouse button on the slider box between the arrows and slide it either left or right.

Main Page

The main page contains general information about the railroad and the connections to the various pages or various parts of Dentry.

Railroad Name: Enter the Railroad name (enter Alphanumeric Characters).

Name of the Principal Owner: Enter the name of the principal owner (Enter Alpha numeric characters).

Survey Contact Person: Person to be contacted regarding survey.

Year Established as a Short Line: Enter any years between 1850 - 1996 (when your railroad became classified as a short-line railroad) or enter a 0 if unknown.

Railroad Type: Enter Railroad type (Select from a list of types).

Railroad Region: Enter Region of Railroad Operation (Select from a list of ASLRA designated regions).

To continue after filling out the entire main page, either choose from one of the section titled option boxes, or use the scroll bar to move through the pages.

The following section briefly describes the types of information requested in each section of the survey:

Customer Profile

Provide information on the types of customers served in 1996.

Road and Track Inventory

Provide information on the amount of road & track owned and operated by state. Any two letter state abbreviation is accepted in the state fields and illegal entries are not accepted. In all other fields the numeric values entered are rounded off to two decimal places.

Structures

Provide information pertaining to track and structures.

All the fields accept integer values.

Intermodal Transloading Facilities

Provide information on the number and types of intermodal and transloading facilities.

All the fields accept integer values.

Equipment Inventory

Provide information on train equipment owned or leased.

All the fields accept integer values.

Annual Operating Statistics

Provide information on different types of commodities shipped.

All fields in the Annual Operating Statistics section are rounded off to the nearest integer value.

Financial Data

Provide auxiliary, base, and future financial information.

All fields in the Financial Data section accept real values.

Employee Benefit Data

Provide information about employees, annual compensation paid, benefit plans, pension plans, insurance plans, etc.

Passenger Services

Provide information about the kind of passenger services provided over your track and check in appropriate boxes.

Computer Systems

Provide information on the various computer systems and applications utilized. Check the appropriate boxes to provide information about the computers, and the computer related information that are used by your railroad.

Comments and Recommendations

Provide any comments or suggestions about the survey or program, if you have any.

Chapter 4 - Printing

To print the survey, click on the ***print*** button on the toolbar, or click ***Report***, then ***Print*** from the ***file*** menu. A dialog box will appear displaying three command buttons. If you wish to print the 1995 survey, click the ***Print 1995 Survey*** button. If you want to print the 1996 survey, click the ***Print 1996 Survey*** button. If you want to cancel the print operation, click on the ***Cancel*** button.

If you choose to print either the 1995 or 1996 survey, a list of the different railroad records you can print will appear on a new form. Double-click on a railroad to print that railroad's survey. The next form displayed is shown in Figure A.

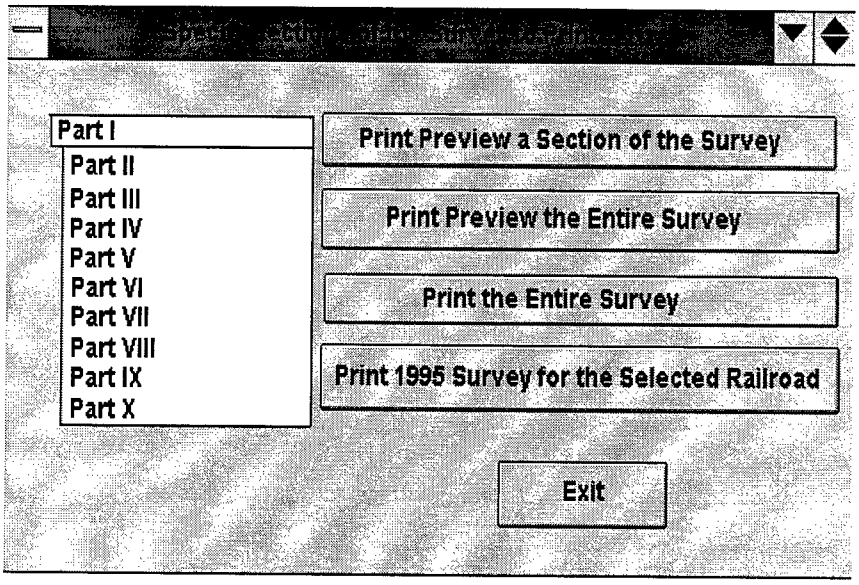


Figure A. Print Window

If you are printing a 1995 survey, only the Print 1995 Survey for the Selected Railroad command is available. If you are printing a 1996 survey, the first three command button options are available. If you choose to Print the Entire Survey, the survey report will be sent directly to your windows default printer. Otherwise, the survey or section of the survey will be displayed in a print preview window. Figure B shows how the print preview window will look.

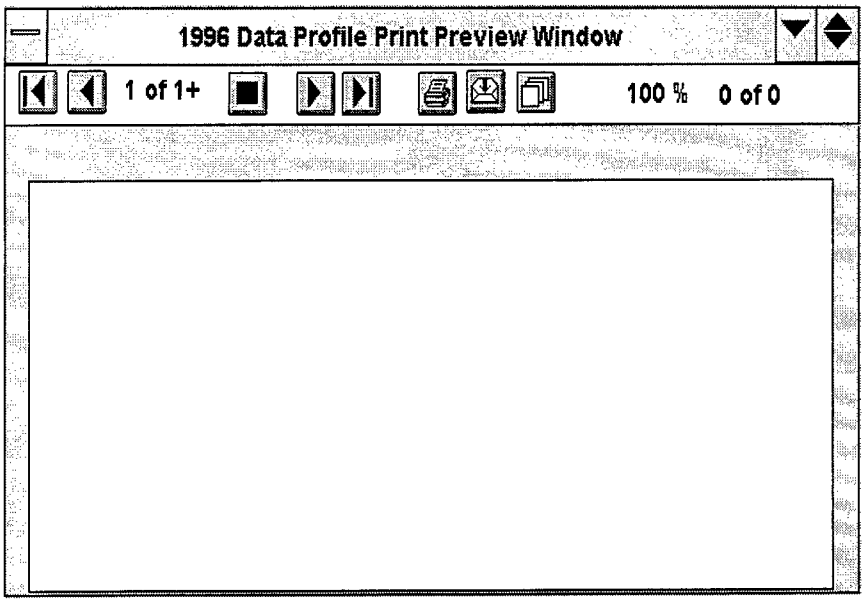


Figure B. Print Preview Window

Once the survey or survey section is displayed, the following options are available:

Print Preview Browse buttons: Used to scroll through the pages of the print preview.

Print button: Click on this to print a copy of the pages in the print preview window.

Export button: Click on this to export a copy of the survey to a different format. When exporting the survey, some of the formatting may be lost. Example - If you export to an MS Word document, the lines and alignment will not be the same as the actual survey report.

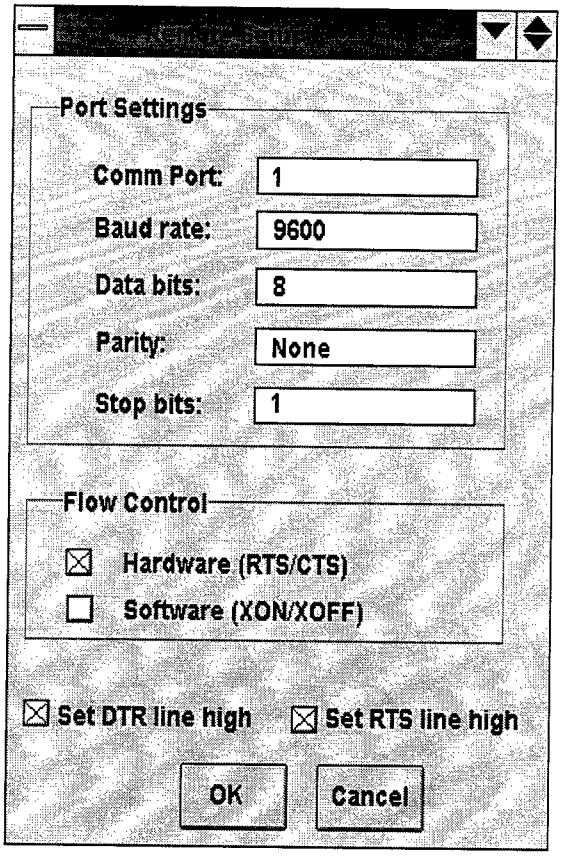
Zoom button: Click on this to increase or decrease the view size of the print preview window. The alignment may look slightly off in the smaller viewing windows.

When done viewing and/or printing the survey, double click on the upper left corner of the window. This should bring you back to the screen in Figure A. Then click ***Exit*** on this form to return to the Dentry program.

Chapter 5 - Returning the Completed Survey

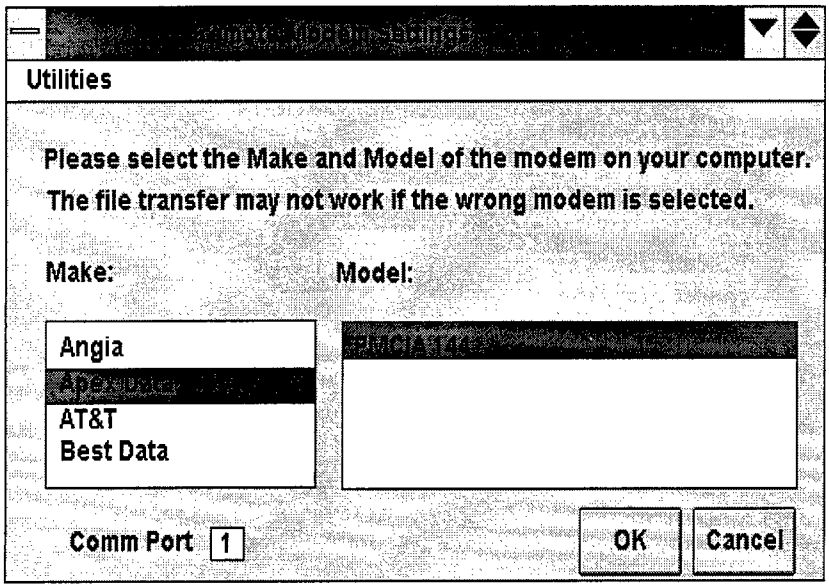
When the entire survey has been completed and saved, you will have two electronic options for sending the data back to us.

1. **Return Disk**: Place a blank floppy disk in either drive a: or drive b:. While in the program, go to the file menu and click on ***SaveAs***. Then click the drive letter corresponding to the drive containing the blank floppy disk. The information you have entered for your railroad or railroads will be copied to the floppy disk. Seal the disk in the envelope supplied, and promptly return it by mail with the appropriate postage.
2. **File Transfer via your Modem**: Once the information is completed for each railroad you enter data for, send us the information directly through your modem. **Warning! Before choosing this option, be sure that you know the model and make of your modem, the comm port your modem is located on, and the maximum baud rate your modem can accept.** Once you have this information, click on either the ***command*** button with a telephone on it, or, from the menu, click on the ***File Transfer, Send Database via Modem*** command. When you do this, the following screen should appear.



Set the Comm Port, maximum baud rate your modem can accept, and switch the flow control to Hardware(RTS/CTS), then click OK.

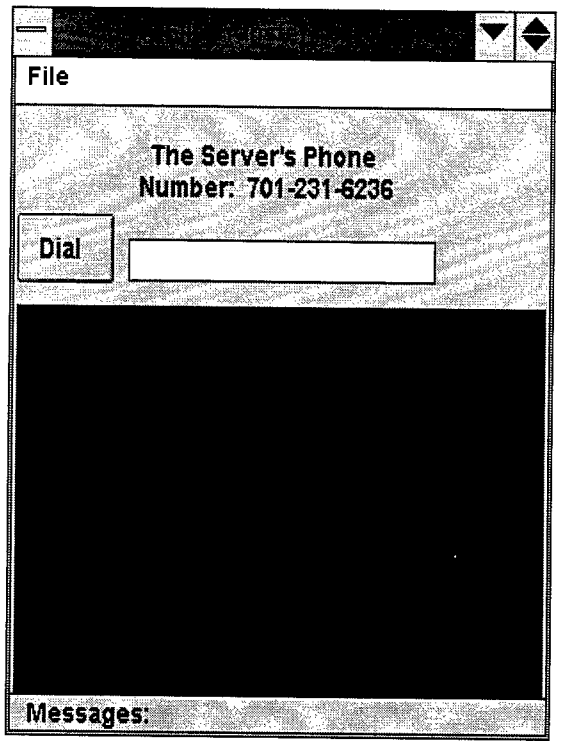
If there were no errors with your port selection, the following Remote Modem Settings screen will appear:



There are two list boxes on this form. Select the make of your modem in the list box on the left. When you make this selection, several models for that modem will be displayed in the list box on the right. The models usually describe the different modem speeds available for that particular make. Select the model that matches your modem. Click OK.

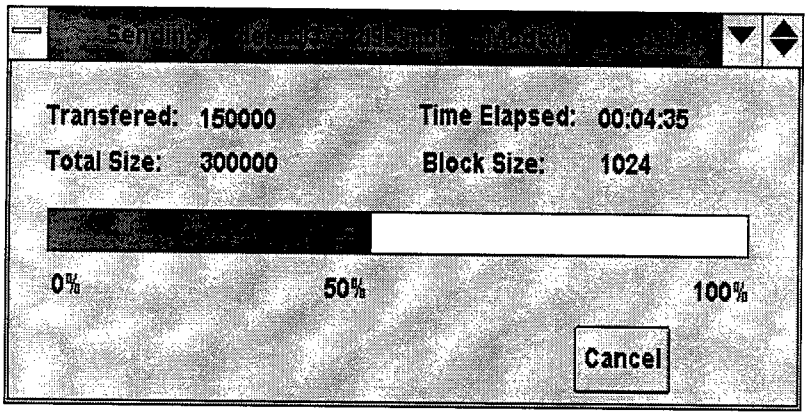
The program will now run a test to check your make and model selected with your modem. If your modem is not compatible with your selection, you will receive an error message and be requested to make another modem selection.

If there are no error messages, the following File Transfer screen will appear:



On this screen, type the phone number of our server into the text box, 1-701-231-6236, and then press the ***Dial*** command button. Be sure to include any number you need to dial out from your phone system. The program will then dial and attempt to connect to our server.

If the program connects, there will be messages displayed in the black box area on the bottom of the File Transfer form. Once the actual file transfer begins, the following will be displayed on your screen:



If the transfer is working properly, the number of bytes transferred and the percent completed gauge should both be increasing. If the maximum baud rate was set too high when you set the modem port settings, you will notice the following on the screen: the bytes transferred and percent complete will increase for a while, then abruptly go back to zero. If this condition repeats itself several times, you will need to cancel the transfer, reset the baud rate to a lower rate in the Port Settings form, and re-attempt dialing up our system. If the file transfer is completed without error, this form will close, and you will return to the File Transfer form. A message will appear in the message area saying "Upload Successful." If you get this message you are finished; the data has been transferred successfully to our server.

Chapter 6 - Help System

A Help Guide is included with Dentry 3.0. After starting the program, you can access the help file through the menu. There is a Table of Contents section and also a Search Facility available. General assistance, such as definitions and information similar to the information found in this Help Guide are available electronically.

The Survey Glossary included in the mailing defines the terms of each survey question. Built into the program this year is context-sensitive help. If you have a question on a definition of a particular question asked, all you need to do is double-click on the corresponding label in the program, and a small box will appear with the definition for that term. Most of the labels in the program have the context-sensitive help feature.

[Warning: The Technical Support option in the Help menu is not working. To get technical support read Chapter 7 of this guide, or if using the electronic help system's Table of Contents, jump to the TroubleShooting section.]

Chapter 7 - Troubleshooting

1. When you click on the 1994 data, if the data is either not in the correct directory or its not installed, a dialogue box appears prompting the user to copy the 1994 data into the C:\Dentry2\ directory. Copy the 1994 data into C:\Dentry2\ and try clicking on 1994 again.

2. If the program doesn't run at all, or quits after you press Continue from the startup form, you may want to check to make sure the program was installed in the c:\Dentry2\ directory. If it wasn't, you will have to reinstall the program, and make sure to install it to the c:\Dentry2\ directory.

If you have any further questions, please feel free to call:

Trent Byberg at (701) 231-1075
or, Doug Benson at (701) 231-8388

between 7:30 A.M. and 4:00 P.M. Central Standard Time

or send e-mail to:

Trent at byberg@badlands.nodak.edu
or, Doug at benson@plains.nodak.edu

Appendix D:

World Wide Web Design Background

Purpose

To disseminate information on the distinctive characteristics of the small railroad industry and to increase knowledge of the intrinsic role small railroads play in maintaining an effective and efficient national transportation system.

Audience

The main audience on the internet will be short line railroad managers and owners, policy makers, industry representatives, government officials, researchers, and others interested in transportation.

Web Site Content List

Section 1: Information on the survey, who supported the effort, how to obtain a survey, participate in the survey, etc.
Section 2: Industry Total Estimates
Section 3: Weighted Averages over the three years of information
Section 4: 3-year ratios computed directly from the database
Section 5: Survey Response Rates

Index Page and Site Organization

First page contains Introduction
Second page contains the Index
Other pages contain different information, graphs, and tables from the survey

Background Color or Texture

Remain consistent with the UGPTI web site color scheme

Basic Page Elements

Basic elements of the pages are graphs, charts, and tables.

Web Site Maintenance

Identify where ongoing changes need to be addressed. Generally, the ongoing changes will be the addition of new survey information and the updating of existing survey information on the web site.

Adding New Information

The site must maintain its audience. Those interested will not come back if information is not updated at regular intervals. Information should be updated at least every two weeks. Also keep a *What's New* tab in the UGPTI area to attract attention to the web pages that recently have been updated or added.

Interaction Plan

Solicit comments from the readers of this information. Feedback on the content and design of the database web pages is useful. Other information of interest is the audience. Minor adjustments can be applied to the web site to better fit the background of the audience.

APPENDIX E:

Computing the Variance of the Sum of Point Estimates

Computation of Variance

In 1995, there were 72 missing local line-haul railroad data points, and 1 missing regional railroad data point. The variance of the sum of 457 data points and 73 missing data points is derived as follows:[3]

Let n = the number of valid responses.
l = the number of missing local line-haul railroads
r = the number of missing regional railroads
$\bar{\hat{x}}_{loc}$ = the average point estimate for all known local line-haul railroads
$\bar{\hat{x}}_{reg}$ = the average point estimate for all known regional railroads

$$Var\left(\hat{x}_1+\hat{x}_2+\ldots+\hat{x}_n+l*\bar{\hat{x}}_{loc}+r*\bar{\hat{x}}_{Reg}\right)$$

$$= Var\left(\begin{array}{l}\left(\alpha_1+\hat{\beta}_1 TCar_1+\hat{\beta}_2 Emp_1+\hat{\beta}_3 MO_1+\hat{\beta}_4 Av_1+\hat{\beta}_5 RT_1+\right.\\ \left.\hat{\beta}_6 TCar_1*RT_1+\hat{\beta}_7 Emp_1*RT_1+\hat{\beta}_8 MO_1*RT_1+\hat{\beta}_9 Av_1*RT_1\right)\\ +\left(\alpha_1+\hat{\beta}_1 TCar_2+\hat{\beta}_2 Emp_2+\hat{\beta}_3 MO_2+\hat{\beta}_4 Av_2+\hat{\beta}_5 RT_2+\right.\\ \left.\hat{\beta}_6 TCar_2*RT_2+\hat{\beta}_7 Emp_2*RT_2+\hat{\beta}_8 MO_2*RT_2+\hat{\beta}_9 Av_2*RT_2\right)\\ +\quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\\ +\left(\alpha_1+\hat{\beta}_1 TCar_n+\hat{\beta}_2 Emp_n+\hat{\beta}_3 MO_n+\hat{\beta}_4 Av_n+\hat{\beta}_5 RT_n+\right.\\ \left.\hat{\beta}_6 TCar_n*RT_n+\hat{\beta}_7 Emp_n*RT_n+\hat{\beta}_8 MO_n*RT_n+\hat{\beta}_9 Av_n*RT_n\right)\\ +l*\bar{\hat{x}}_{loc}+r*\bar{\hat{x}}_{reg}\end{array}\right)$$

[3]Personal Communication: Discussion with Dr. M.B. Rao, North Dakota State University, September 1997.

$$= \left(n\,Var\left(\hat{\alpha}\right) \right) + Var(\hat{\beta}_1)\left[\left(\sum_{i=1}^{n-(l+r)} TCar_i \right) + l * \overline{\hat{TCar}}_{loc} + r * \overline{\hat{TCar}}_{reg} \right] +$$

$$Var(\hat{\beta}_2)\left[\left(\sum_{i=1}^{n-(l+r)} Emp_i \right) + l * \overline{\hat{Emp}}_{loc} + r * \overline{\hat{Emp}}_{reg} \right] +$$

$$Var(\hat{\beta}_3)\left[\left(\sum_{i=1}^{n-(l+r)} MO_n \right) + l * \overline{\hat{MO}}_{loc} + r * \overline{\hat{MO}}_{reg} \right] +$$

$$Var(\hat{\beta}_4)\left[\left(\sum_{i=1}^{n-(l+r)} Av_i \right) + l * \overline{\hat{AV}}_{loc} + r * \overline{\hat{AV}}_{reg} \right] +$$

$$Var(\hat{\beta}_5)\left[\left(\sum_{i=1}^{n-(l+r)} RT_i \right) + l * \overline{\hat{RT}}_{loc} + r * \overline{\hat{RT}}_{reg} \right] +$$

$$Var(\hat{\beta}_6)\left[\left(\sum_{i=1}^{n-(l+r)} TCar_i * RT_i \right) + l * \overline{TCar\hat{} * RT}_{loc} + r * \overline{TCar\hat{} * RT}_{reg} \right] +$$

$$Var(\hat{\beta}_7)\left[\left(\sum_{i=1}^{n-(l+r)} Emp_i * RT_i \right) + l * \overline{Emp\hat{} * RT}_{loc} + r * \overline{Emp\hat{} * RT}_{reg} \right] +$$

$$Var(\hat{\beta}_8)\left[\left(\sum_{i=1}^{n-(l+r)} MO_i * RT_i \right) + l * \overline{MO\hat{} * RT}_{loc} + r * \overline{MO\hat{} * RT}_{reg} \right] +$$

$$Var(\hat{\beta}_9)\left[\left(\sum_{i=1}^{n-(l+r)} Av_i * RT_i \right) + l * \overline{Av\hat{} * RT}_{loc} + r * \overline{Av\hat{} * RT}_{reg} \right] +$$

$$2Cov(\hat{\alpha}, \hat{\beta}_1) * n * \left(\sum_{i=1}^{n-(l+r)} TCar_i \right) + 2Cov(\hat{\alpha}, \hat{\beta}_2) * n * \left(\sum_{i=1}^{n-(l+r)} Emp_i \right) +$$

$$\ldots \quad + \text{the 43 other covariances}$$

This formula is quite long, and appears complex. There is, however, a straightforward way to calculate the variance. This large formulation can be put into matrix form and any software capable of doing matrix algebra can calculate the resulting variance. Using the SAS statistical software package, the first matrix needed is calculated automatically. The resulting model gives us 10 parameter estimates,

$$\alpha, \hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_5, \hat{\beta}_6, \hat{\beta}_7, \hat{\beta}_8, \hat{\beta}_9$$

Each of these parameter estimates has a variance associated with it and each combination of any two of these estimates has an associated covariance. The resulting variance and covariances are outputted by SAS to a 10x10 matrix.

VarCov =

$$\begin{pmatrix}
Var(\hat{\alpha}) & Cov(\hat{\alpha},\hat{\beta}_1) & Cov(\hat{\alpha},\hat{\beta}_2) & Cov(\hat{\alpha},\hat{\beta}_3) & Cov(\hat{\alpha},\hat{\beta}_4) & Cov(\hat{\alpha},\hat{\beta}_5) & Cov(\hat{\alpha},\hat{\beta}_6) & Cov(\hat{\alpha},\hat{\beta}_7) & Cov(\hat{\alpha},\hat{\beta}_8) & Cov(\hat{\alpha},\hat{\beta}_9) \\
Cov(\hat{\beta}_1,\hat{\alpha}) & Var(\hat{\beta}_1) & Cov(\hat{\beta}_1,\hat{\beta}_2) & Cov(\hat{\beta}_1,\hat{\beta}_3) & Cov(\hat{\beta}_1,\hat{\beta}_4) & Cov(\hat{\beta}_1,\hat{\beta}_5) & Cov(\hat{\beta}_1,\hat{\beta}_6) & Cov(\hat{\beta}_1,\hat{\beta}_7) & Cov(\hat{\beta}_1,\hat{\beta}_8) & Cov(\hat{\beta}_1,\hat{\beta}_9) \\
Cov(\hat{\beta}_2,\hat{\alpha}) & Cov(\hat{\beta}_2,\hat{\beta}_1) & Var(\hat{\beta}_2) & Cov(\hat{\beta}_2,\hat{\beta}_3) & Cov(\hat{\beta}_2,\hat{\beta}_4) & Cov(\hat{\beta}_1,\hat{\beta}_5) & Cov(\hat{\beta}_2,\hat{\beta}_6) & Cov(\hat{\beta}_2,\hat{\beta}_7) & Cov(\hat{\beta}_1,\hat{\beta}_8) & Cov(\hat{\beta}_2,\hat{\beta}_9) \\
Cov(\hat{\beta}_3,\hat{\alpha}) & Cov(\hat{\beta}_3,\hat{\beta}_1) & Cov(\hat{\beta}_3,\hat{\beta}_2) & Var(\hat{\beta}_3) & Cov(\hat{\beta}_3,\hat{\beta}_4) & Cov(\hat{\beta}_3,\hat{\beta}_5) & Cov(\hat{\beta}_3,\hat{\beta}_6) & Cov(\hat{\beta}_3,\hat{\beta}_7) & Cov(\hat{\beta}_3,\hat{\beta}_8) & Cov(\hat{\beta}_3,\hat{\beta}_9) \\
Cov(\hat{\beta}_4,\hat{\alpha}) & Cov(\hat{\beta}_4,\hat{\beta}_1) & Cov(\hat{\beta}_4,\hat{\beta}_2) & Cov(\hat{\beta}_4,\hat{\beta}_3) & Var(\hat{\beta}_4) & Cov(\hat{\beta}_4,\hat{\beta}_5) & Cov(\hat{\beta}_4,\hat{\beta}_6) & Cov(\hat{\beta}_4,\hat{\beta}_7) & Cov(\hat{\beta}_4,\hat{\beta}_8) & Cov(\hat{\beta}_4,\hat{\beta}_9) \\
Cov(\hat{\beta}_5,\hat{\alpha}) & Cov(\hat{\beta}_5,\hat{\beta}_1) & Cov(\hat{\beta}_5,\hat{\beta}_2) & Cov(\hat{\beta}_5,\hat{\beta}_3) & Cov(\hat{\beta}_5,\hat{\beta}_4) & Var(\hat{\beta}_5) & Cov(\hat{\beta}_5,\hat{\beta}_6) & Cov(\hat{\beta}_5,\hat{\beta}_7) & Cov(\hat{\beta}_5,\hat{\beta}_8) & Cov(\hat{\beta}_5,\hat{\beta}_9) \\
Cov(\hat{\beta}_6,\hat{\alpha}) & Cov(\hat{\beta}_6,\hat{\beta}_1) & Cov(\hat{\beta}_6,\hat{\beta}_2) & Cov(\hat{\beta}_6,\hat{\beta}_3) & Cov(\hat{\beta}_6,\hat{\beta}_4) & Cov(\hat{\beta}_6,\hat{\beta}_5) & Var(\hat{\beta}_6) & Cov(\hat{\beta}_6,\hat{\beta}_7) & Cov(\hat{\beta}_6,\hat{\beta}_8) & Cov(\hat{\beta}_6,\hat{\beta}_9) \\
Cov(\hat{\beta}_7,\hat{\alpha}) & Cov(\hat{\beta}_7,\hat{\beta}_1) & Cov(\hat{\beta}_7,\hat{\beta}_2) & Cov(\hat{\beta}_7,\hat{\beta}_3) & Cov(\hat{\beta}_7,\hat{\beta}_4) & Cov(\hat{\beta}_7,\hat{\beta}_5) & Cov(\hat{\beta}_7,\hat{\beta}_6) & Var(\hat{\beta}_7) & Cov(\hat{\beta}_7,\hat{\beta}_8) & Cov(\hat{\beta}_7,\hat{\beta}_9) \\
Cov(\hat{\beta}_8,\hat{\alpha}) & Cov(\hat{\beta}_8,\hat{\beta}_1) & Cov(\hat{\beta}_8,\hat{\beta}_2) & Cov(\hat{\beta}_{8_1},\hat{\beta}_3) & Cov(\hat{\beta}_8,\hat{\beta}_4) & Cov(\hat{\beta}_8,\hat{\beta}_5) & Cov(\hat{\beta}_8,\hat{\beta}_6) & Cov(\hat{\beta}_8,\hat{\beta}_7) & Var(\hat{\beta}_8) & Cov(\hat{\beta}_8,\hat{\beta}_9) \\
Cov(\hat{\beta}_9,\hat{\alpha}) & Cov(\hat{\beta}_9,\hat{\beta}_1) & Cov(\hat{\beta}_9,\hat{\beta}_2) & Cov(\hat{\beta}_9,\hat{\beta}_3) & Cov(\hat{\beta}_9,\hat{\beta}_4) & Cov(\hat{\beta}_9,\hat{\beta}_5) & Cov(\hat{\beta}_9,\hat{\beta}_6) & Cov(\hat{\beta}_9,\hat{\beta}_7) & Cov(\hat{\beta}_1,\hat{\beta}_8) & Var(\hat{\beta}_9)
\end{pmatrix}$$

The other matrix, call it A, contains the sums of the known quantities for each railroad.
A =

$$\left[\begin{array}{l} n-(l+r),\ \left(\sum_{i=1}^{n-(l+r)}(TCar_i)+1*\overline{\mathrm{TCar_i}}+r*\overline{\mathrm{TCar_i}}\right),\ \left(\sum_{i=1}^{n-(l+r)}(Emp_i)+1*\overline{Emp_i}+r*\overline{Emp_i}\right),\ \left(\sum_{i=1}^{n-(l+r)}(MO_i)+1*\overline{MO_i}+r*\overline{MO_i}\right) \\ \left(\sum_{i=1}^{n-(l+r)}(AV_i)+1*\overline{AV_i}+r*\overline{AV_{i_1}}\right),\ \left(\sum_{i=1}^{n-(l+r)}(RT_i)+1*\overline{RT_i}+r*\overline{RT_i}\right),\ \left(\sum_{i=1}^{n-(l+r)}(TCar_i*\mathrm{RT_i})+1*\overline{TCar_i*RT_i}+r*\overline{TCar_i*RT_i}\right) \\ \left(\sum_{i=1}^{n-(l+r)}(Emp_i*\mathrm{RT_i})+1*\overline{Emp_i*RT_i}+r*\overline{Emp_i*RT_i}\right),\ \left(\sum_{i=1}^{n-(l+r)}(MO_i*\mathrm{RT_i})+1*\overline{MO_i*RT_i}+r*\overline{MO_i*RT_i}\right), \\ \left(\sum_{i=1}^{n-(l+r)}(AV_i*\mathrm{RT_i})+1*\overline{AV_i*RT_i}+r*\overline{AV_i*RT_i}\right) \end{array}\right]$$

Next, the variance is computed from the two matrices:

Variance(Industry Estimate) = (A)(VarCov)(A`)
where A` is the transpose of A.

This computation will result in a single answer that is the variance of the industry estimate.

Appendix F:

SAS Program For Model Estimation and Variance Computation

"Industry Estimate Variance.SAS"

```
libname slrd'd:\aslra';
data one;

set slrd.combo;

proc reg outest=CV covout;
model transfrt = mownop employes avg_leng transcar reg mownreg empreg lengreg treg;

proc iml;

/** 1995 variance-covariance matrix from the computed model is CV        **/
/** Keep necessary variance-covariance variables and place into matrix C **/

Use CV;
Read point {2 3 4 5 6 7 8 9 10 11} var{INTERCEP MOWNOP EMPLOYES AVG_LENG
        TRANSCAR REG MOWNREG EMPREG LENGREG TREG} into C;

/** Sum the Known variables from the AAR data and place the sums in matrix A **/
A = {530 46856 24103 18377 10192.99 500 27801 13089 13005 6189.68};

/** The order of the sums in matrix A are as follows:
       N
       Miles owned and operated
       Employees
       Average Length of haul
       Transformed carloads
       Reg
       Miles owned and operated * reg
       employees * reg
       Average length of haul * reg
       Transformed Carloads * Reg
*/

/** B = the transpose of A **/

B = T(A);

Test = A*C*B;

/** Test = the variance of the sum of N point estimates **/
print Test;

quit;
run;
```

Appendix G:

Results of Other Analysis

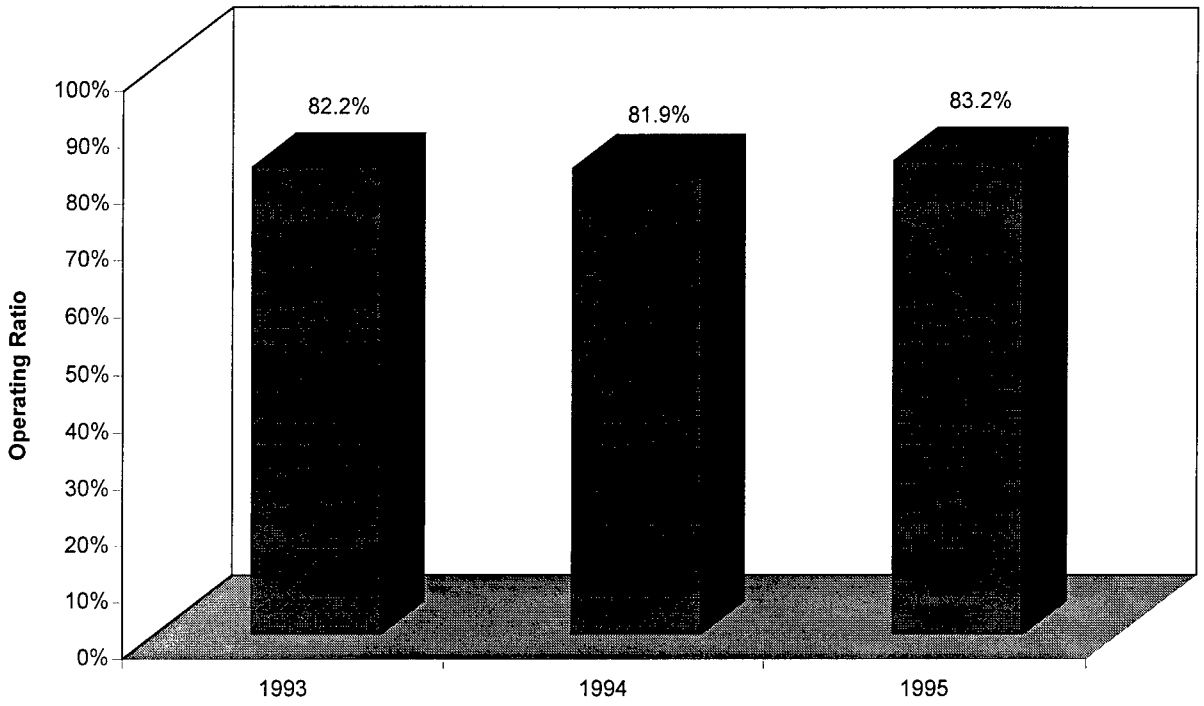
Table G1: Distribution of Traffic Flow 1993-1995

The following table displays the distribution of traffic by movement type for small railroads over the three-year period from 1993 to 1995. There are four movements listed — local, outbound, inbound, and bridge. Each value in the table represents the share each commodity has of the corresponding type of movement. The percentages are weighted by carloads over the three-year period.

Commodity	Average Percent of Local Traffic[1]	Average Percent of Outbound Traffic[2]	Average Percent of Inbound Traffic[3]	Average Percent of Bridge Traffic[4]
01 Farm Products	7%	11%	8%	12%
10 Metallic Ores	28%	9%	6%	5%
11 Coal	10%	13%	28%	6%
14 Non-metallic Minerals	4%	4%	2%	2%
20 Food & Kindred Products	5%	6%	4%	8%
24 Lumber & Wood Products	4%	5%	5%	8%
26 Pulp,Paper and Allied Products	3%	8%	6%	9%
28 Chemicals & Allied Products	3%	5%	8%	7%
29 Petroleum Products	4%	7%	6%	2%
32 Stone, Clay & Glass Products	2%	5%	5%	4%
33 Primary Metal Products	15%	13%	5%	3%
37 Transportation Equipment	1%	3%	2%	16%
40 Waste and Scrap Material	8%	3%	6%	3%
Other Commodities	6%	7%	7%	14%
Total	100%	100%	100%	100%

1. Local carloads are carloads, which both originated and terminated on the same railroad (a.k.a. single line movements).
2. Outbound traffic includes carloads that originated on the local railroad, but were interchanged to another carrier.
3. Inbound traffic includes carloads that were received from another carrier and then terminated on the local railroad.
4. Bridge traffic includes traffic received from one railroad, then delivered to another carrier on a different point in the local railroad's system.

Figure G1: 1993-1995 Average Operating Ratios
(all shortline survey respondents)



Operating Ratio	1993	1994	1995
N	175	184	162
Average	82.2%	81.9%	83.2%
Upper 10%	103.7%	108.4%	104.7%
Median	83.6%	80.7%	84.2%
Lower 10%	54.8%	53.0%	53.9%

Figure G2: 1993-1995 Freight Revenue per Car-Mile and Operating Expense per Car-Mile for Local Line-haul Railroads