U.S. Department
of Transportation
**Federal Transit
Administration**

To Classify Transit Services

Eight Case Studies

June 1992

An FTA Policy Paper

Final Report

TO CLASSIFY TRANSIT SERVICES: EIGHT CASE STUDIES

prepared for

U.S. Department of Transportation
Federal Transit Administration
Office of Budget and Policy

in association with

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This report presents the results of an analysis of the change in the mix of fixed-route transit service in eight metropolitan areas. These case studies were conducted for the Federal Transit Administration (FTA) to support its 1992 report to Congress concerning transit performance. The case studies provide a reasonable picture of how transit performance has changed with respect to different functions served by transit.

The analysis examined the functions, characteristics, and clientele of six different types of bus service (Exhibit 1). These route types cover the bus services provided by local transit systems.

The case studies examined the change in the mix of service provided in the following metropolitan areas:

- Albany, New York
- Miami, Florida
- Los Angeles County, California
- Minneapolis/St. Paul, Minnesota
- St. Louis, Missouri
- San Antonio, Texas
- San Diego, California
- Washington, DC

These cities were selected because: 1) they represented a geographic cross-section of large and medium-sized cities served by complex transit systems; and 2) their own data were in a form readily useful for this analysis.

MIX OF SERVICES

Local and radial services are the largest percent of service in each system (Exhibit 2). These services represent transit's classic central city and close-in suburban commuting and mobility functions.

Beyond the basic local and radial services, however, systems differ significantly in the mix of crosstown, suburban, and express/limited services that they provide. Bus systems that a part of a larger system that includes rail service (i.e., Miami and Washington) have a different mix of services than do single-mode bus systems.

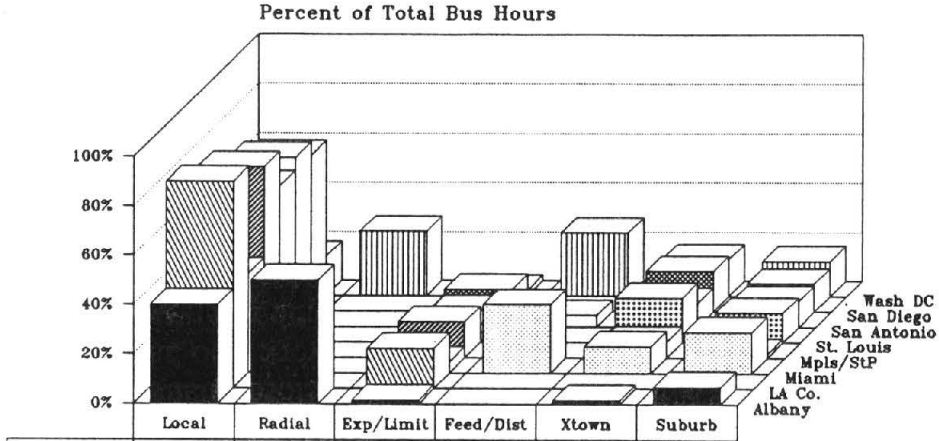
There were no overall trends in service changes by type except for general increases in suburban service (Exhibit 2). This reflects the differences among areas in how total transit service changed between FY85 and FY90 --- four areas increased their bus hours

Exhibit 1
Typology of Transit Services

Route Type	Location of Terminals	Boarding and Alighting	Route Structure	Typical Patronage
Local	Within and outside of Central Business District (CBD).	Not restricted.	Circulatory central city and inner suburbs.	General mobility in dense markets and in low income neighborhoods.
Radial	One terminal inside CBD; other outside CBD.	Not restricted.	Radial form central city hub.	General mobility in dense markets and for work commuting.
Express/ Limited	One terminal inside CBD; other outside CBD.	Restricted to increase speed.	Radial from central city hub circulatory pattern near terminals.	Mode of choice for work commuting.
Feeder/ Distribution	Rail stations inside and outside CBD.	Not restricted.	Radial from rail stations.	Mode of choice for work commuting.
Crosstown	Neither terminal inside CBD.	Not restricted.	Circumference and cross-radial in central city and inner suburbs.	General mobility in dense markets and in low income neighborhoods.
Suburban	Local service in suburbs with terminals at suburban centers and rail stations.	Not restricted.	Circulatory with focus on suburban centers and rail stations.	Mode of choice for work commuting and general mobility in low income neighborhoods.

Exhibit 2
Composition and Changes in Bus Service by Type

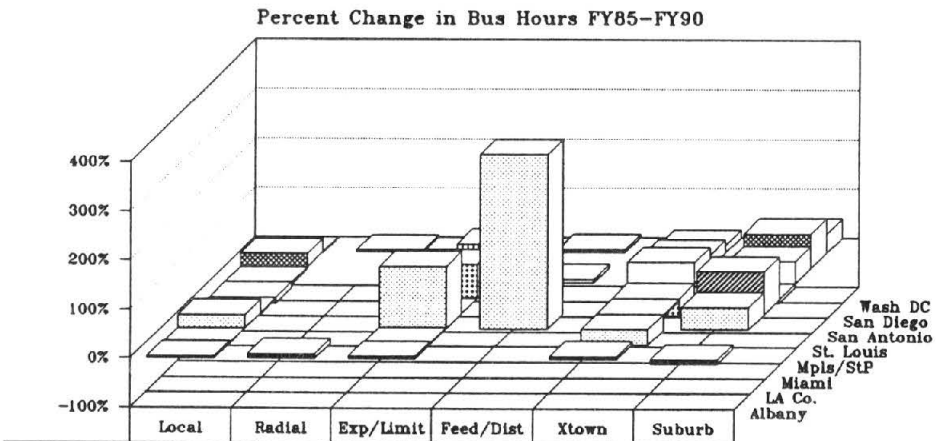
Distribution of Bus Service



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	16%	26%	2%	26%	15%	14%
San Diego	63%		9%		16%	11%
San Antonio	69%		6%	5%	10%	11%
St. Louis	63%		7%		18%	12%
Mpls/StP	77%		15%		6%	2%
Miami	40%		4%	28%	11%	17%
LA Co.	84%		16%			
Albany	40%	50%	2%		2%	7%

St. Louis values for FY89

Changes in Bus Service



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	-2%	4%	17%	6%	15%	39%
San Diego	27%		-11%		27%	70%
San Antonio	-5%		-4%	8%	43%	45%
St. Louis	-12%		69%		-34%	-8%
Mpls/StP	-3%		0%		-6%	86%
Miami	27%		127%	355%	-34%	45%
LA Co.	1%		3%			
Albany	5%	10%	5%		6%	-8%

St. Louis values for FY89

of service by more than six percent, three areas maintained stable service, and one area (St. Louis) reduced service by 14 percent.

PERFORMANCE TRENDS

The analysis examined performance according to four measures --- cost per hour. passengers per hour, cost per passenger, and percent farebox revenue of cost. For the case studies, a uniform cost allocation model was used to allocate "joint expenses" such as administration across the service types. This model is common method used by many transit systems.

To normalize the differences in cost factors among the case studies, the measures were expressed as percentages of the system value for the measure. For example if a transit system's average cost per hour was $30 and the express service cost per hour was $45, the relative cost per hour for express service became 150 percent ($45/$30).

Comparative Unit Costs

Using the measure cost per hour as an indicator, the case studies suggest that the unit cost of service is relatively uniform across service types with the exception of express/limited services (Exhibit 3). This occurs because these services have a high ratio of productive time to total pay time. This means that the bus operators spend a high percentage of their carrying passengers in revenue service.

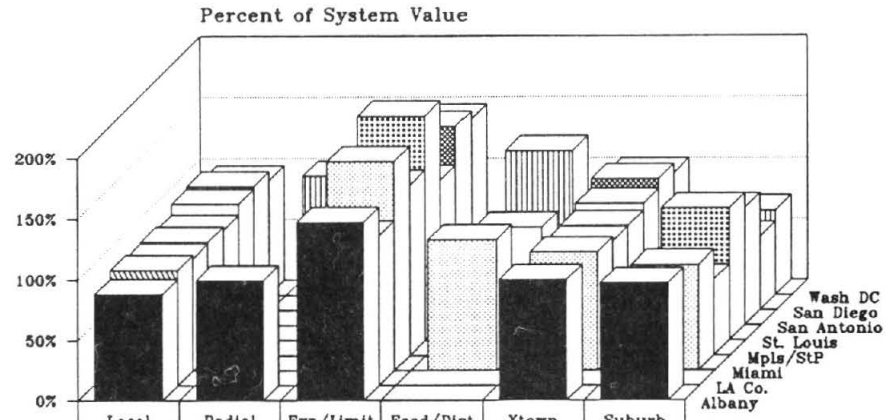
In contrast, most express/limited services cost more than other services. Most of the express/limited services cost over 40 percent more than other services. This disparity is associated with the extreme peaking of most express services and the resultant low ratio of revenue service hours to total pay time. Drivers of express/limited services spend a greater portion of their work day driving to and from the operating garage than do their counterparts on other services.

Service Utilization

The case studies suggest that there is great variation in the passenger utilization of different service types (Exhibit 3). Generally, local, radial, and crosstown services carry more passengers per hour than other service types. This is not unexpected since different types of service are tailored for different markets.

Across the case studies there is no pattern in the service utilization of express/limited, crosstown,and suburban services. This may reflect different levels of penetration and service provision in these markets.

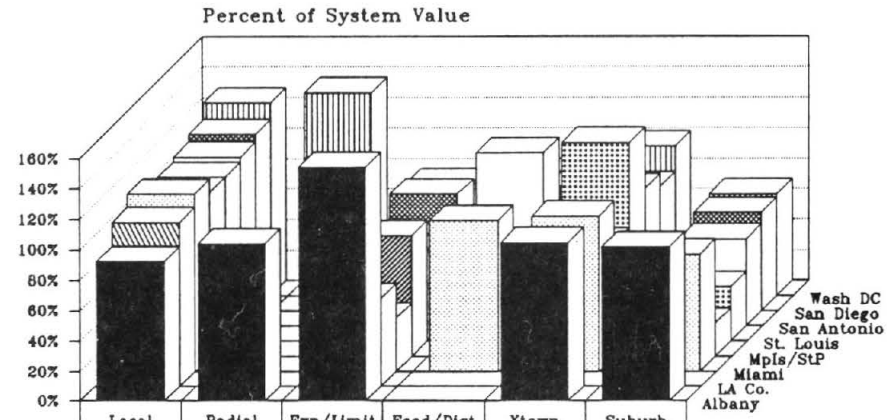
Exhibit 3
Comparative Unit Costs and Service Utilization by Type
Cost per Hour



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	94%	96%	144%	118%	100%	69%
San Diego	102%		151%		106%	60%
San Antonio	100%		119%	81%	100%	96%
St. Louis	91%		184%		94%	108%
Mpls/StP	94%		140%		94%	63%
Miami	93%		172%	108%	98%	87%
LA Co.	95%		124%			
Albany	88%	99%	147%		100%	97%

St. Louis, San Antonio, and San Diego values per rev hr; others per veh hr
St. Louis values for FY89

Passengers per Hour



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	126%	133%	74%	72%	98%	67%
San Diego	116%		77%		82%	65%
San Antonio	111%		58%	114%	90%	57%
St. Louis	108%		60%		130%	36%
Mpls/StP	108%		79%		74%	22%
Miami	117%		35%	99%	102%	77%
LA Co.	108%		58%			
Albany	92%	104%	154%		105%	102%

St. Louis, San Antonio, and San Diego values per rev hr; others per veh hr
St. Louis values for FY89

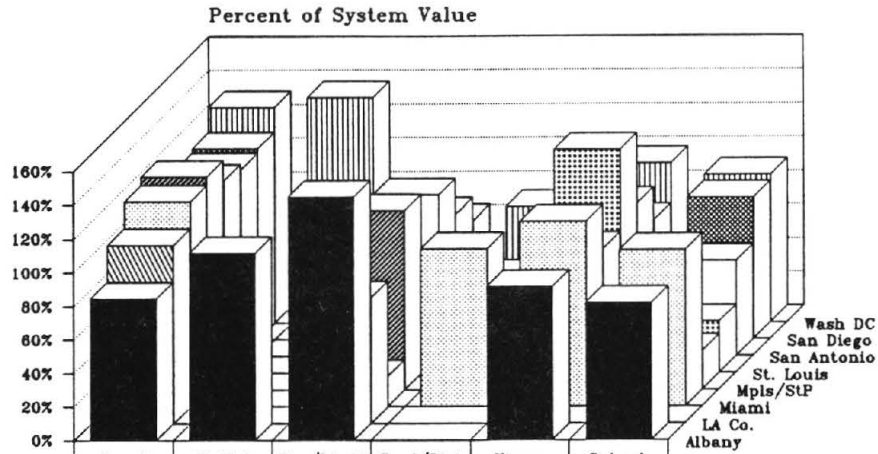
It is interesting that the information on farebox revenues shows similar results --- local and radial routes generally show the best returns (Exhibit 4). This suggests that systems do not charge riders based the costs of service provison.

Comparative Cost per Passenger

The measures cost per passenger reflects combined impact of the measures cost per hour and passengers per hour. Therefore, it is no surprise that the lowest costs per passenger are in local and radial services (Exhibit 4) since they have relatively low unit costs and high passenger utilization.

Likewise, the highest costs per passenger are on express/limited services that have relatively high unit costs and low passenger utilization. The performance of crosstown and suburban services varies and reflects the different rates of passenger utilization among the different systems.

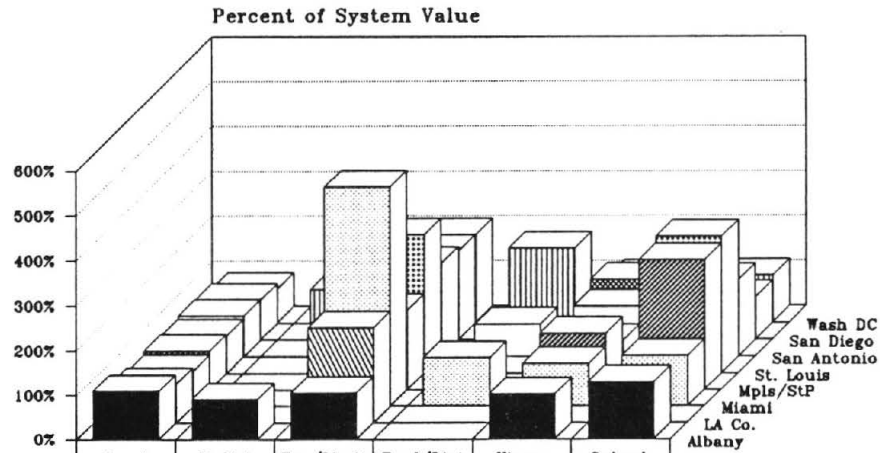
Exhibit 4
Comparative Farebox Returns and Cost per Passenger by Type
Percent Farebox Revenue of Cost



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	128%	134%	61%	69%	95%	87%
San Diego	113%		74%		71%	84%
San Antonio	111%		96%	48%	91%	57%
St. Louis	115%		62%		133%	31%
Mpls/StP	127%		106%		84%	23%
Miami	122%		18%	94%	110%	93%
LA Co.	106%		75%			
Albany	86%	112%	145%		91%	82%

St. Louis values for FY89

Cost per Passenger



	Local	Radial	Exp/Limit	Feed/Dist	Xtown	Suburb
Wash DC	74%	74%	196%	165%	102%	104%
San Diego	88%		197%		132%	94%
San Antonio	89%		206%	71%	111%	168%
St. Louis	84%		309%		72%	304%
Mpls/StP	87%		177%		126%	269%
Miami	80%		490%	109%	96%	113%
LA Co.	88%		213%			
Albany	110%	91%	105%		103%	130%

St. Louis values for FY89

Introduction

This report presents the results of an analysis of the change in the mix of fixed-route transit service in eight metropolitan areas. These case studies were conducted for the Federal Transit Administration (FTA) to support its 1992 report to Congress concerning transit performance. The case studies provide a reasonable picture of how transit performance has changed with respect to different functions served by transit.

The case studies examined the change in the mix of service provided in the following metropolitan areas:

- Albany, New York
- Miami, Florida
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- San Diego, California
- Washington, DC

The case studies examined changes that occurred over at least a five year period. Seven case studies examined the period between fiscal years 1985 (FY85) and 1990 (FY90). The case study for St. Louis covered the period between FY80 and FY89.

The report is divided into the following sections:

- **Case Study Approach** provides a overview of the methodology used for the case studies and its limitations.
- **Data Collection Issues** discusses problems encountered during the conduct of the case studies with emphasis on those that relate to the development of a recurring data collection program.
- **Individual Case Summaries** provide the analyses of each metropolitan area. Each summary describes the demographic and service changes that occurred and discusses the statistics and performance information about the different service types.

Case Study Approach

The objective of conducting the case studies was to assess transit performance. Ideally, data would be collected on the different types of needs (e.g., commuter, basic mobility) and population groups (e.g., low-income central city residents, high-income suburbanites) served by transit. However, because of data limitations, different types of bus route types were used as surrogates for major functions.

This chapter describes how this approach was applied. It then discusses some limitations of the approach.

OVERVIEW OF APPROACH

The case study had three key features:

- the use of bus route types as surrogates for major transit functions;
- the collection of key information on transit service levels and performance; and
- the use of a traditional, three-variable cost model to allocate joint expenses to bus routes.

Bus Routes and Transit Functions

Data availability was a major factor in the design of the case study approach. Ideally, the cases studies would examine data on different types of needs and population groups served by transit. To obtain these data, transit systems conduct on-board surveys of transit users and ask them questions about their use of transit (e.g., trip purpose, origin and destination, auto availability for the trip) and their socio-economic status (e.g., income, age, residence).

Unfortunately, few transit systems routinely conduct on-board surveys. Only of one (Minneapolis/St. Paul) of the eight cases studies had on-board survey information that could be used in the case studies.

Therefore, different types of bus routes were used as surrogates for major functions. Initially, the following categories of routes were used:

- radial routes that serve the central city central business district

  - local
  - limited
  - express

- local distributor routes in the central city central business district

- crosstown routes that serve the central city but do not go to the central business district

- local suburban routes

- feeder routes that serve line-haul rail or express bus

The transit systems were asked to classify their routes according to this format. In most case studies, a modified classification scheme was used that reflected the ways the transit system categorized its routes and maintained its data. For example, in Los Angeles County, routes are classified either as local or express because of the way the Los Angeles Transportation Commission collected its data.

In the absence of on-board survey data, the transit systems also were asked to comment on the predominate types of riders and trip purposes that were served by each route type. For example, radial express lines were assumed to be principally designed for travel to and from work by moderate-to-upper income suburbanites. The transit system responses were based on their experience and on-board surveys that were conducted before 1985.

Service Level and Performance Data

The case studies look at changes by route type in both service levels (e.g., hours and miles of service, number of lines) and performance (e.g., cost per hour). The following data were requested in each metropolitan area:

- revenue hours
- revenue miles
- peak vehicles
- number of lines
- boarding passengers
- passenger miles
- farebox revenue
- operating expense

Some transit systems did not collect data on revenue hours and revenue miles by route type. Instead, they collected data on vehicle hours and vehicle miles. Since there is generally less than a five percent difference between revenue hours (miles) and vehicle hours (miles), vehicle hours and vehicle miles were used in five of the eight case studies.

The analysis of service level changes relied on absolute and relative differences in amounts of service provided between FY85 and FY90 (FY84 and FY89 in St. Louis). The analysis of performance changes examined changes in following four measures:

- **operating cost per revenue hour** answers the question *How much does it cost to provide a unit of service?* Transit systems try to minimize the increases of this measure.

- **boarding passengers per revenue hour** answers the question *How many people are carried for every unit of service provided?* Transit systems try to maximize this measure.

- **operating cost per boarding passenger** answers the question *How much does it cost to carry a passenger?* This measure combines the impacts of unit costs and passenger utilization and is a fundamental issue in most metropolitan areas.

- **farebox recovery (farebox revenues/operating cost)** measures equity and answers the question *How much do passengers contribute to the cost of their trips?* Some transit systems as a matter of policy require passenger fares to cover a minimum percentage of revenues.

Cost Allocation Model

Unlike other data collected in the case studies, some operating costs cannot be readily assigned to different route types. These costs are often called joint costs because they are incurred for the benefit of more than one route or service. The salary of the manager of maintenance and marketing expenses are examples of expenses that cannot readily be assigned or attributed to one specific service.

Many transit systems address this problem through the development and use of a three-variable cost allocation model. The model is an accepted private and public sector business procedure for determining the costs of specific services.

Since costs play an important role in the case studies, a traditional three-variable cost model was developed and applied in each case study. The model was developed from the Section 15 reports submitted by each transit system for FY85 and FY90. In the development of the models, each expense line item was assigned to one of the following three variables:

- **revenue hours.** Bus operator wages and fringe benefits were the largest expenses assigned to this variable.

- **revenue miles.** Vehicle maintenance, fuel, oil, and insurance costs were assigned to miles.

- **peak vehicles.** Overhead and administrative charges were assigned to this variable.

Appendix A show the detailed allocation of the expense accounts.

The output of this process was a three-variable formula that was used to allocate costs to individual or groups of bus routes. For example, the FY90 costs for the Metropolitan Transit Commission were allocated using the following formula:

Cost = $26.31/vehicle hour + $1.09/vehicle mile + $50,961.01/peak vehicle

The costs of a specific bus route were estimated by multiplying the annual hours, miles, and peak vehicles operated on the route by the units costs in the formula.

For example, to find the cost of a route with one peak vehicle that travelled 40,000 annual miles in 3,100 hours of operation, the equation is used as follows:

Annual Cost = ($26.31 X 3,100) + ($1.09 X 40,000) + ($50,961.01 X 1)

= $81,561 + $43,600 + $50,961

= $176,122

In an identical process, cost formulae were developed for all transit systems in the case studies. Using a consistent process provides consistency among the costs in the case studies.

LIMITATIONS OF THE APPROACH

Data availability, time constraints, and other factors influenced the design and conduct of the case studies. Therefore, the findings of the case studies should be viewed with the following limitations in mind:

- **the case study approach is not a statistical representation.** The case studies sites were selected because: 1) the necessary data were available for the FY85-FY90 analysis period; and 2) they were large metropolitan areas with a great diversity of bus route types. While the contractors involved in producing the case studies found the study results to be consistent with their experience, the sample of sites was not statistically-selected and, therefore, the findings may not be representative.

- **surrogate routes is a simplifying assumption for transit functions.** Many bus routes serve more than one trip purpose and more than one socio-economic group. For example, while radial local routes serve low-to-moderate income, transit-dependent people, they also serve upper-income, choice riders. If these choice riders did not use the transit service, they would commute by car and increase the existing highway congestion. Therefore, many radial local routes serve functions: 1) helping some people get to work who have no other option; and 2) reducing highway congestion by serving some riders who would otherwise drive.

The case study approach assumes that only one function is served by a route type when in many cases they serve multiple functions. The case study contractors feel, nevertheless, that the majority of riders are properly represented using this scheme. Until regular on-board surveys are conducted, the inaccuracy of this approach cannot be estimated.

- **route classifications were made by the transit systems.** There may be some inconsistency among case studies in the classification of bus routes. It does not appear that there were significant deviations.

- **the cost model may somewhat understate peak-period costs and overstate off-peak costs.** The model assesses costs for all hours of service at the same unit rate even though many studies have shown that peak period service is more expensive than service in other parts of the day. It is not expected that the general trends and results would be significantly different if a more rigorous costing approach was used.

- **the cost model may overstate the cost of peak-only service.** The cost model allocates most joint expenses using the variable peak vehicles. This makes peak-only service bear a high percentage of fixed-costs relative to the number of hours service is operated. However, the joint expenses also are incurred for off-peak services. For example, the transit general manager --- a joint expense --- oversees the provision of off-peak service as well as peak service. However, the total cost of the general manager is assessed to services that operate during without an recognition of the amount of service operated during the off-peak periods.

  While some portion of the joint expenses should be assessed to off-peak services, the case study contractors believe that these costs may be offset by the understatement of peak period hourly costs as discussed in the previous point.

In spite of these limitations, it is felt that the methodology provides a reasonable picture of how transit performance has changed with respect to different functions served by transit. It is important to consider these limitations, however, in the design of a more direct, recurring process to collect information on the functions served by transit.

Data Collection Issues

The objective of conducting the case studies was to provide the FTA with data on transit performance in selected metropolitan areas with respect to different functions served by transit. The contractor, MacDorman & Associates, had great difficulty finding transit systems with the data that could used in this study. MacDorman & Associates talked to almost 20 transit systems to obtain the eight case studies in this report.

This chapter describes some of the data collection issues that surfaced during the conduct of the case studies and are important to the design of a recurring process. These issues include ongoing transit system involvement, recurring on-board surveys, and computerized data transfer.

ONGOING TRANSIT SYSTEM INVOLVEMENT

MacDorman & Associates and its subcontractors conducted this study with the assistance of the transit systems in each case study area. The transit systems were asked to classify their lines into route types and provide performance information for the five-year analysis period.

While the transit systems were very cooperative, they provided information according to the ways that they categorized their routes and maintained their data. For example, in Los Angeles County, routes were classified either as local or express because of the way the Los Angeles Transportation Commission collected its data.

MacDorman & Associates could not manipulate the data to make it totally consistent across case studies. Some systems stored and provided data by route category that could not be disaggregated to individual routes. Some systems had route-level information in terms of revenue hours and miles while others collected information in on vehicle hours and miles.

Many systems had their own unique route classification schemes. They willingly provided this information, but did not have the time to help MacDorman & Associates classify their routes according to a common format.

Consistency is needed in a recurring data collection program to obtain meaningful findings. Ongoing transit involvement will insure that data are consistently collected and processed.

RECURRING ON-BOARD SURVEYS

The cases studies should examine data on different types of needs and population groups served by transit. To obtain these data, transit systems conduct on-board surveys of transit users and ask them questions about their use of transit (e.g., trip purpose, origin and destination, auto availability for the trip) and their socio-economic status (e.g., income, age, residence).

Unfortunately, only one transit system in the case study routinely conduct on-board surveys. Therefore, different types of bus routes were used in the case study as surrogates for major functions. Until regular on-board surveys are conducted, the inaccuracy of this approach cannot be estimated.

Recurring on-board surveys should be an integral part of the data collection program. Since most transit systems do not routinely conduct on-board surveys, on-going transit involvement is necessary.

COMPUTERIZED DATA TRANSFER

Obtaining data in a useable format often is a difficult problem in case studies. This study was no different. A considerable amount of effort was spent in converting data from one format to another. Some transit systems had erased the original raw data from their computers and MacDorman & Associates had to enter the data by the remaining paper summary reports.

The longer the analysis period, the more important it is to take measures to insure that data are saved in the proper format. This issue should be given significant attention in the design of the data collection program.

Albany, New York Metropolitan Area

SUMMARY

This case study is an examination of the change in the mix of service provided in the Albany metropolitan area. It covers the period between FY85 and FY90 for the only transit provider in the area, the Capital District Transportation Authority (CDTA).

The service area of the CDTA is socio-economically and developmentally diverse and relatively stable. The urbanized areas of the four counties and the three major cities in the region have a diverse economic, population, and employment trends built on a combination of state government, colleges and universities, recreation and tourism, and the industrial base centered on General Electric.

DEMOGRAPHIC CHANGES

The population and employment of the Capital District both increased moderately between 1985 and 1990. The overall regional population increased four percent while the total number of jobs in the region increased by six percent.

The distribution of this growth among the four counties varied significantly. The changes in population within the four counties have been largely a move toward increased suburbanization and the growth of some satellite suburban centers.

Albany County is at the center of the region and comprises most the service area. It grew moderately in both population and employment --- at two percent and three percent respectively.

Saratoga County, which is at the northern end of the region and is the least urbanized county, experienced the fastest growth in both population and employment - at 13 percent and 38 percent respectively. Only a small portion of Saratoga County has any fixed-route service.

Rensselaer County experienced a modest population growth of two percent, but the number of jobs in the county increased by 15 percent. Schenectady County, on the other hand, experienced a decline in population of one percent and a decline in employment of five percent.

TRANSIT SERVICE CHANGES

The fixed-route system has remained relatively constant, but has evolved gradually as services have been tailored to meet the declining and dispersing demand. The result is that total miles of fixed-route services have decreased about five percent, while ridership of the fixed-route system has declined 23 percent from 16.1 million riders to 12.4 million.

The major changes in the services provided by the CDTA were related to demand responsive service. There was a 247 percent increase in the amount of demand responsive service provided and a 344 percent increase in the use of the demand responsive system.

The existence of the three major urban centers and the several smaller centers results in an unusual service pattern for the CDTA. The pattern has:

- three sets of radial links between the three city pairs serving intercity demand;
- three sets of local routes that serve the residents of each of the three cities;
- a set of express routes serving the center cities; and
- sets of crosstown and inter-suburban routes that connect some smaller satellite city centers and their surrounding residential areas.

The trends from 1985 to 1990 among the five kinds of fixed-route services differed significantly. The level of local bus service declined 4.6 percent, while radial bus service increased by 10.1 percent. Together, the two services represented 89 percent of the service in 1985 and increased marginally to 90 percent in 1990.

The other categories of service, representing a total of about ten percent of the fixed-route services, experienced minor changes. Express and crosstown service each remained almost the same at 1.5 percent of service as express service declined by 0.9 percent and crosstown service declined by 0.4 percent of the system total. Inter-suburban service declined from eight percent of the service to seven percent of the system total.

The fare structure of the CDTA fixed-route services remained relatively constant over the period. A $0.15 increase from $0.60 to $0.75 in 1989 was the only increase in the base fare during the period. The prices of passes based on multiples of the base fare increased correspondingly. The remaining elements of the fare structure were unchanged, except the increase in the fares on the demand responsive systems from $2.00 to $2.25.

The performance of the five route types is mixed. Only one type of service placed "first" in more than one of the four major performance indicators used in this analysis

--- express service had both the highest passenger per vehicle hour and the highest operating ratio.

Local bus service had the lowest cost per hour, but had low passengers per hour and operating ratio. Radial bus service had the lowest cost per passenger, and the second highest passengers per hour and operating ratio.

Inter-suburban service generally had the lowest passengers per hour and highest cost per hour. Therefore, it had the lowest performance in six of the eight performance criteria.

The total number of lines of service provided in each of the five service types remained almost unchanged. There was a net change of one less line in 1990 compared to 1985, with the elimination of two local service lines and the addition of one crosstown line.

FUNCTIONAL CHANGES

There has been limited growth in fixed-route transit services in the Albany area. Most of the service is still oriented toward travel to and from the three central areas.

The CDTA lost almost a quarter of its ridership between FY85 and FY90. All service types except the small crosstown category lost between 15 and 25 percent of the passengers carried in FY85. Since the vast majority of users ride either local or radial services, most lost passengers were low-to-moderate income, transit dependent riders who used transit for work commuting and other purposes.

BACKGROUND

The Capital District Transportation Authority (CDTA) provides fixed-route and demand response services in the four county Capital District of New York. The four counties are Albany, Rensselaer, Saratoga, and Schenectady. The total urbanized area in the four counties is 1,760 square miles.

The service area contains three major central cities of Albany, Troy, and Schenectady, several smaller cities, and the major activity center that includes the State Office Building Campus and the campus of the State University of New York at Albany. Each of the three major cities has a college or university near its center. In addition, the service area includes several smaller urban centers, some of which are next to the three major cities in the region and are significant in the service structure.

This chapter presents a brief description of the changes that occurred in the Albany metropolitan area in terms of population, employment, and transit service during the period 1985 through 1990.

DEMOGRAPHIC CHANGES

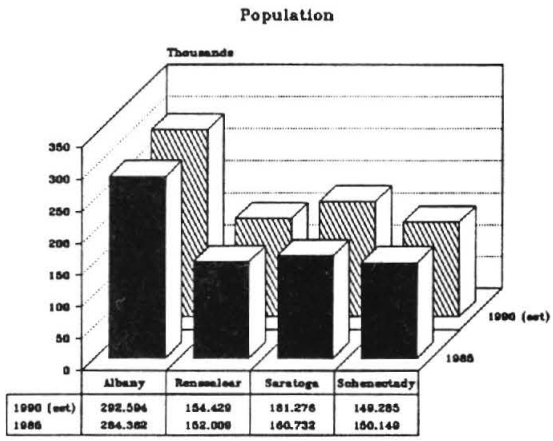
The population and employment of the Capital District have both increased moderately over the period (Exhibit 5). The total regional population increased four percent from 1985 to 1990, from 747,252 to 777,584, while the total number of jobs in the region increased by six percent, from 367,448 to 389,806.

The distribution of this growth among the four counties varied significantly. Albany County, which is at the center of the region (Exhibit 6) and comprises most the service area, grew moderately in both population and employment - at two percent and three percent respectively.

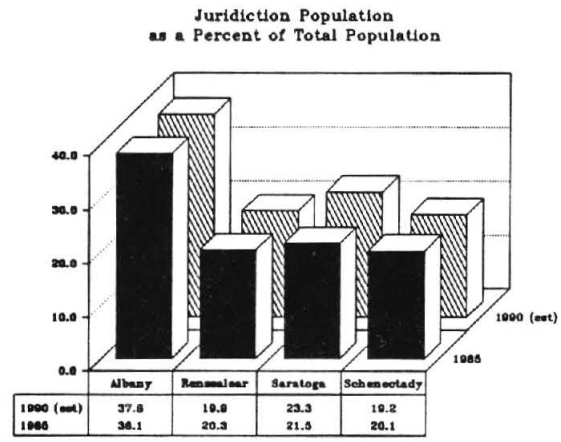
Saratoga County, which is at the northern end of the region and is the least urbanized county, experienced the fastest growth in both population and employment - at 13 percent and 38 percent respectively. Only a small portion of Saratoga County has any fixed-route service.

Rensselaer County experienced a modest population growth of two percent, but the number of jobs in the county increased by 15 percent. Schenectady County, on the other hand, experienced a decline in population of one percent and a decline in employment of five percent.

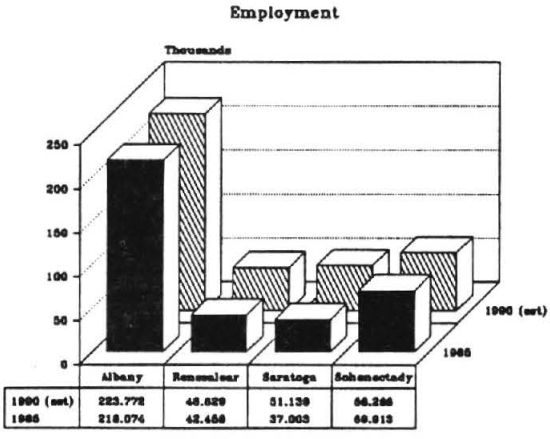
Exhibit 5
Albany Metropolitan Area
Population and Employment



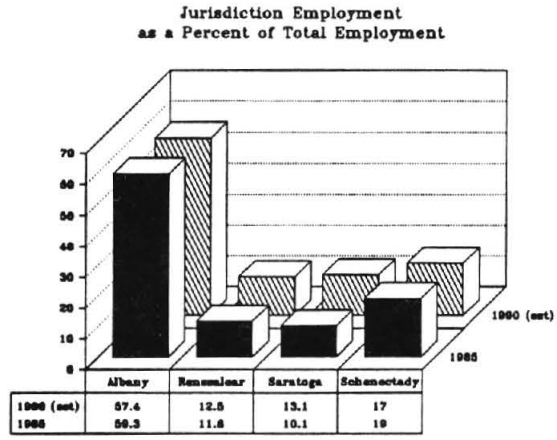
	Albany	Rensselaer	Saratoga	Schenectady
1990 (est)	292.594	154.429	181.276	149.285
1985	284.362	152.009	160.732	150.149



	Albany	Rensselaer	Saratoga	Schenectady
1990 (est)	37.8	19.9	23.3	19.2
1985	36.1	20.3	21.5	20.1



	Albany	Rensselaer	Saratoga	Schenectady
1990 (est)	223.778	46.529	51.139	66.266
1985	218.074	42.458	37.003	60.913



	Albany	Rensselaer	Saratoga	Schenectady
1990 (est)	57.4	12.5	13.1	17
1985	59.3	11.6	10.1	19

Source: Capital Regional Planning Comm.

Exhibit 6
Albany Metropolitan Area

Discounting the growth of employment in population and employment in Saratoga County, the net change in population and jobs in the rest of the region was two percent and three percent respectively. This rate of change is smaller than the margin of error for the estimates.

TRANSIT CHARACTERISTICS

The CDTA is a public benefit corporation that was established under state enabling legislation in the late 1960's as a multi-purpose regional transportation agency. It is empowered to own and operate rail, airport, transit, and port services and facilities. Except for some recent consideration of taking over the regional commercial airport, the CDTA's activities over the past two decades have been focussed primarily on transit.

The current system is a unified operation that is an amalgamation of three formerly private transit carries that operated separate transit systems in Albany, Schenectady, and Troy. The CDTA has replaced the former facilities and fleet of the former carriers, and has integrated and expanded the route structures of the three systems into a single regional network.

The Board of Directors of the CDTA is appointed by the Governor, subject to the advice and consent of the State Senate. Three members must be residents of Albany County. The other three counties each have two representatives on the Board. The Authority lacks taxing powers. Its "local" funding comes from a variety of transit assistance programs legislated by New York State.

The system is managed by an internal management team that has had considerable longevity. Two of the key managers have been on board for over 20 years, and others have been with the system for over ten years.

The CDTA is the only public transit carrier in the region. There are several small, specialized service operators, and a few charter and subscription services operating in the region.

The CDTA provides both fixed-route and demand responsive services. The fixed-route services have been relatively constant between 1985 and 1990, while the paratransit system has grown substantially.

The miles of service provided by the paratransit system has increased from three percent of the total CDTA services in 1985 to twelve percent in 1990. At the same time, the costs of the paratransit operations have increased from two percent to six percent of the total cost of operations.

The number of buses in service in the peak hours has increased slightly from 182 in 1985 to 185 in 1990. The number of paratransit vehicles in service increased from four to eleven.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

Fixed-route service increased between 1985 and 1990 by about six percent in terms of vehicle hours (Exhibit 7). The number of peak vehicles required for fixed-route service increased slightly from 182 to 185. The number of fixed-routes operated on weekdays, Saturdays, and Sundays was virtually the same in 1985 as it was in 1990 with the increase of two routes on Sundays being the only net change.

Although service levels remained stable, ridership declined. Total boarding passengers in 1990 were only 77 percent of the passenger level in 1985 (Exhibit 8).

FARE STRUCTURE

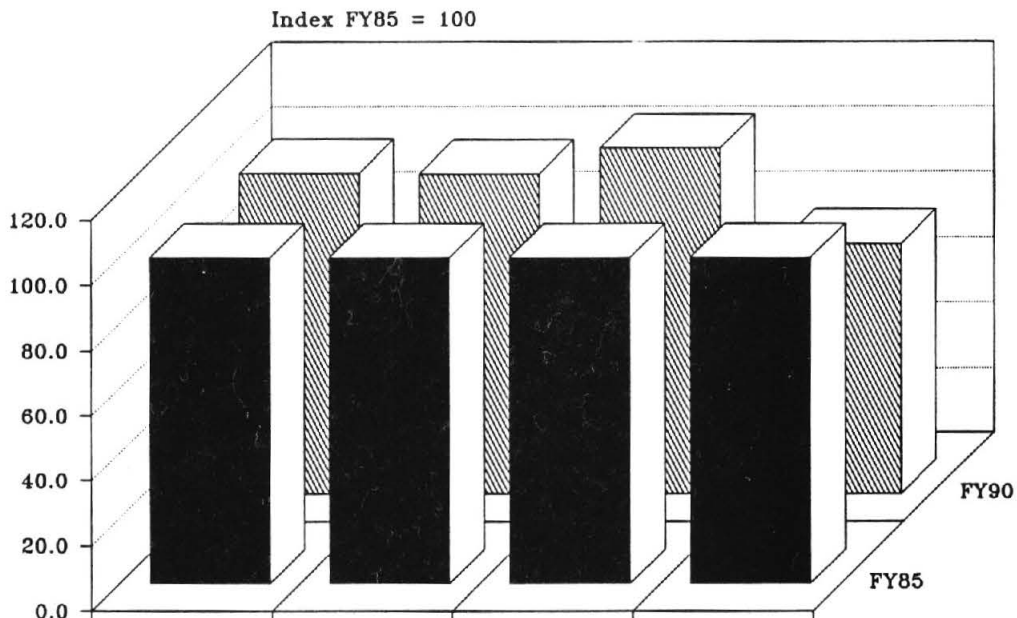
The fixed-route fare structure is a distance based system, with fare zone boundaries arranged in concentric circles around the three urban cores. The first zone boundary is approximately seven miles from the centers, and the second zone boundary is about 12 miles out. The boundaries of the zones are designed to be consistent among the routes that serve the three urban centers. Since many express and inter-suburban routes cross more than one zone, they tend to have higher average fares than other routes.

Only one change was made in the fare structure from 1985 through 1990 (Exhibit 9). The base fare was increased $0.15 in June, 1990, from $0.60 to $0.75. The prices of the five day and seven day passes, which are priced at multiples of 40 and 50 times the base fare respectively, were also raised accordingly.

Exhibit 7
FY85-FY90 CDTA Operating Performance

Operating Statistic	FY85	FY90	Change
Peak Vehicles	182	185	1.6%
# Weekday Lines	55	54	-1.8%
# Saturday Lines	37	39	5.4%
# Sunday Lines	12	12	0.0%
Vehicle Hours	460,440	489,149	6.2%
Vehicle Miles	5,509,381	5,198,425	-5.6%
Passenger Boardings	16,099,782	12,379,806	-23.1%
Passenger Miles	55,834,302	55,813,990	0.0%
Operating Costs	$16,349,187	$18,872,463	15.4%
Farebox Revenue	$6,554,355	$6,744,708	2.9%

Exhibit 8
FY85-FY90 CDTA Operating Trends



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	98.4	98.2	106.2	76.9
FY85	100.0	100.0	100.0	100.0

Exhibit 9
CDTA Fare Structure

	FY85		FY90		Change FY85-FY90	
	Base	Maximum	Base	Maximum	Base	Maximum
Adult Cash Fare	$0.60	$1.05	$0.75	$1.25	25.0%	19.0%
Five-Day Pass	$24.00	$24.00	$30.00	$30.00	25.0%	25.0%
Seven-Day Pass	$30.00	$30.00	$37.50	$37.50	25.0%	25.0%

MIX OF FIXED-ROUTE SERVICES

This section describes the performance of the fixed-route system of the CDTA by type of fixed-route service.

BUS SERVICE CLASSIFICATION

The CDTA's fixed-route bus services are divided into five types of routes. Sometimes, an individual route might fall into more than one category. For example, a route might operate as a radial service but the trips on the route may be mostly short, local, trips. Similarly, an express route might have many characteristics of a radial route. In developing this route classification, each route has been assigned to the category appropriate to its major characteristics.

Five bus service classifications were used in this case study:

- **Local** routes operate within the immediate environs of one of the three major central business districts, connecting them with the residential areas surrounding them, and serving origins and destinations along the way. These routes are typically well established routes of long standing, or are variations on such traditional services. These services are used typically by low income, transit dependent riders for work commuting and other trip purposes.

- **Radial** routes are longer routes that tend to reach out beyond the traditional separate-city service areas of the three former private operators, but connect the three central business or government districts with newer suburban areas. They also include service along the major arterials that connect the three cities, and that have significant traffic generators along the way. Such generators include shopping centers, office buildings, medical centers, and other apartment complexes, and other residential and employment centers on the radial arterials. These services are used typically by low-to-moderate income, transit dependent riders for work commuting and by state employees and university students.

- **Express** routes consist of services that operate mainly on the Interstate system and other limited access highways, and operate most miles non-stop to a major, single destination. Both transit dependent riders and moderate income, choice riders use the service primarily for work commuting and other trip purposes.

- **Crosstown** routes operate from one section of the service area to another without passing through a central business district. Most of the lines operate within the

suburban jurisdictions and are used by low income, transit dependent riders for a variety of trip purposes.

- **Inter-suburban** routes operate between the smaller activity centers in the service area, and generally connect these centers with residential areas or a suburban population center. These services are used by moderate-to high income persons for work commuting and low income persons for other trip purposes.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

The general picture of the CDTA's fixed-route system is one of relatively little change among service types, but with the overall performance of the system affected by the combined impact of lower ridership and increased operating expenses. This section discusses trends in service levels and performance among the five bus types --- local, radial, express, crosstown, and inter-suburban.

Local Service

Local service represents about 40 percent of the hours of service provided in 1985 and 1990 (Exhibit 10). The number of lines of local service operated declined by two over the period, and the number of buses operated in the peak hour declined by one. Passenger boardings declined by 25 percent over the period, even as the hours of service increased by 5 percent. The fare box revenues remained relatively stable, due in part to the impact of the fare increase in 1990. The average fare on these routes increased dramatically, from $0.30 in 1985 to $0.50 in 1990.

The performance measures for this service category tended to be in the middle range of the five service types in 1985 (Exhibit 11). The passengers per hour and farebox return ranked third of five, while the cost per vehicle hour ranked second and the cost per passenger ranked second (Exhibit 12).

This general pattern persisted in 1990, although the local routes felt the loss of ridership most severely among the service types. The local service ranked second in cost per hour, and fourth in cost per passenger in 1990.

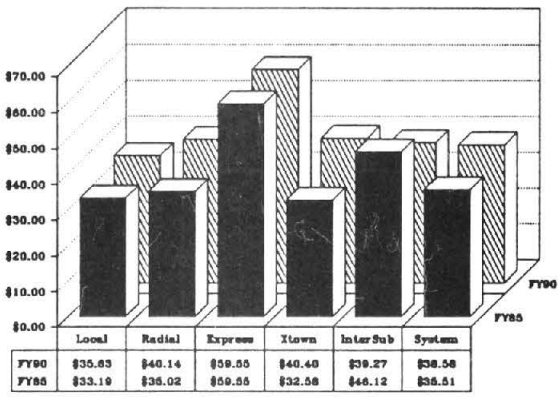
With passenger boardings and hours of service increasing, the number of passengers carried per hour decline by 28 percent over the analysis period, from 29.6 to 21.3. The operating ratio decline by 12 percent, while the cost per passenger increased by 49 percent. Also, the cost per hour of service declined by nine percent, as the costs increased less rapidly than the hours.

Exhibit 10
FY85–FY90 CDTA Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Vehicle Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Local	72	26	186,899	5,525,063	$6,204,110	$2,120,630
Radial	82	16	222,593	9,318,806	$7,794,468	$3,782,798
Express	7	3	7,115	344,577	$423,707	$206,073
Crosstown	2	2	6,999	122,987	$228,005	$49,125
Inter–Suburban	19	8	36,834	788,349	$1,698,898	$395,730
Total CDTA Bus	182	55	460,440	16,099,782	$16,349,188	$6,554,356
FY90						
Local	71	24	195,453	4,166,527	$6,964,728	$2,105,582
Radial	85	16	245,046	7,072,815	$9,836,932	$3,926,459
Express	8	3	7,490	279,110	$446,004	$230,847
Crosstown	3	3	7,403	190,969	$299,100	$97,575
Inter–Suburban	18	8	33,756	670,384	$1,325,699	$387,244
Total CDTA Bus	185	54	489,148	12,379,805	$18,872,463	$6,747,707
Percent Change FY85 to FY90						
Local	–1.4	–7.7	4.6	–24.6	12.3	–0.7
Radial	3.7	0.0	10.1	–24.1	26.2	3.8
Express	14.3	0.0	5.3	–19.0	5.3	12.0
Crosstown	50.0	50.0	5.8	55.3	31.2	98.6
Inter–Suburban	–5.3	0.0	–8.4	–15.0	–22.0	–2.1
Total CDTA Bus	1.6	–1.8	6.2	–23.1	15.4	2.9

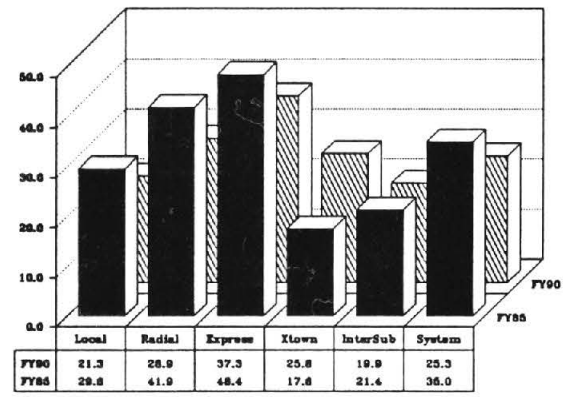
Exhibit 11
FY85-FY90 CDTA Bus Service Type Performance Trends

Cost per Vehicle Hour



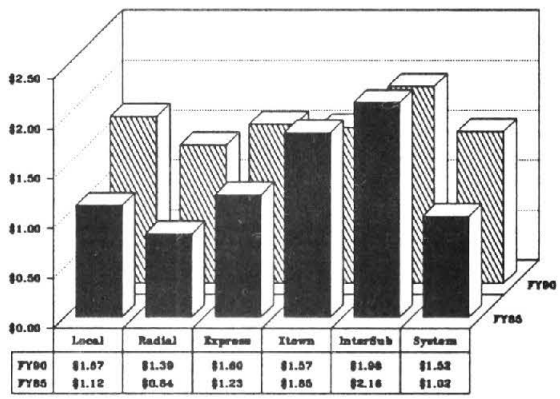
	Local	Radial	Express	Xtown	InterSub	System
FY90	$35.63	$40.14	$59.55	$40.40	$39.27	$36.58
FY85	$33.19	$36.02	$59.55	$32.58	$46.12	$36.51

Passengers per Vehicle Hour



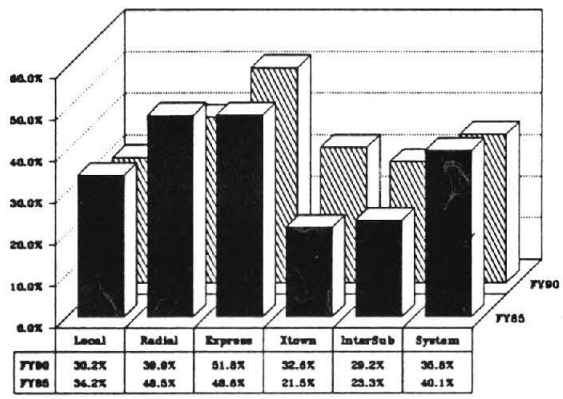
	Local	Radial	Express	Xtown	InterSub	System
FY90	21.3	28.9	37.3	25.8	19.9	25.3
FY85	29.8	41.9	48.4	17.8	21.4	36.0

Cost per Passenger Boarding



	Local	Radial	Express	Xtown	InterSub	System
FY90	$1.67	$1.39	$1.60	$1.57	$1.98	$1.52
FY85	$1.12	$0.86	$1.23	$1.85	$2.16	$1.02

Percent Farebox Revenue of Cost



	Local	Radial	Express	Xtown	InterSub	System
FY90	30.2%	30.8%	51.8%	32.6%	29.2%	35.8%
FY85	34.2%	48.5%	48.6%	21.5%	23.3%	40.1%

Exhibit 12
FY85-FY90 CDTA Bus Service Type Performance Measures

Service Type	Cost/ Veh Hr	Pass/ Veh Hr	Cost/ Pass	Revenue/ Cost
FY85				
Local	$33.19	29.56	$1.12	34.2%
Radial	$35.02	41.86	$0.84	48.5%
Express	$59.55	48.43	$1.23	48.6%
Crosstown	$32.58	17.57	$1.85	21.5%
Inter-Suburban	$46.12	21.40	$2.16	23.3%
System	*$35.51*	*34.97*	*$1.02*	*40.1%*
FY90				
Local	$35.63	21.32	$1.67	30.2%
Radial	$40.14	28.86	$1.39	39.9%
Express	$59.55	37.26	$1.60	51.8%
Crosstown	$40.40	25.80	$1.57	32.6%
Inter-Suburban	$39.27	19.86	$1.98	29.2%
System	*$38.58*	*25.31*	*$1.52*	*35.8%*
Percent Change FY85 to FY90				
Local	7.3%	-27.9%	48.9%	-11.6%
Radial	14.6%	-31.1%	66.3%	-17.8%
Express	0.0%	-23.1%	30.0%	6.4%
Crosstown	24.0%	46.8%	-15.5%	51.4%
Inter-Suburban	-14.9%	-7.2%	-8.2%	25.4%
System	*8.7%*	*-27.6%*	*50.1%*	*-10.8%*

Radial Service

The CDTA operated 85 buses on 24 radial routes in 1990, or about the same as in 1985 (Exhibit 10). The hours of service operated on radial routes increased 10 percent, from 225,593 in 1985 to 245,046 in 1990. Ridership on the routes decreased 24 percent, from 9.3 million in 1985 to 7.1 million in 1990. This loss of ridership can be partially attributed to the 36 percent increase in the average fare on these routes, from $0.40 to $0.55.

The operating expenses associated with this service increased by 26 percent over the period from $7.8 million to $9.8 million. The revenue on the services increased by 3.8 percent with the higher average fare offsetting the lower ridership.

The cost per service hour increased by 14 percent, from $35.02 to $40.14, while the passengers per vehicle hour declined by 31 percent, from 41.6 to 28.9 (Exhibit 11). Even with this decline, the performance is well above the planning standard of 20 passengers per hour.

Express Service

The three express service routes provided by the CDTA represent a small percentage of the total system, at 1.5 percent of the hours operated (Exhibit 10). Most routes are new in the past 15 years, whereas many local and radial routes have been in existence, in something like their present form, for many years.

The service levels have remained relatively constant, with hours of service increasing by five percent and the number of buses used in service increasing from seven to eight. Ridership on the service decreased 19 percent, and the fare box revenues increased 12 percent. Operating expenses of the express routes increased five percent.

The performance measures for the express services reflect the impact in the trends of the service and the financial results (Exhibit 11). The cost per revenue hour of the express service is virtually unchanged, as the number of hours and the costs of the service both increased by five percent (Exhibit 12). The number of passengers per hour declined 23 percent from 48 in 1985 to 37 in 1990, but is still well above standards for express services.

The cost per passenger increased 30 percent, but remained below the average of the system as a whole. The farebox return increased by six percent, and was the highest among the five categories of service in both 1985 and 1990.

Crosstown Service

This relatively small category of service was provided on two routes in 1985, and increased to three by 1990 (Exhibit 10). The number of buses used in the service also increased from two to three (one bus per route), reflecting the relatively low level of service on these routes. The number of hours operated on these routes was the lowest among the five service types, but increased by six percent over the period from 6,999 in 1985 to 7,403 in 1990.

The service was the only one to increase ridership from 1985 to 1990, with a 55 percent increase from 122,987 passengers to 190,969 passengers. Operating expenses increased by 31 percent, and the fare box revenue increased almost 100 percent, reflecting the combined impact of the increase in riders and the increase in fares. The average fare on these routes was 37 percent higher in 1990 than it was in 1985.

The operating performance of this class of service showed a mixed result, with the cost per hour increasing by 24 percent, but with the other three measures improving (Exhibit 11). The number of passengers carried per hour increased by 47 percent, the cost per passenger decreased by 16 percent, and the farebox return improved by 51 percent (Exhibit 12).

Inter-Suburban Service

This category of services at the CDTA represents about seven percent of the total hours of operation (Exhibit 10). It reflects the relatively high importance of travel between various points other than the three major urban centers in the region.

The CDTA dedicated 18 buses to the eight routes in this service in 1990, which is one bus less than was used in 1985. The number of hours of service operated on these routes declined by 8 percent from 1985 to 1990, from 36,834 hours to 33,756 hours. The utilization of the service declined from 1985 to 1990 by 15 percent, from 788,349 riders to 670,384.

The operating costs of these routes declined by 22 percent over the period, reflecting the lower number of hours and the elimination of one bus. The revenues were 2 percent lower in 1990 than in 1985. The average fare on these routes increased by 14 percent.

The performance measure trends for this service type tended to be the lowest among the five service categories (Exhibit 11). Of the eight possibilities in the four measures for the two years, the inter-suburban services ranked lowest in six categories, and second lowest in the other two (Exhibit 12).

The trends in the performance measures showed some improvement, as the cost per hour declined by 15 percent, the cost per passenger declined by eight percent, and the

farebox return increased by 25 percent. However, the number of passengers per hour declined by seven percent.

Los Angeles County Area

SUMMARY

Los Angeles County travelers are served by 10 public transit operators. The Southern California Rapid Transit District (SCRTD), the regional transit operator, is by far the largest operator. It operates about 83 percent of the total service miles operated in FY90.

Except SCRTD, which provides service throughout most of the County and into several neighboring counties, most of the 10 transit providers operate in a somewhat limited service area, and in primarily suburban areas. Most of the operators (primarily cities) provide local service within their city limits and may offer one or two routes into neighboring municipalities. Many provide opportunities for transfers to SCRTD service or neighboring transit systems.

DEMOGRAPHIC CHANGES

The Los Angeles area grew substantially between 1985 and 1990. Population expanded by more than 10 percent to over 14 million. Over 8.9 million of these residents lived in Los Angeles County. Employment in Los Angeles County also expanded, by 24 percent, to 4.7 million. Growth in neighboring counties has been even more dramatic, as new developments have sprung up to meet the increasing demand for affordable housing.

Employment development has not followed as quickly to these areas and central Los Angeles remains the dominant employment destination. The spreading population without a complementary shift of employment has increased travel distances for many area residences and taken them farther from the areas of Los Angeles currently served by transit.

TRANSIT SERVICE CHANGES

Nearly 81 million weekday vehicle service miles and 6.5 million revenue hours were operated on 249 routes in FY90 in Los Angeles County. This service level required over 2,300 buses during the peak period. Total ridership on all the routes in FY90 was nearly 374 million boardings.

The service operated in FY90 represented a 2.5 percent decline in total revenue miles from FY85 revenue miles and a slight increase of 1.1 percent in total revenue hours. The number of routes operated decreased 8.1 percent, from 271 to 249, although the number of peak vehicles needed in FY90 was slightly higher (0.3 percent) than that

needed in FY85. Despite this relatively constant level of revenue miles and hours, however, passenger boardings decreased from nearly 450 million in FY85 to 374 million in 1990, a 16.7 percent decline.

The decline in service was driven by service reductions at SCRTD, the largest transit provider in the County. Service levels were relatively stable between 1985 and 1988. Between 1988 and 1989, however, SCRTD reduced annual weekday service by 5.4 million miles, 7.5 percent of its total. Some of this service was assumed by other transit operators. However, because of budget constraints, other service was dropped and total service in the County declined.

The number of revenue hours increased slightly to accommodate the somewhat slower operating speeds caused by increased congestion and delay throughout the region. The number of operating vehicles also increased, in part due to the slower operating speeds and management decisions to maintain FY85 headways.

Operating costs increased across the analysis period by 27.7 percent or about five percent per year. This increase was slightly higher than the three to four percent annual inflation rate experienced during the period. It was related to the added costs of operating service at slower speeds.

Farebox revenue more than kept pace with costs, however, even with the ridership decline. Revenue increased nearly 80 percent due to a more than 100 percent increase in the transit fare at SCRTD.

Passengers per vehicle hour declined between FY85 and FY90 by 18 percent from 69.6 to 57.4. This decline reflects both an increase (1.1 percent) in the number of revenue hours operated (due to traffic congestion) and a decrease (16.7 percent) in the number of passenger boardings.

Transit service operated in FY90 also was more expensive per unit, than that operated in FY85. The cost per revenue hour rose from $62.53 to $79.03, an increase of more than 26 percent during the five year period.

The combination of rising costs and lower passenger productivity increased the costs of carrying passengers. The cost per passenger rose from $0.90 to $1.38, an increase of over 50 percent.

Fares covered a larger percentage of costs in FY90 than in FY85. Farebox revenue recovery rate (revenue/cost) increased 40.6 percent to 40.7 percent during the five years.

FUNCTIONAL CHANGES

There has been limited growth in fixed-route transit services in the Los Angeles County area. Most of the services are local, either connecting downtown Los Angeles with city neighborhoods or providing community-based service in suburban areas.

Ridership declined by almost 17 percent between FY85 and FY90. Both local and express service types lost passengers that they carried in FY85. Since the vast majority of users ride local services, most lost passengers were low-to-moderate income, transit dependent riders who used transit for work commuting and other purposes.

BACKGROUND

This chapter presents a brief description of the changes that occurred in Los Angeles County in terms of population, employment, and transit service during the period FY85 through FY90.

DEMOGRAPHIC CHANGES

The Los Angeles area is one of the largest, and fastest growing, metropolitan areas in the country (Exhibit 13). In 1990, its population was 14.6 million (Exhibit 14), of which 2.0 million were new residents since 1985. Over 8.9 million of these residents lived in Los Angeles County, the most urbanized segment of the Los Angeles area, and the primary focus of this case study. Employment in both Los Angeles County and the region also grew substantially between 1985 and 1990, increasing 29 percent from just 5.6 million to 7.2 million.

Although the County's growth has been substantial, growth in population in the neighboring Counties of Orange to the south, San Bernadino and Riverside to the east, and Ventura to the west, has been even more dramatic. New developments have sprung up to meet the increasing demand for affordable housing. Most of the development has been traditional, low-density, suburban development that is not easily or efficiently served by transit.

Employment development has not followed as quickly to these new areas. Central Los Angeles and other employment centers, such as Century City, near to downtown, remain the dominant employment destinations.

The spreading of the population without a complementary shift of employment has increased travel distances for many area residences and taken them farther from the areas of Los Angeles currently served by transit. The combination of factors has made area residents even more reliant on the automobile for travel needs.

TRANSIT CHARACTERISTICS

Like many large metropolitan areas, Los Angeles County is served by more than one transit operator. In FY90, ten public operators (North County service includes two separate systems) provided transit service in the region (Exhibits 15 and 16).

Exhibit 13
Los Angeles Metropolitan Area

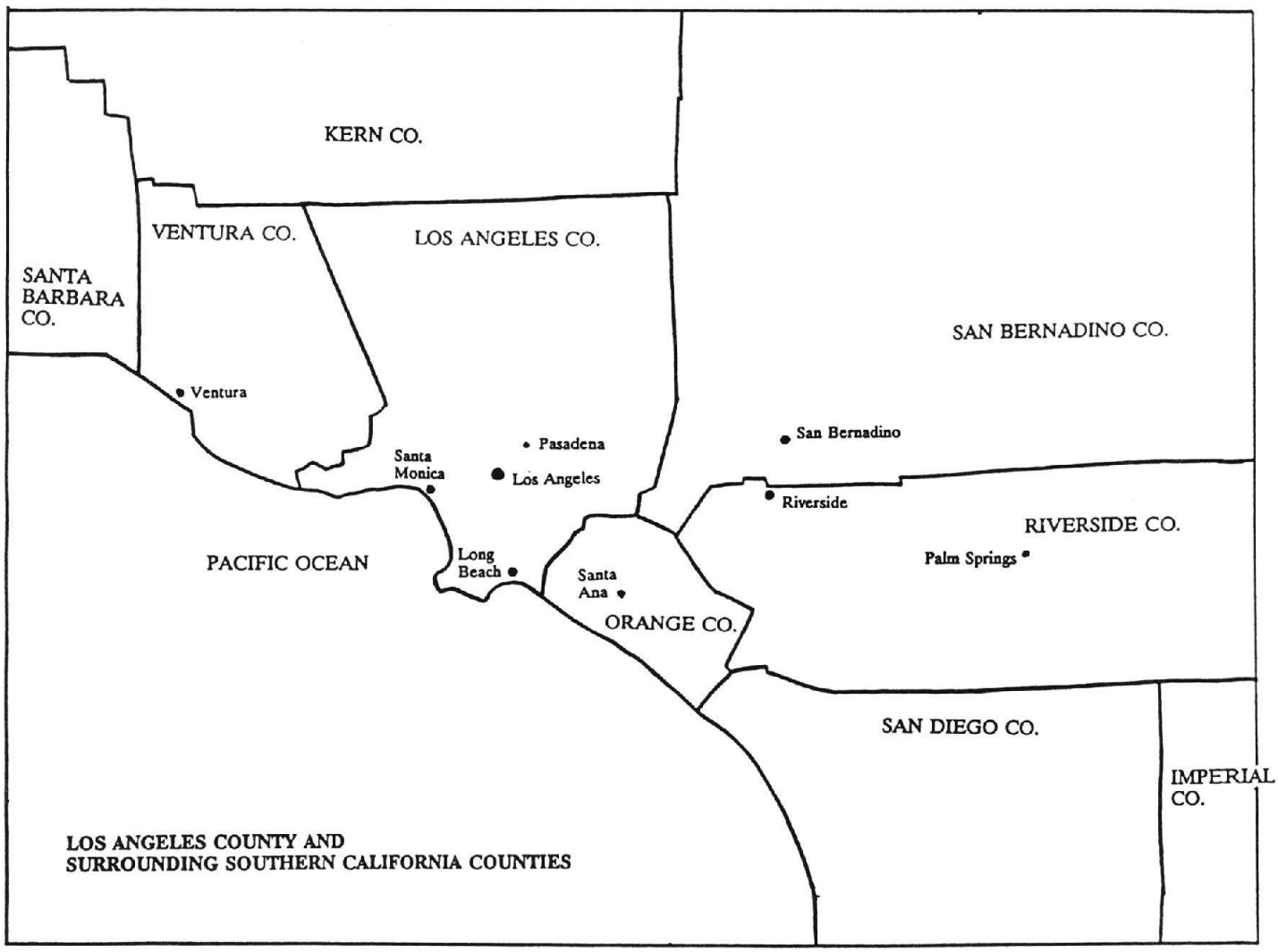
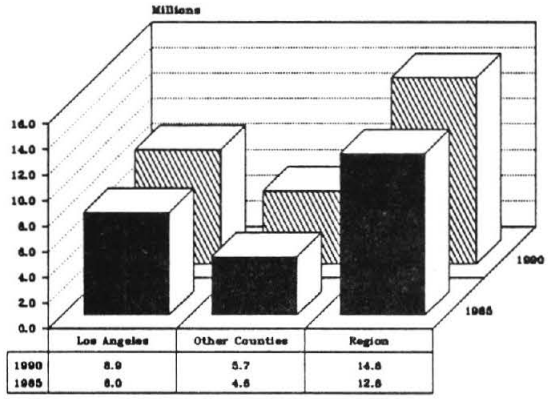


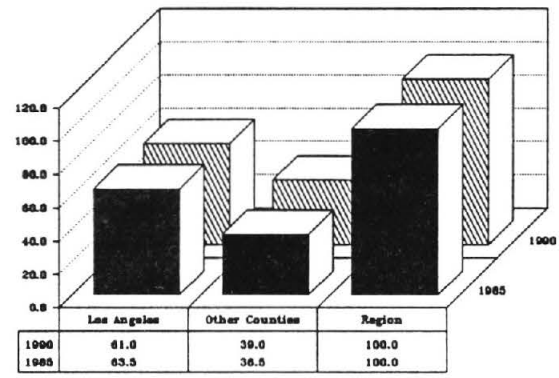
Exhibit 14
Los Angeles Metropolitan Area
Population and Employment

Population



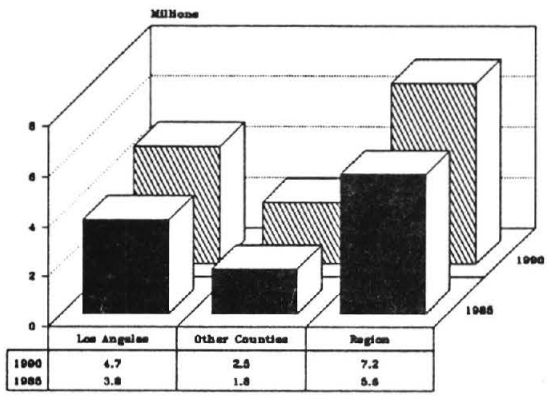
	Los Angeles	Other Counties	Region
1990	8.9	5.7	14.6
1985	8.0	4.8	12.8

Juridiction Population
as a Percent of Total Population



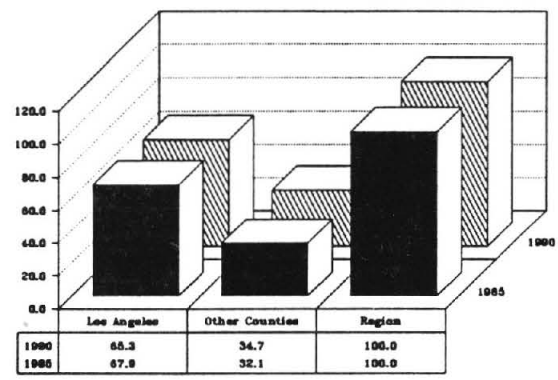
	Los Angeles	Other Counties	Region
1990	61.0	39.0	100.0
1985	63.5	36.5	100.0

Employment



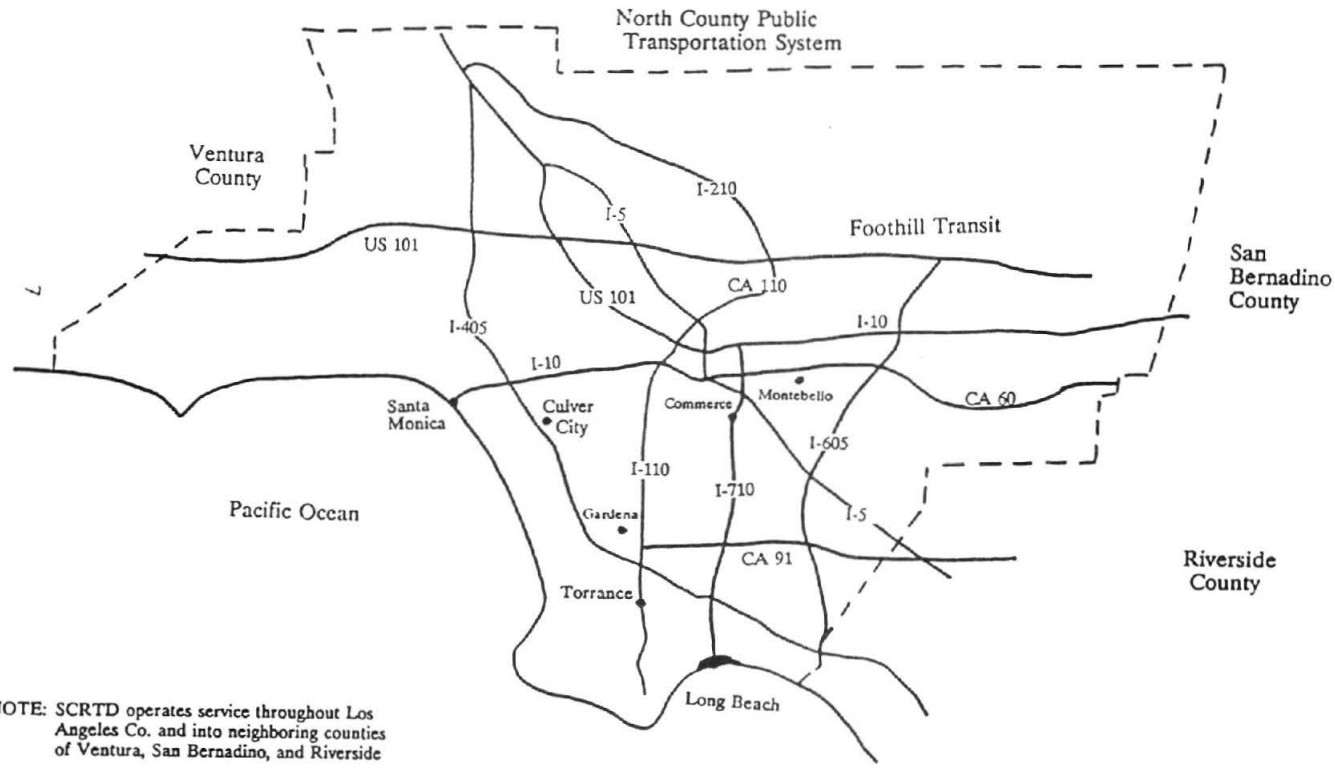
	Los Angeles	Other Counties	Region
1990	4.7	2.5	7.2
1985	3.8	1.8	5.6

Jurisdiction Employment
as a Percent of Total Employment



	Los Angeles	Other Counties	Region
1990	65.3	34.7	100.0
1985	67.9	32.1	100.0

Exhibit 15
Public Bus Operators in Los Angeles County



NOTE: SCRTD operates service throughout Los Angeles Co. and into neighboring counties of Ventura, San Bernadino, and Riverside

Exhibit 16
Public Bus Operators in Los Angeles County
FY90 Operating Statistics

Bus Operator	Peak Vehicles	Revenue Hours
City of Commerce Transit Service	6	13,000
Culver City Municipal Bus Lines	21	68,000
Foothill Transit Zone	39	70,100
Gardena Municipal Bus Lines	31	69,000
Long Beach Transit	134	401,000
Montebello Bus Lines	29	95,100
North County Public Transportation System[1]	29	42,000
Santa Monica Municipal Bus Lines	106	232,200
Southern California Rapid Transit District	1,889	5,430,000
Torrance Transit	28	94,400
Totals	**2,312**	**6,514,800**

[1] *Includes Santa Clarita Valley (SCV) Local Bus and Antelope Valley Bus*

The Southern California Rapid Transit District (SCRTD) was by far the largest transit provider. It operated 5.4 million revenue hours annually or about 84 percent of the total revenue hours operated in FY90.

No other provider approached SCRTD in service provided. Long Beach Transit and Santa Monica Municipal Bus Lines each operate over 100 daily peak vehicles with the remaining providers each scheduling less than 40 daily peak vehicles.

With one exception, all ten transit systems also operated service in FY85. The single exception, Foothill Transit Zone, began service in 1988. It was created in late 1987 to assume service, then provided by SCRTD, in the foothills of the San Gabriel Mountains, north-east of downtown Los Angeles.

SCRTD provides service throughout most of Los Angeles County and the neighboring counties of Ventura, Orange, and San Bernadino. Long Beach Transit offers service in a ten-city area centered on Long Beach. North County serves a large but sparsely populated part of north Los Angeles County.

The remaining transit providers operate in relatively limited suburban service areas. Most of these operators (primarily cities) provide local service only within their city limits and/or offer one or two routes into neighboring municipalities. Many provide opportunities for transfers to SCRTD service or service of neighboring transit systems.

SCRTD also operates one rail transit line, the Metro Blue Line, which runs between Long Beach and downtown Los Angeles. Several transit operators provide feeder bus service to Metro stations. Rail service is not included in this analysis since service did not begin until July 1990, the beginning of the 1991 fiscal year.

The two largest of the 10 properties, SCRTD and Long Beach Transit, are detailed more completely in separate case studies prepared by COMSIS for the FTA in 1990. Readers interested in learning more about these prominent Los Angeles transit providers are referred to those reports.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

Nearly 81 million weekday revenue miles and 6.5 million revenue hours were operated in FY90 in Los Angeles County (Exhibit 17). This service level required over 2,300 buses during the peak period and provided service on 249 routes. Total ridership in FY90 was nearly 374 million boardings.

The service operated in FY90 represented a 2.5 percent decrease in total revenue miles from FY85 miles and a slight increase of 1.1 percent in total revenue hours (Exhibit 18). The number of routes operated decreased 8.1 percent, from 271 to 249, although the number of peak vehicles needed in FY90 was slightly higher (0.3 percent) than that needed in FY85. Despite this relatively constant level of service miles and hours, passenger boardings decreased from nearly 450 million in FY85 to 374 million in FY90, a 16.7 percent decline.

The decreases in revenue miles and weekday routes were driven by service reductions at the Southern California Rapid Transit District (SCRTD), the regional, and largest, transit provider in the County. Service levels were relatively stable between FY85 and 1988. Between 1988 and 1989, SCRTD's annual weekday revenue miles decreased 5.4 million miles, 7.5 percent of its total.

Some of this service was assumed by other transit operators. The new Foothill Transit Zone began service in mid-1988, and the North County Public Transportation System assumed some SCRTD service in the Antelope and Santa Clarita Valleys in the northern section of Los Angeles County.

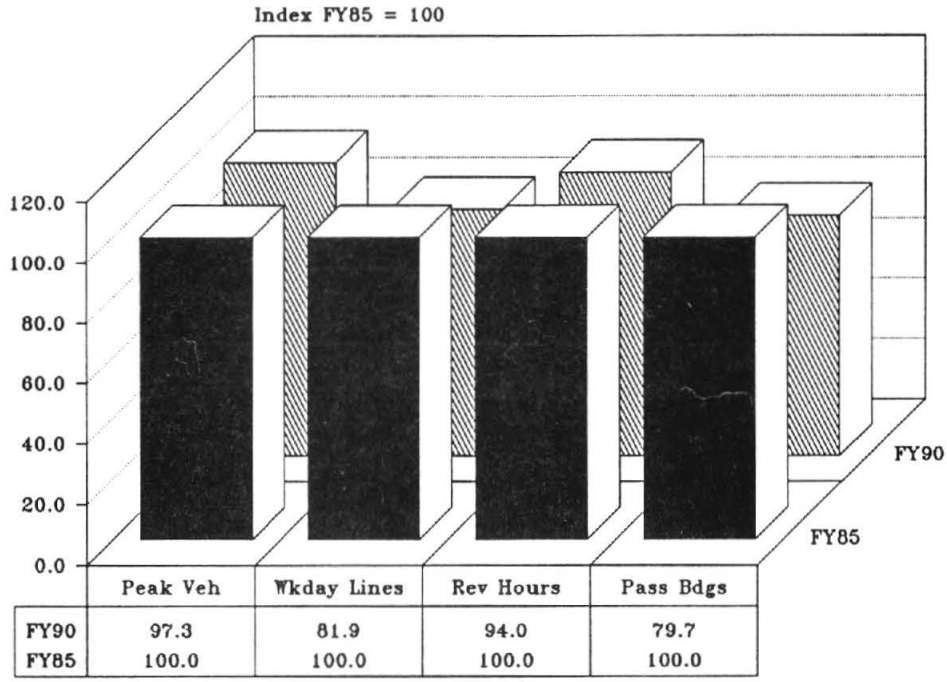
However, other service was eliminated due to budget constraints and was not replaced. Total service in the County decreased.

The number of revenue hours increased slightly, to accommodate the somewhat slower operating speeds, caused by increased congestion and delay throughout the region. The number of vehicles needed to operate regional service also increased in part due to the slower operating speeds and the decisions of transit properties to maintain FY85 headways.

Exhibit 17
FY85–FY90 Los Angeles Operating Performance

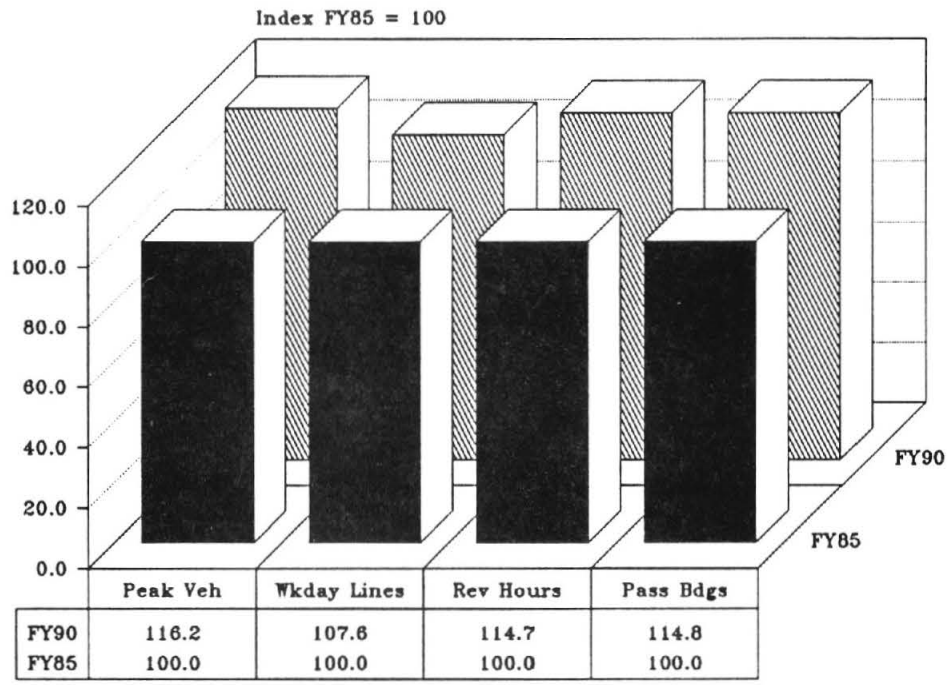
Operating Statistic	SCRTD			Other Providers			Total		
	FY85	FY90	Change	FY85	FY90	Change	FY85	FY90	Change
Peak Vehicles	1,942	1,889	-2.7%	364	423	16.2%	2,306	2,312	0.3%
# Weekday Lines	166	136	-18.1%	105	113	7.6%	271	249	-8.1%
Vehicle Hours	5,500,000	5,430,000	-1.3%	946,000	1,085,000	14.7%	6,446,000	6,515,000	1.1%
Vehicle Miles	71,327,000	67,075,000	-6.0%	11,678,000	13,850,000	18.6%	83,005,000	80,925,000	-2.5%
Passenger Boardings	402,700,000	321,025,000	-20.3%	45,879,000	52,660,000	14.8%	448,579,000	373,685,000	-16.7%
Operating Cost	$362,660,000	$459,803,000	26.8%	$40,441,000	$55,058,000	36.1%	$403,101,000	$514,861,000	27.7%
Farebox Revenue	$100,566,000	$190,748,000	89.7%	$16,168,000	$18,929,000	17.1%	$116,734,000	$209,677,000	79.6%

Exhibit 18
FY85-FY90 Los Angeles County Operating Trends
So. California Rapid Transit District



	Peak Veh	Wkday Lines	Rev Hours	Pass Bdgs
FY90	97.3	81.9	94.0	79.7
FY85	100.0	100.0	100.0	100.0

Other Providers



	Peak Veh	Wkday Lines	Rev Hours	Pass Bdgs
FY90	116.2	107.6	114.7	114.8
FY85	100.0	100.0	100.0	100.0

Service operating costs increased during the analysis period, by 27.7 percent or about five percent per year. This increase was slightly higher than the three to four percent annual inflation rate experienced during the period, and was related to the added costs of operating service under slower operating speeds.

Total transit ridership in the County decreased nearly 17 percent during the FY85 to FY90 period. As with revenue miles, the decrease was primarily due to a ridership decline at SCRTD, which lost 81.7 million annual passengers, 20.3 percent of its FY85 ridership. Transit ridership at Long Beach Transit decreased by more than 1 million, 6.3 percent of its FY85 ridership. Both transit operators increased fares during the period, SCRTD by more than 100 percent, and attributed ridership losses, in part, to the higher fares.

All other Los Angeles County transit operators experienced ridership increases during the period. Most had added service during the period while keeping fares at their FY85 levels, thus their ridership increases are not unexpected.

Farebox revenue more than kept pace with operating costs, even with the ridership decrease. Nearly all the operators increased passenger revenue between FY85 to FY90, in both absolute and percentage terms, at a higher rate than the growth in passenger boardings. SCRTD's significant increase was the result of a large fare increase, which more than compensated for its reduced passenger volume. Many other transit systems increased total revenue, without increasing fares, suggesting more effective fare collection and/or changes in the applicability of fares.

FARE STRUCTURE

Except for SCRTD, which more than doubled its base fare between FY85 and FY90, few transit systems in the County raised fares during the analysis period (Exhibit 19). In FY85, base fares ranged from $0.00 to $0.50. The most common fare was $0.50, charged by seven of the nine systems that provided service in FY85. Of the other two operators, City of Commerce offered free service and Torrance Transit charged $0.35.

Between FY85 and FY90, three of the nine operators increased their base fare including SCRTD. The SCRTD fare increase from $0.50 to $1.10 was the largest change among the operators. Due to the overwhelming dominance of SCRTD in the region, most transit riders experienced a significant fare increase during the FY85 to FY90 period.

Five transit systems provided express bus service in FY85, with fares ranging from $0.70 to $1.75. Except for North County, whose express service fare was $1.25 higher than its base fare, the express surcharge was $0.25 to $0.35. The high North County surcharge is due to the long-distance service (more than 40 miles) that it provides.

Exhibit 19
Los Angeles County Fare Structure

	FY85		FY90		Change FY85-FY90	
	Base	Express	Base	Express	Base	Express
City of Commerce Transit Service	$0.00	---	$0.00	---	0.0%	---
Culver City Municipal Bus Lines	$0.50	---	$0.50	---	0.0%	---
Foothill Transit Zone	---	---	$0.85	$1.20	---	---
Gardena Municipal Bus Lines	$0.50	---	$0.50	---	0.0%	---
Long Beach Transit	$0.50	$0.75	$0.60	---	20.0%	---
Montebello Bus Lines	$0.50	---	$0.50	---	0.0%	---
North County Public Transportation System	$0.50	$1.75	$0.50	$2.00	0.0%	14.3%
Santa Monica Municipal Bus Lines	$0.50	$0.80	$0.50	$0.80	0.0%	0.0%
Southern California Rapid Transit District	$0.50	$0.75	$1.10	$1.50	120.0%	100.0%
Torrance Transit	$0.35	$0.70	$0.50	$1.00	42.9%	42.9%

Express fares increased between FY85 and FY90 for three of the four transit operators that offered express service in both FY85 and FY90, with a FY90 range of $0.80 to $2.00. The largest increase again was from SCRTD, whose express fare doubled from $0.75 to $1.50.

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in transit service levels and performance by type of fixed-route service provided. The scheme used to classify bus service in Los Angeles County is presented first. This description is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

Transit service can include many types of service, serving different travel needs and populations. Except SCRTD service, which includes a broad range of service types such as community circulators, regional local service, crosstown, and express, for example, most transit service operated in Los Angeles County is community-based service in suburban areas.

Analyses of other transit systems prepared for this report explored as many as six types of service: local, radial, express, crosstown, rail feeder, and suburban. Due to the large number of transit systems included in this report, and the difficulty in compiling route level data for each, only two service type categories were used: local and express service.

- **Local** routes have terminals both within and outside the central business district (CBD). Service may be radial or crosstown. Boardings and alightings are unrestricted. These services are used typically by low income, transit dependent riders for work commuting and other trip purposes.

- **Express** routes have one terminal inside the central business district (CBD) and one outside. The direction of travel is typically radial and most service is operated only during the peak commuting periods. Boardings and alightings are limited, at least for the line haul portion of the trip, but more frequent stops are made in the terminal areas. Both transit dependent riders and moderate income, choice riders primarily use this service for work commuting and other trip purposes.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

The general picture of the fixed-route services in Los Angeles County is one of little change between the proportions of local and express bus service and the overall performance of the system affected by the impacts of lower ridership and farebox

revenues that increased at a faster rate than operating expenses. This section discusses trends in service levels and performance between local and express services.

Local Service

Local service represents about 84 percent of the revenue hours of service provided in FY85 and FY90 (Exhibit 20). During the analysis period, revenue miles decreased by 1.2 million (1.9 percent) and the number of local bus routes also decreased by seven routes (3.3) percent. Local revenue hours increased slightly (0.7 percent) reflecting a decrease from 11.9 mph to 11.6 mph in the average operating speed for local service as the result of increased traffic congestion.

Despite the decline in miles and routes, the number of peak vehicles was essentially the same (six additional vehicles). This was the result of transit systems' maintaining service frequency despite the slower operating speed.

Passenger boardings declined by 16 percent over the period, even as the hours of service remained stable. Despite the ridership decrease, farebox revenue increased for local service by 84 percent due to a more than 100 percent increase in the local service fares at SCRTD.

Local service operating costs also increased during the analysis period, by 28 percent or about five percent per year. This increase was slightly higher than the three to four percent annual inflation rate experienced during the period, and was related, in part, to the added costs of operating service at slower operating speeds.

Since most of service provided in the County is local, the performance measures for local service were similar to services as a whole (Exhibit 21). The values for all four measures --- cost per vehicle hour, passengers per vehicle hour, cost per passenger, and percent fare box revenue of cost ---- were within eleven percent of the County-wide values (Exhibit 22).

Express Service

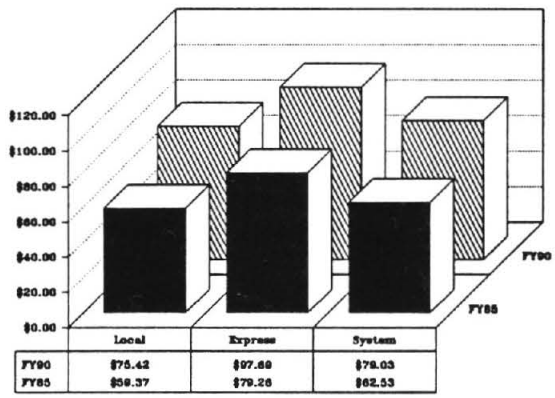
The express service represents 16 percent of the total service as measured by revenue hours provided in the County (Exhibit 20). Between FY85 and FY90, revenue miles for express service decreased almost as much as local service, but from a much smaller base. This 872,000 mile decrease was nearly a five percent decrease in total express miles, compared to a less than two percent decrease in local service. The number of express service hours also increased more, in percentage terms (2.9 percent increase), than did local service (0.7 percent increase). In FY90, express service operated at 16.5 mph, compared with 17.9 mph in FY85.

Exhibit 20
FY85–FY90 Los Angeles County Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Vehicle Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Local	1,844	215	5,420,600	404,389,900	$321,798,800	$96,989,800
Express	462	56	1,025,800	44,189,400	$81,302,400	$19,744,100
Total FY85	2,306	271	6,446,400	448,579,300	$403,101,200	$116,733,900
FY90						
Local	1,850	208	5,459,600	338,593,400	$411,778,700	$178,339,600
Express	462	41	1,055,200	35,091,500	$103,082,600	$31,337,000
Total FY90	2,312	249	6,514,800	373,684,900	$514,861,300	$209,676,600
Percent Change FY85 to FY90						
Local	0.3%	-3.3%	0.7%	-16.3%	28.0%	83.9%
Express	0.0%	-26.8%	2.9%	-20.6%	26.8%	58.7%
Total % Change	0.3%	-8.1%	1.1%	-16.7%	27.7%	79.6%

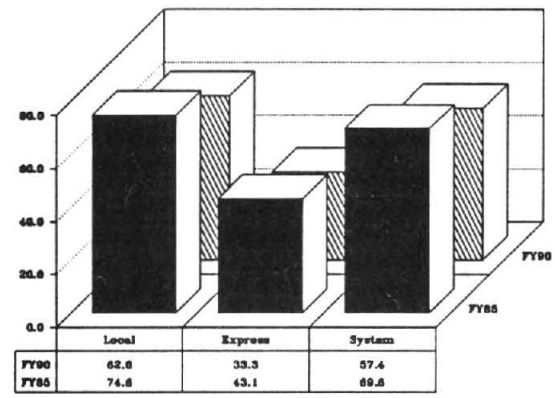
Exhibit 21
FY85-FY90 Los Angeles County Bus Service Type Performance Trends

Cost per Revenue Hour



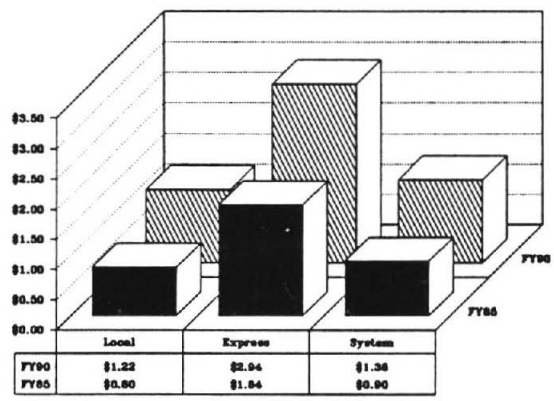
	Local	Express	System
FY90	$75.42	$97.68	$79.03
FY85	$56.37	$79.26	$62.53

Passengers per Revenue Hour



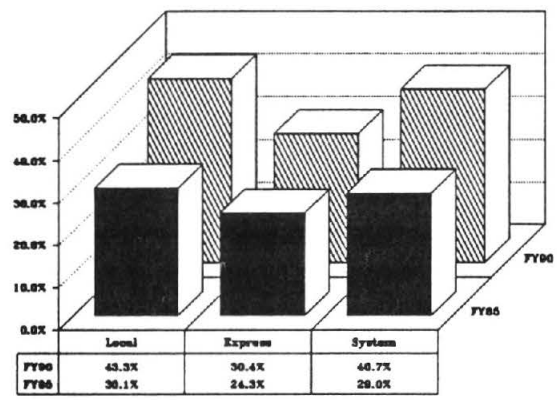
	Local	Express	System
FY90	62.6	33.3	57.4
FY85	74.6	43.1	69.6

Cost per Passenger Boarding



	Local	Express	System
FY90	$1.22	$2.94	$1.36
FY85	$0.80	$1.84	$0.90

Percent Farebox Revenue of Cost



	Local	Express	System
FY90	43.3%	30.4%	40.7%
FY85	30.1%	24.3%	29.0%

Exhibit 22
FY85-FY90 Los Angeles County
Bus Service Type Performance Measures

Service Type	Cost/ Rev Hr	Pass/ Rev Hr	Cost/ Pass	Revenue/ Cost
FY85				
Local	$59.37	74.60	$0.80	30.14%
Express	$79.26	43.10	$1.84	24.28%
System	$62.53	69.60	$0.90	28.96%
FY90				
Local	$75.42	62.00	$1.22	43.31%
Express	$97.69	33.30	$2.94	30.40%
System	$79.03	57.40	$1.38	40.72%
Percent Change FY85 to FY90				
Local	27.0%	-16.9%	52.8%	43.7%
Express	23.3%	-22.8%	59.7%	25.2%
System	26.4%	-17.6%	53.3%	-40.6%

The larger decrease in miles and larger increase in hours for express service resulted in an even greater decrease in the average express service operating speed. The service levels remained relatively constant, with an increase of three percent in the hours of service and no increase in the number of buses used in service.

Between FY85 and FY90, 15 express service routes were eliminated, reducing the total number of express service routes by one quarter. The reduction in routes did not affect the number of vehicles needed, however. In both FY85 and FY90, 462 vehicles were operated in express service.

Passenger boardings for express service decreased slightly more than for local service, 21 percent for express service compared to 17 percent for local service. This was consistent with the larger decrease in express revenue miles than local revenue miles.

Fare increases at several transit systems kept farebox revenues from decreasing; express service revenue was 59 percent higher in FY90 than in FY85. As with local service, express service operating costs increased during the analysis period, but not substantially higher than the average rate of inflation.

The performance measures for the express services reflect the impact in the service trends and the financial results (Exhibit 21). The cost per revenue hour of the express service increased 23 percent (Exhibit 22). The number of passengers per revenue hour declined 23 percent from 43 in FY85 to 33 in FY90.

These two trends combined to produce a 60 percent increase in the cost per passenger. The farebox return increased by 25 percent due to the large fare increases.

Miami Metropolitan Area

SUMMARY

This case study is an examination of the change in the mix of service provided in the Miami metropolitan area. It covers the period between FY85 and FY90 for the only transit provider in the area, the Metro-Dade Transit Agency (MDTA).

The total amount of transit service in the Miami area increased between 1985 and 1990. Bus service increased somewhat, but most of the expansion came in the introduction of two fixed guideway services: rapid rail service and a downtown people mover.

DEMOGRAPHIC CHANGES

The area served by the Metro-Dade Transit Agency experienced significant growth between 1980 and 1990, as Dade County's population rose by over 19 percent. However, this growth was focused in the area outside of the central city of Miami. Miami itself experienced a much smaller population increase (less than 4 percent). MDTA provides service -- both bus and rail -- throughout Dade County.

TRANSIT SERVICE CHANGES

MDTA's fixed route service, including both bus and rail (Metrorail and Metromover), increased by approximately 13 percent (in terms of vehicle hours) between 1985 and 1990. Both bus and rail service were expanded although the two rail services experienced much greater percentage increases: Metrobus service grew by 8 percent, Metrorail by 50 percent, and Metromover by 135 percent. On the other hand, while vehicle hours -- and vehicle miles, to a lesser extent -- were expanded, the number of bus routes was consolidated considerably (from 84 to 66, a 21 percent reduction).

Total passenger boardings increased by 21 percent during the five-year period. This net increase was due to significant growth in rail ridership (180 percent on Metrorail, 138 percent on Metromover), and a five percent increase in bus ridership.

MDTA restructured its bus system in 1986, as part of the Network '86 Project. This project involved conducting surveys and analysis and revamping the route structure to improve the total transit system. The changes included "...integration of routes, where appropriate; simplification, where possible; and consolidation, where necessary..." The restructuring focused on providing a grid-like system of local and "trunk" routes

throughout the County, with a feeder system to support Metrorail. Bus routes seen as duplicating Metrorail were eliminated.

This restructuring significantly reduced the number of bus routes from 84 in FY85 to 66 in FY90. On the other hand, the total number of vehicle hours of bus service was increased by approximately 8 percent.

The distribution among the different types of service was substantially changed. While the number of feeder routes was increased by more than a third, the numbers of local radial, crosstown, express and local distributor routes were each reduced. Local radial routes, which represented the single largest category in FY85 (over 30 percent of the routes and over 60 percent of the bus system vehicle hours), were reduced by more than 40 percent. In FY90, there were equal numbers of local radial and feeder routes, although the latter still accounted for more vehicle hours.

The number of crosstown routes was cut in half, while the number of vehicle hours was reduced by 50 percent. The number of express routes dropped from 10 to 4, although vehicle hours rose by 14 percent. The number of local distributor routes was also reduced during this period --- from four to a single route; vehicle hours were cut accordingly. Limited service was increased considerably, in terms of both number of routes and vehicle hours. Finally, the number of suburban routes remained about the same, although it received a 30 percent increase in vehicle hours.

Despite these changes, the relative proportion of service among the different categories remained largely the same in FY90. The major exception to the ranking in terms of amount of service provided was that feeder service rose to the second largest category, following local radial. Crosstown service dropped from second to fourth, following suburban service. These four categories together account for 95 percent of MDTA's bus service.

Regarding ridership, these four categories account for 98 percent of the FY90 bus system total. They fall in the same ranking as for service provided, as local radial routes alone carried approximately 47 percent of the total FY90 riders; however, this was down from over 70 percent in FY85. Feeder routes increased their share of riders greatly during the period --- from two to 27 percent. Crosstown and suburban routes combined to carry 24 percent of the total bus passengers in both FY85 and FY90, although the distribution between them shifted somewhat toward suburban in the latter year. The remaining three categories of service accounted for very small percentages of the bus ridership in both analysis years.

Local radial service has the highest passengers per vehicle hour and ranks second to suburban service in the lowest cost per vehicle hour. Local radial services tend to be used by low-to-moderate income, transit-dependent riders for various purposes, including work trips. The high passengers per vehicle hour and low costs per vehicle hour combine to make local radial service have the lowest cost per passenger; it also ranks first in terms of farebox recovery.

Crosstown service also is heavily used by transit dependent riders, and it ranks behind local radial in all of the performance categories (i.e., second in passengers per vehicle hour, cost per passenger, and farebox recovery, and third in cost per vehicle hour). The relative performance rankings of both local and crosstown service remained almost unchanged between FY85 and FY90.

In contrast to local and crosstown service, suburban and feeder routes are used by both transit dependent and choice riders from moderate-to-high income households. However, these categories differ in terms of major trip purpose. Feeder service is most often used for work trips, while suburban routes are used for a range of purposes -- often by young and elderly persons.

FUNCTIONAL CHANGES

There were dramatic shifts in the use of different types of services between FY85 and FY90. Ridership on local radial service declined by 13 million passengers. This shift affected transit dependent riders (i.e., low income, elderly, and young people) who ride local radial service for work and other trip purposes. Likewise, there was a loss of 2.1 million riders on the crosstown services that affected similar types of users.

Many of these riders probably shifted to feeder buses and use the rail system. Ridership on the feeder buses and rail system increased by 15 million and 11 million passengers, respectively.

There was an increase of 2.8 million passengers on suburban services. These services are used by both transit dependent and choice riders for a variety of trips.

BACKGROUND

The Metro-Dade Transit Agency (MDTA) offers a tri-modal transportation service for Dade County. Bus service extends throughout central Miami and the surrounding cities within Dade County.

Most bus routes connect with Metrorail, a 21-mile elevated rail line. The rail line runs from Hialeah to Dadeland, with stops almost every mile. In the central Miami area, Metrorail connects to the 1.9-mile Metromover, a local downtown "people mover" fixed guideway service.

The MDTA also provides the Special Transportation Service (STS) to meet the needs of handicapped riders. Transit service is also provided in Dade County by the Tri-rail system, a 67-mile long commuter service that also serves Broward and Palm Beach counties.

This chapter presents a brief description of the demographic and transit service changes that occurred in the Miami area between 1985 and 1990.

DEMOGRAPHIC CHANGES

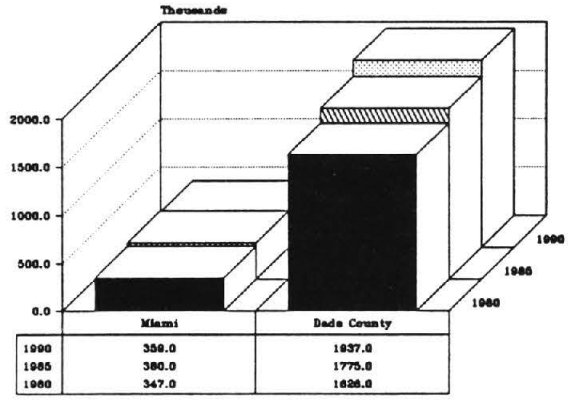
Dade County's population rose by 19 percent between 1985 and 1990 (Exhibit 23). The influx of Central American and Cuban refugees (primarily Marielitos) is reflected in the changing ethnic mix of the county. By 1990, Hispanics represented 49 percent of the County's population (an increase of 36 percent over 1980). During the same period, the central city of Miami increased by only 3.5 percent.

Miami's racial and ethnic group distributions correspond to various income patterns. For Dade County in 1980, non-Latino whites had higher average family incomes, lower poverty rates, and higher automobile ownership rates than either Hispanics or blacks. Minority neighborhoods generally had lower median household incomes than white areas.

Within MDTA's service area, Hispanics are concentrated within the northwest and central areas of the county. According to 1990 census figures, Hispanics represent large majorities in the following municipalities: Hialeah (88 percent) and Hialeah Gardens (82 percent) in the northwest; and Sweetwater (93 percent), Miami (63 percent), and West Miami (79 percent) in the central area. Except for West Miami, the median household income for these cities is often much below the Dade county mean, according to 1980 census figures.

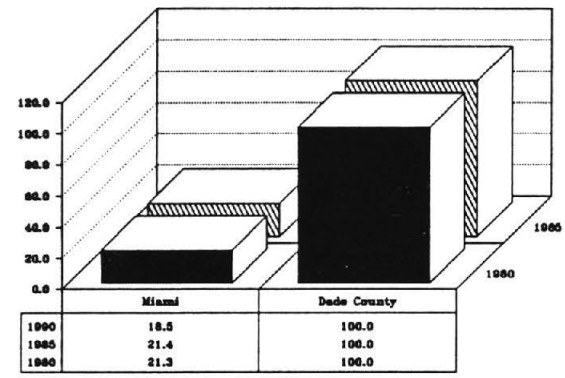
Exhibit 23
Miami Metropolitan Area
Population and Employment

Population



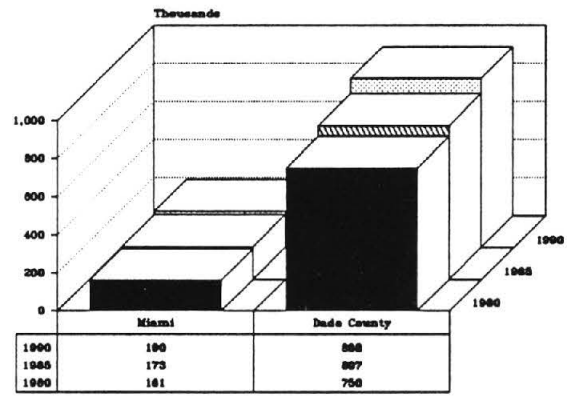
	Miami	Dade County
1990	358.0	1837.0
1985	380.0	1775.0
1980	347.0	1626.0

Juridiction Population
as a Percent of Total Population



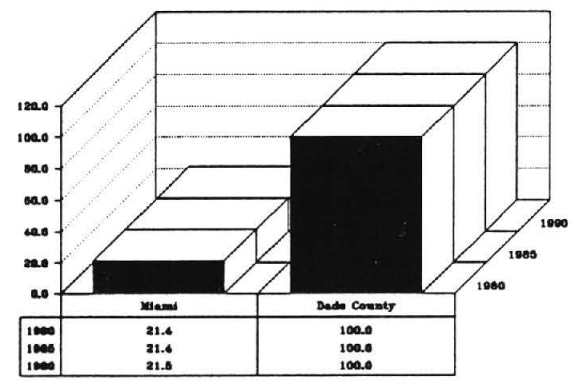
	Miami	Dade County
1990	18.5	100.0
1985	21.4	100.0
1980	21.3	100.0

Employment



	Miami	Dade County
1990	190	868
1985	173	807
1980	161	750

Jurisdiction Employment
as a Percent of Total Employment



	Miami	Dade County
1990	21.4	100.0
1985	21.4	100.0
1980	21.5	100.0

Whites are concentrated predominantly in the areas directly north of Miami Beach. Cities with high concentrations of non-Hispanic whites in 1990 include Bal Harbour (90 percent), Golden Beach (85 percent), Bay Harbor Islands (84 percent), and Biscayne Park (74 percent). As of 1980, these cities also had among the highest recorded median household incomes in the County.

Non-Hispanic blacks are concentrated in the northern and southern parts of the County. Cities with high (non-Hispanic) black concentrations in 1990 include Opalocka (65 percent), El Portal (52 percent) in the north and Florida City (60 percent) in the south. Areas with concentrations of 20 percent or more also include North Miami Beach, North Miami, Homestead, and Miami. According to 1980 figures, these cities are among the poorest in the County, with Florida City, Opalocka, and Homestead having the three lowest median household income figures.

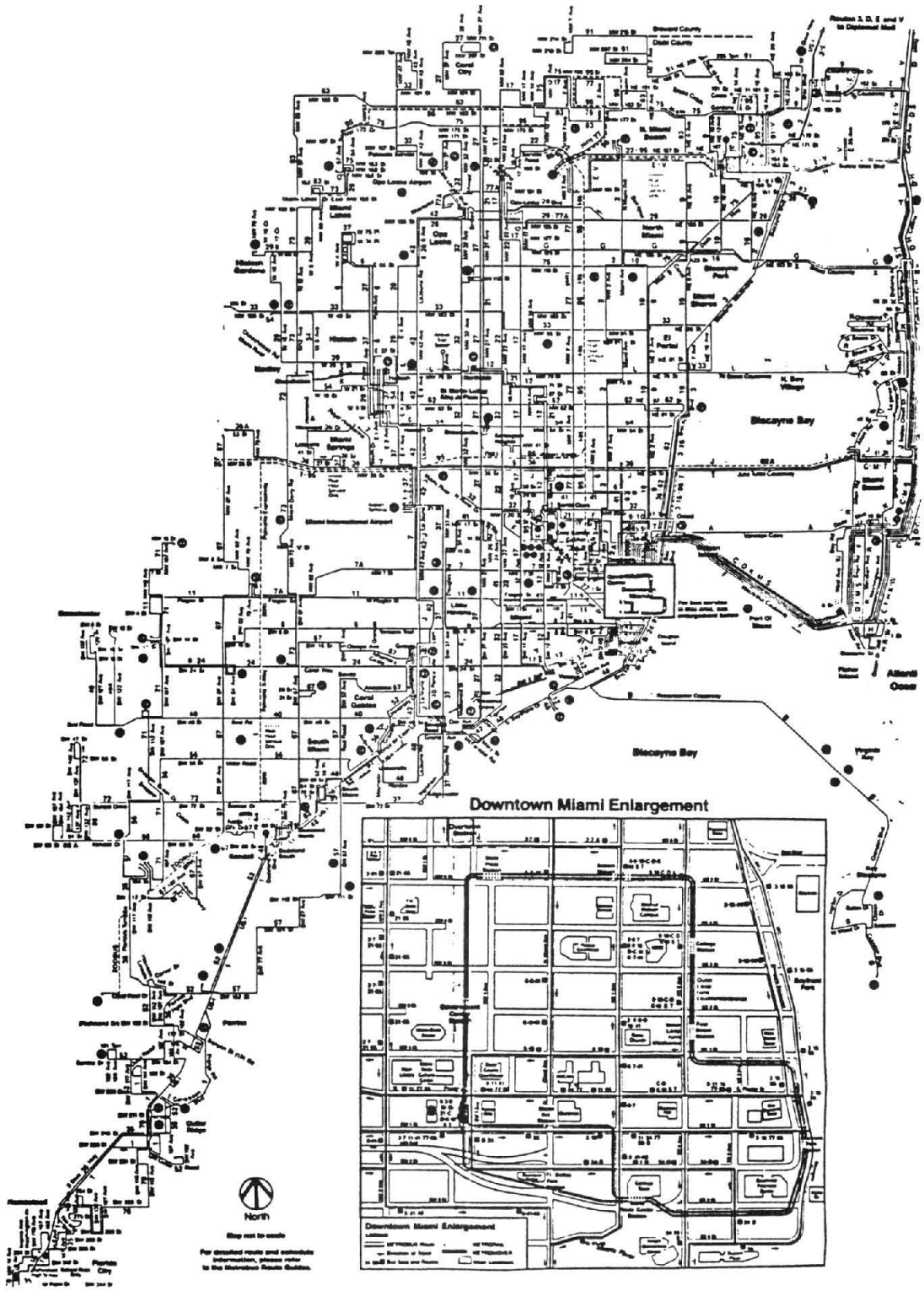
TRANSIT CHARACTERISTICS

Metro-Dade offers a mix of bus and rail transit service for the Miami metro area (Exhibit 24). The Metrorail south line, extending from downtown Miami to Kendall, opened in May 1984. The Metrorail north line, extending from downtown Miami to Hialeah, began operations in June 1985. The 21-mile elevated rail system connects to the 1.9-mile elevated Metromover at Government Center Station in downtown Miami. The Metromover is a downtown people mover with destinations such as the Bayside Marketplace, Miami-Dade Community College, and the James L. Knight Convention Center; the Metromover opened in May 1986.

Metrobus provides a mixture of bus services throughout Dade County that includes local radial, crosstown, feeder, suburban, express, limited, and local distributor services. Since the new Metrorail and Metromover services are centered around downtown Miami, MDTA restructured its bus service as a grid system in June 1986. Feeder lines were added and expanded, while local radial and crosstown service was cut back. Additional service such as the Kendall Area Transportation (KAT) service was provided through state funding as an "express feeder" to Metrorail beginning in July 1987.

Between November 1988 and November 1990, the Private Enterprise Participation Program (PEP) was in operation. This resulted in an increase in bus and rail service (rail service was extended until midnight). In January 1989, Metrorail service was extended to accommodate the new Tri-Rail Station. The Tri-Rail Station serves commuters from Dade, Broward and Palm Beach Counties through peak bus service provided by the Tri-County Metropolitan Transit Authority.

Exhibit 24
Miami Metropolitan Area



DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

Between FY85 and FY90, the MDTA service expanded in terms of vehicle hours and vehicle miles (Exhibit 25). The increases in rail service more than compensated for the reduction in bus service.

Metrobus was streamlined in terms of number of weekday routes. Vehicle hours grew slightly (8 percent) while vehicle miles and peak vehicles remained essentially unchanged (Exhibit 26). Service to the suburbs, in particular, increased during this period to provide additional feeder service to the growing areas outside Miami. MDTA essentially realigned its bus service to complement the rail services.

Passenger boardings rose slightly (five percent). Both operating costs and farebox revenues increased, by 17 and 28 percent, respectively, over the same period.

Metrorail and Metromover each had substantial growth. The vehicle hours for the former increased by almost 50 percent, the latter nearly 135 percent.

Total system ridership increased by about 21 percent during the period. The increase was due primarily to a 180 percent (nearly 9 million annual boardings) increase in Metrorail boardings, coupled with a 138 percent (nearly 2 million) rise in Metromover boardings. Metrobus ridership also grew, by 4.5 percent (27 million).

FARE STRUCTURE

Between FY85 and FY90, two fare increases were instituted by MDTA (Exhibit 27). In October 1987, an increase in the full fare for bus and rail from $.75 to $1.00 (a 33 percent increase) was implemented. A second fare increase was instituted in FY90, as full bus and rail fares went from $1.00 to $1.25 (a 25 percent increase); however, a 20 percent token discount scheme was offered for full-fare passengers. The fare for the Metromover remains $0.25, as initially implemented.

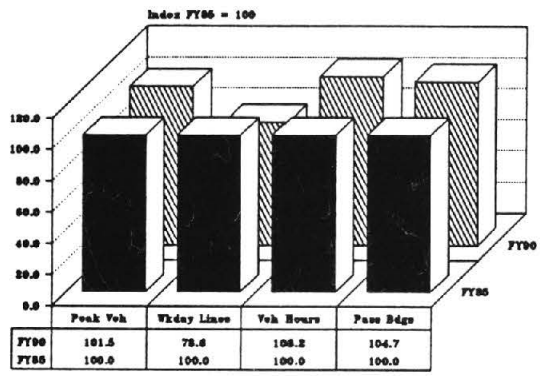
Exhibit 25
FY85–FY90 MDTA Operating Performance

Operating Statistic	MDTA Bus			Metromover			Metrorail		
	FY85	FY90	Change	FY85	FY90	Change	FY85	FY90	Change
Peak Vehicles	403	409	1.49%	11	9	-18.18%	56	76	35.71%
# Weekday Lines	84	66	-21.43%	1	1	0.00%	1	1	0.00%
Vehicle Hours	1,641,654	1,775,591	8.16%	14,700	34,504	134.72%	161,420	241,460	49.58%
Vehicle Miles	22,045,550	21,863,275	-0.83%	150,950	371,527	146.13%	3,681,588	5,575,130	51.43%
Passenger Boardings	56,967,332	59,658,305	4.72%	1,360,753	3,234,723	137.72%	4,856,606	13,621,918	180.48%
Passenger Miles	266,870,556	232,121,993	-13.02%	1,033,900	2,723,962	163.46%	39,338,350	109,692,672	178.84%
Operating Cost	$88,112,169	$103,265,690	17.20%	$3,249,000	$6,450,240	98.53%	$30,627,060	$41,960,620	37.01%
Farebox Revenue	$30,956,717	$39,646,176	28.07%	$97,744	$383,973	292.84%	$5,364,134	$10,973,411	104.57%

Source: UMTA Section 15 Reports and MDTA Summary Reports

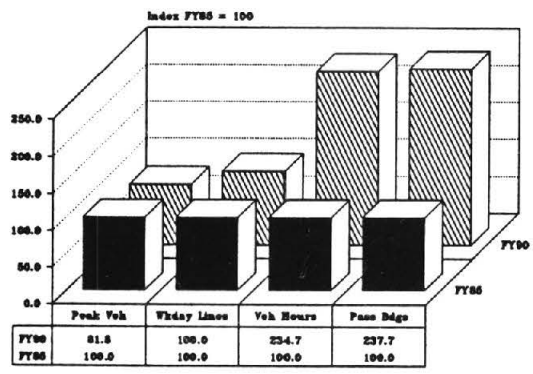
Exhibit 26
FY85-FY90 MDTA Operating Trends

MDTA Bus



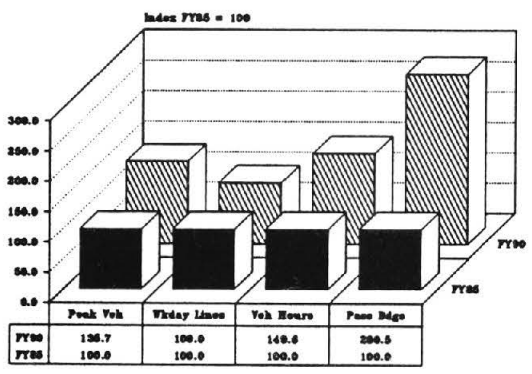
	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	101.5	78.6	108.2	104.7
FY85	100.0	100.0	100.0	100.0

MDTA Metromover



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	81.8	100.0	234.7	237.7
FY85	100.0	100.0	100.0	100.0

Metrorail



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	136.7	100.0	149.6	286.5
FY85	100.0	100.0	100.0	100.0

Exhibit 27 MDTA Fare Structure				
	FY85	**FY87**	**FY90**	**Change FY85-FY90**
Bus Rail	$0.75	$1.00	$1.25	66.7%
Express Bus	$1.00	$1.25	$1.50	50.0%
Metormover	NA	$0.25	$0.25	NA

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service level and performance by type of bus service provided. The categories and scheme used to classify MDTA's bus lines is presented first. This is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

MDTA provides a mix of bus service types. Bus line classifications were determined by MDTA staff. The following categories were used in this case study:

- **Local radial** routes have terminals both within and outside the CBD, and do not restrict boardings and alightings along the route. These services tend to be used by transit dependent riders (i.e., low income, elderly, and young people) for work and other trip purposes.

- **Crosstown** routes have neither terminus inside the CBD, but often pass through the central city. The direction of travel is generally "cross-radial." Boardings and alightings are not restricted along the route. These services tend to be used by transit dependent riders (i.e., low income, elderly, and young people) for work and other trip purposes.

- **Feeder** routes, while providing some local service, are principally designed to provide service to and from rail stations. Rail feeder routes may provide either restricted or unrestricted passenger boardings along routes.

- **Local suburban** routes operate within suburban areas, and do not enter the central city. These services are used by both transit dependent and choice riders for a variety of trips.

- **Express** routes have one terminal inside the CBD and one outside. The direction of travel is generally radial. Boardings and alightings are restricted along the most of the route. These services tend to be used by moderate income choice riders for work trip commuting.

- **Limited** routes have one terminal inside the CBD and one outside. The direction of travel is generally radial. Boardings and alightings are restricted to key stops along the route. These services tend to be used by moderate income choice riders for work trip commuting.

- **Local distributor** routes circulate within the CBD. These services are used by all types of riders, often in off-peak periods.

TRENDS IN SERVICE LEVEL AND PERFORMANCE

The MDTA bus system experienced a decline in performance over the five-year period in terms of the measures cost per vehicle hour, passengers per vehicle hour, cost per passenger, and farebox recovery (revenue/cost). This section discusses trends in service levels and performance among the bus service types.

Local Radial Service

Local radial service is the largest service category in Metro-Dade's bus system and represents 40 percent of the hours of service provided in FY90 (Exhibit 28). The level of local service declined between FY85 and FY90 by about 30 percent in terms of peak vehicles, number of bus lines, and vehicle hours.

Local radial service ranked second (to suburban service) in cost per vehicle hour (Exhibit 29) in FY90. In terms of passengers per vehicle hour, cost per passenger, and farebox recovery ratio, this service ranked highest in FY90.

MDTA's local radial service performed well relative to other service types for all four performance measures over five-year period. However, except for farebox recovery, the measures have slightly worsened since FY85 (Exhibit 30).

Crosstown Service

Crosstown service represented the fourth largest service category for MDTA in FY90 with respect to number of lines, vehicle hours, boarding passengers, and farebox revenues (Exhibit 28). For each of these measures, crosstown service constituted approximately 10 percent of the total system. The level of crosstown service declined significantly between FY85 and FY90 in terms of peak vehicles (37 percent), number of bus lines (54 percent), and vehicle hours (27 percent).

In FY90, crosstown service ranked second highest in terms of cost per vehicle hour, passengers per vehicle hour, cost per passenger, and farebox recovery (Exhibit 29). Except for cost per vehicle hour (in which it ranked third highest), crosstown was also the second best performer in FY85.

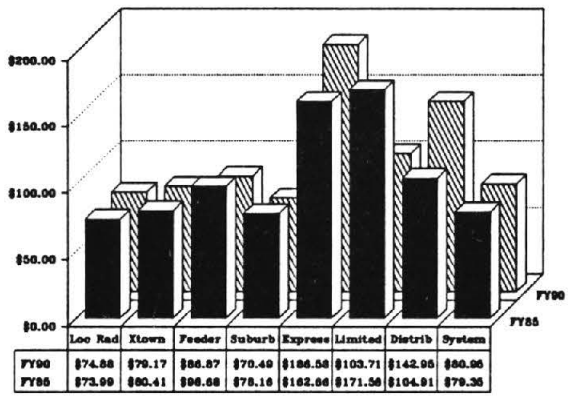
Unlike local radial service, crosstown service improved its performance over the five years for all four measures (Exhibit 30). The greatest increase was in farebox recovery, which increased by 32 percent between FY85 and FY90.

Exhibit 28
FY85–FY90 MDTA Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Vehicle Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Local/Radial	214	27	813,589	41,003,990	$60,196,244	$17,884,279
Crosstown	75	15	240,945	8,712,180	$19,373,234	$4,199,718
Feeder	28	12	73,871	1,366,838	$7,289,838	$733,002
Suburban	45	15	169,681	4,888,420	$13,261,881	$2,316,815
Express	21	10	24,263	636,786	$3,946,551	$455,061
Limited	5	1	4,727	102,316	$811,035	$57,354
Local–Distributor	10	4	16,479	256,802	$1,728,830	$38,319
Total MDTA Bus	398	84	1,343,555	56,967,332	$106,607,613	$25,684,547
FY90						
Local/Radial	160	19	592,761	27,997,954	$44,386,543	$14,056,607
Crosstown	47	7	160,102	6,602,545	$12,675,850	$3,625,601
Feeder	137	19	408,054	16,376,715	$35,448,737	$8,753,474
Suburban	63	13	245,406	7,641,768	$17,297,737	$4,196,072
Express	25	4	28,288	546,308	$5,278,059	$337,801
Limited	16	3	37,422	388,599	$3,880,896	$84,599
Local Distributor	2	1	3,102	104,416	$443,430	$7,339
Total MDTA Bus	450	66	1,475,136	59,658,305	$119,411,251	$31,061,493
Percent Change FY85 to FY90						
Local/Radial	-25.2	-29.6	-27.1	-31.7	-26.3	-21.4
Crosstown	-37.3	-53.3	-33.6	-24.2	-34.6	-13.7
Feeder	389.3	58.3	452.4	1098.1	386.3	1094.2
Suburban	40.0	-13.3	44.6	56.3	30.4	81.1
Express	19.0	-60.0	16.6	-14.2	33.7	-25.8
Limited	220.0	200.0	691.7	279.8	378.5	47.5
Local Distributor	-80.0	-75.0	-81.2	-59.3	-74.4	-80.8
Total MDTA Bus	13.1	-21.4	9.8	4.7	12.0	20.9

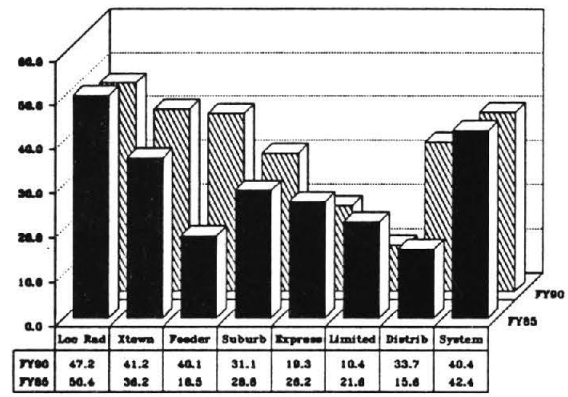
Exhibit 29
FY85-FY90 MDTA Bus Service Type Performance Trends

Cost per Vehicle Hour



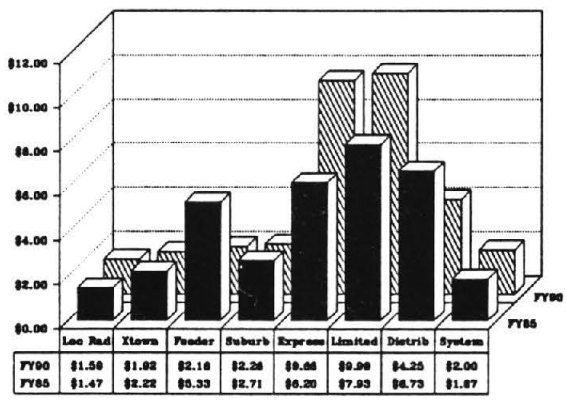
	Loc Rad	Xtown	Feeder	Suburb	Express	Limited	Distrib	System
FY90	$74.88	$79.17	$86.87	$70.49	$186.58	$103.71	$142.95	$80.96
FY85	$73.99	$80.41	$96.68	$78.16	$162.66	$171.56	$104.91	$79.36

Passengers per Vehicle Hour



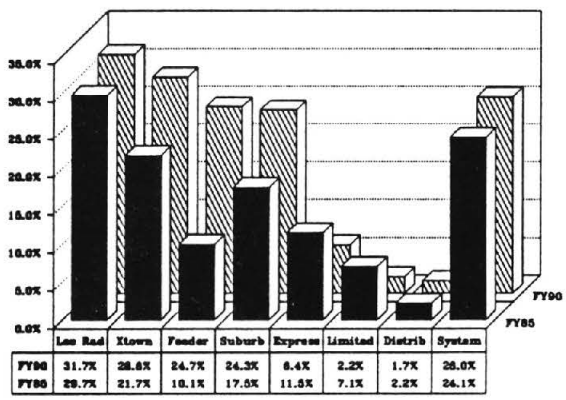
	Loc Rad	Xtown	Feeder	Suburb	Express	Limited	Distrib	System
FY90	47.2	41.2	40.1	31.1	19.3	10.4	33.7	40.4
FY85	50.4	36.2	18.5	28.8	26.2	21.6	15.6	42.4

Cost per Passenger Boarding



	Loc Rad	Xtown	Feeder	Suburb	Express	Limited	Distrib	System
FY90	$1.58	$1.92	$2.16	$2.26	$3.66	$6.90	$4.25	$2.00
FY85	$1.47	$2.22	$5.33	$2.71	$6.20	$7.93	$6.73	$1.87

Percent Farebox Revenue of Cost



	Loc Rad	Xtown	Feeder	Suburb	Express	Limited	Distrib	System
FY90	31.7%	26.6%	24.7%	24.3%	6.4%	2.2%	1.7%	26.0%
FY85	29.7%	21.7%	10.1%	17.5%	11.5%	7.1%	2.2%	24.1%

Exhibit 30
FY85-FY90 MDTA Bus Service Type Performance Measures

Service Type	Cost/ Veh Hr	Pass/ Veh Hr	Cost/ Pass	Revenue/ Cost
FY 85				
Local/Radial	$73.99	50.40	$1.47	29.71%
Crosstown	$80.41	36.16	$2.22	21.68%
Feeder	$98.68	18.50	$5.33	10.06%
Suburban	$78.16	28.81	$2.71	17.47%
Express	$162.66	26.24	$6.20	11.53%
Limited	$171.58	21.65	$7.93	7.07%
Local-Distributor	$104.91	15.58	$6.73	2.22%
Total Bus System	*$79.35*	*42.40*	*$1.87*	*24.09%*
FY90				
Local/Radial	$74.88	47.23	$1.59	31.67%
Crosstown	$79.17	41.24	$1.92	28.60%
Feeder	$86.87	40.13	$2.16	24.69%
Suburban	$70.49	31.14	$2.26	24.26%
Express	$186.58	19.31	$9.66	6.40%
Limited	$103.71	10.38	$9.99	2.18%
Local-Distributor	$142.95	33.66	$4.25	1.66%
Total Bus System	*$80.95*	*40.44*	*$2.00*	*26.01%*
Percent Change FY85 to FY90				
Local/Radial	1.20%	-6.29%	8.16%	6.60%
Crosstown	-1.54%	14.05%	-13.50%	31.92%
Feeder	-11.97%	116.88%	-59.50%	145.55%
Suburban	-9.81%	8.09%	-16.69%	38.87%
Express	14.71%	-26.41%	55.81%	-44.49%
Limited	-39.56%	-52.05%	26.03%	-69.17%
Local-Distributor	36.26%	116.05%	-36.85%	-25.23%
Total Bus System	*2.02%*	*-4.62%*	*6.96%*	*7.97%*

Feeder Service

Feeder service changes over the five year period reflect Metro-Dade's integration of bus and rail. In FY90, feeder service became the second largest service category with respect to number of lines, vehicle hours, boarding passengers, and farebox revenues (Exhibit 28). The level of feeder service increased significantly between FY85 and FY90 in terms of peak vehicles (389 percent), number of bus lines (58 percent), and vehicle hours (452 percent).

Feeder service greatly improved its performance over the five year period, especially with regard to passengers per vehicle hour and farebox recovery. In FY85, feeder service ranked near the bottom in all four performance categories (Exhibit 29). By FY90, this service type had improved to third best in all but cost per vehicle hour, in which it continued to rank fourth.

Local Suburban Service

MDTA's local suburban service represented the third largest service category in FY90 with respect to number of lines, vehicle hours, boarding passengers, and farebox revenues (Exhibit 28). The level of local suburban service increased between FY85 and FY90 in terms of peak vehicles (40 percent) and vehicle hours (45 percent).

Local suburban service also improved with respect to cost per vehicle hour, passengers per vehicle hour, cost per passenger, and farebox recovery (Exhibit 30). Relative to other lines, however, suburban service fell behind on most rankings. While it attained the lowest cost per vehicle hour, its ranking fell compared to other measures as other lines showed greater degrees of improvement (Exhibit 29).

Express Service

Express service is the second smallest category of MDTA service. Operating primarily in weekday peak periods, in FY90 it represented less than two percent (vehicle hours) of MDTA's bus service. The level of service was relatively constant over the analysis period in terms of vehicle hours though six routes were eliminated.

In FY90, express service had the worst showing of any service category in terms of cost per vehicle hour ($187) and relatively poor performance in terms of passengers per vehicle hour, cost per passenger, and farebox recovery (Exhibit 29). For these measures, express service's performance deteriorated over the five-year study period; express service had the greatest percentage increase (56 percentage) in cost per passenger of any service category (Exhibit 30).

Limited Service

As part of an effort to streamline service, MDTA substantially increased its limited bus service over the five-year period. In terms of number of lines, vehicle hours, boarding passengers, and farebox revenues, limited service increased both in absolute terms and relative system share (Exhibit 28). This share, however, is still a small part of the Metrobus system, ranging from one to five percent depending on the measure of service provided.

Although limited service had the greatest improvement in cost per vehicle hour of any service category between FY85 and FY90 (-40 percent), it remains a relatively poor performing type of service. In FY90, limited service had the lowest passengers per vehicle hour (10), the highest cost per passenger ($9.99), and the second lowest farebox recovery rate (2 percent). Limited service, also experienced the greatest decline in passengers per vehicle hour (-52 percent) and farebox recovery (-69 percent) over the study period (Exhibit 30).

Local Distributor Service

By FY90, local distributor service had passed limited service as MDTA's smallest bus service category. In FY90, MDTA was only running a single local distributor service line (down from four in FY85).

Local distributor service improved its passengers per vehicle hour (by 116 percent) and cost per passenger (by 37 percent) over the study period (Exhibit 30). Yet, it had the lowest farebox recovery ratio (under 2 percent) by FY90, and still represented a relatively costly service compared to cost per vehicle hour and cost per passenger. Cost per vehicle hour and farebox recovery rate worsened over the five-year period.

Minneapolis/St. Paul Metropolitan Area

SUMMARY

The transit service in the Minneapolis/St. Paul metropolitan area remained stable between 1985 and 1990. While population and employment have increased, most of this growth has occurred outside the area traditionally well served by transit.

DEMOGRAPHIC CHANGES

The population and employment of the Minneapolis/St. Paul metropolitan area increased 5.6 percent and 13.6 percent, respectively, between 1985 and 1990. While most jurisdictions experienced growth, the relative share of the area's population and employment in the fully developed area --- the central cities of Minneapolis and St. Paul and the inner ring of adjacent suburbs --- was reduced. The population of the developed area decreased by 5,000 people, while employment in the developed area grew by 49,000 jobs, primarily due to job increases in the inner ring suburbs.

The developing ring suburbs have had the largest absolute increases in population and employment during the period. These suburbs are within 25 to 30 miles of the central cities. Population increased by 95,000 people and represented the majority of the growth in the area. Employment increased by 90,000 jobs and represented 57 percent of the metropolitan area's increase.

During the period of analysis, almost all fixed-route service was provided in the fully developed and developing areas. If it had kept pace with population and employment increases in these areas, transit ridership would have increased between five and thirteen percent.

The outlying portions of the metropolitan area are developing rural areas. They had impressive population and employment growth during the period. However, the area has small percentages of the population and employment in the metropolitan area. Almost no service is provided service to this area because it falls outside the Metropolitan Transit Taxing District.

TRANSIT SERVICE CHANGES

The MTC is the predominant carrier in the area and operates over 96 percent of the transit service in the region. Besides the MTC, several suburban jurisdictions contract for transit services under the "opt-out" funding provisions recently passed by the State

legislature. Finally, the University of Minnesota contracts for express service for commuting students and distribution service on campus.

During the period 1985 to 1990, transit service in the metropolitan area decreased almost three percent. The service decrease was entirely due to reductions in MTC bus service. Transit service provided by other carriers, however, increased by nearly two-thirds. This growth was divided between adding new suburban-oriented services and taking over the operation of the University express services from the MTC. Nonetheless, total passenger boardings fell by five percent.

Radial local bus lines represented about 77 percent of the bus service provided in the area in 1990. These services are used typically by low-to-moderate income riders primarily for work commuting, but also for other trip purposes.

Among the service types, radial local bus service has the second lowest cost per vehicle hour and the highest passengers per vehicle hour. The combination of these two factors provides radial local service with the lowest operating cost per passenger and the highest farebox recovery ratio among the five service types. Between 1985 and 1990, vehicle hours of service marginally declined by approximately 2.5 percent, passenger boardings fell by 8.1 percent, and farebox revenues dropped 2.5 percent.

Radial express bus lines to the CBD, with restricted passenger boardings and alightings, represented about 13 percent of the bus service provided in 1990. Moderate-to-upper income, choice riders use radial express services for work commuting.

Radial express service has the second highest cost per vehicle hour among the service types. Its passengers per vehicle hour ranks in the middle of the five service types. The combination of these two factors provides radial express service with second to the highest subsidy per passenger and the second highest farebox recovery. MTC increased radial express service levels 14.4 percent from 1985 to 1990. Perhaps in response to service increases, passenger boardings also increased 11.2 percent during the period.

Six percent of the area's bus service is devoted to crosstown service. Most lines operate within or across either Minneapolis or St. Paul and are used by low-to-moderate income, transit dependent riders for a variety of trip purposes.

The cost per vehicle hour of crosstown service is similar to that of radial local bus service. The passenger productivity of crosstown service, however, is lower than that of radial local service probably because this service operates in less densely populated areas. As a result, both the cost per passenger and the farebox recovery for crosstown rank second lowest among the five service types.

The MTC reduced crosstown service levels by 4.5 percent. Passenger boardings fell by three percent during the period, but, perhaps because the composition of the passengers changed to more full-fare paying users, farebox revenues remained stable.

Local suburban service is the second smallest category of service. In 1990, local suburban service represented less than two percent of the 1990 service. The lines are used by low-to-moderate income, transit dependent riders primarily for work commuting.

While the cost per vehicle hour for local suburban service is the lowest of any service type, unfortunately, its passenger productivity is also the lowest of any service type. The low passenger productivity was not offset sufficiently by the low cost per vehicle hour to produce cost per passenger and farebox recovery values close to those of other service types. While its passenger productivity is low compared to other service types, the percent increase in service on local suburban lines between 1985 and 1990 was the largest of any service type.

The university express service is the smallest category of service and constitutes about one percent of the transit service. These services are used primarily by University students, but also by moderate income University workers.

The university express cost per vehicle hour is the second highest of any service type and its passenger productivity is second highest of any service type. The combination of these two factors makes university express service perform in the middle of the service types in terms of cost per passenger boarding and farebox recovery.

University express vehicle hours decreased 13.5 percent between 1985 and 1990. Alarmingly, passenger boardings declined by nearly 50 percent. The corresponding farebox revenues also fell 43.5 percent.

FUNCTIONAL CHANGES

There has been almost no growth in transit services in the Minneapolis/St.Paul metropolitan area. Most service is still oriented toward travel to and from the two central cities.

Most of the passengers use the transit services to travel to work to the central cities. There has been some loss of low-to-moderate income, choice passengers using radial local services and a small increase in moderate-to-upper income, choice people riding radial express services.

There are limited crosstown and local suburban services for the low-to-moderate income transit dependent population that does not travel to the central cities. There has been little absolute growth in these services.

BACKGROUND

The Minneapolis/St.Paul metropolitan area includes the seven counties surrounding the two major cities. The Metropolitan Council has divided the area into five geographic policy areas (Exhibit 31):

- **Fully Developed Area** that includes the two major cities and inner ring of older suburbs.
- **Developing Area** that covers the next ring of suburbs and is often viewed as the limits of most commuting trips to the downtown areas.
- **Freestanding Growth Complexes** where urban services are provided in rural areas of metropolitan areas.
- **Commercial Agricultural Area** where there is heavy concentration of commercial farming.
- **General Rural Use Area** that contains of mixture of commercial farming and other uses.

Virtually all transit services are provided in the fully developed and developing areas.

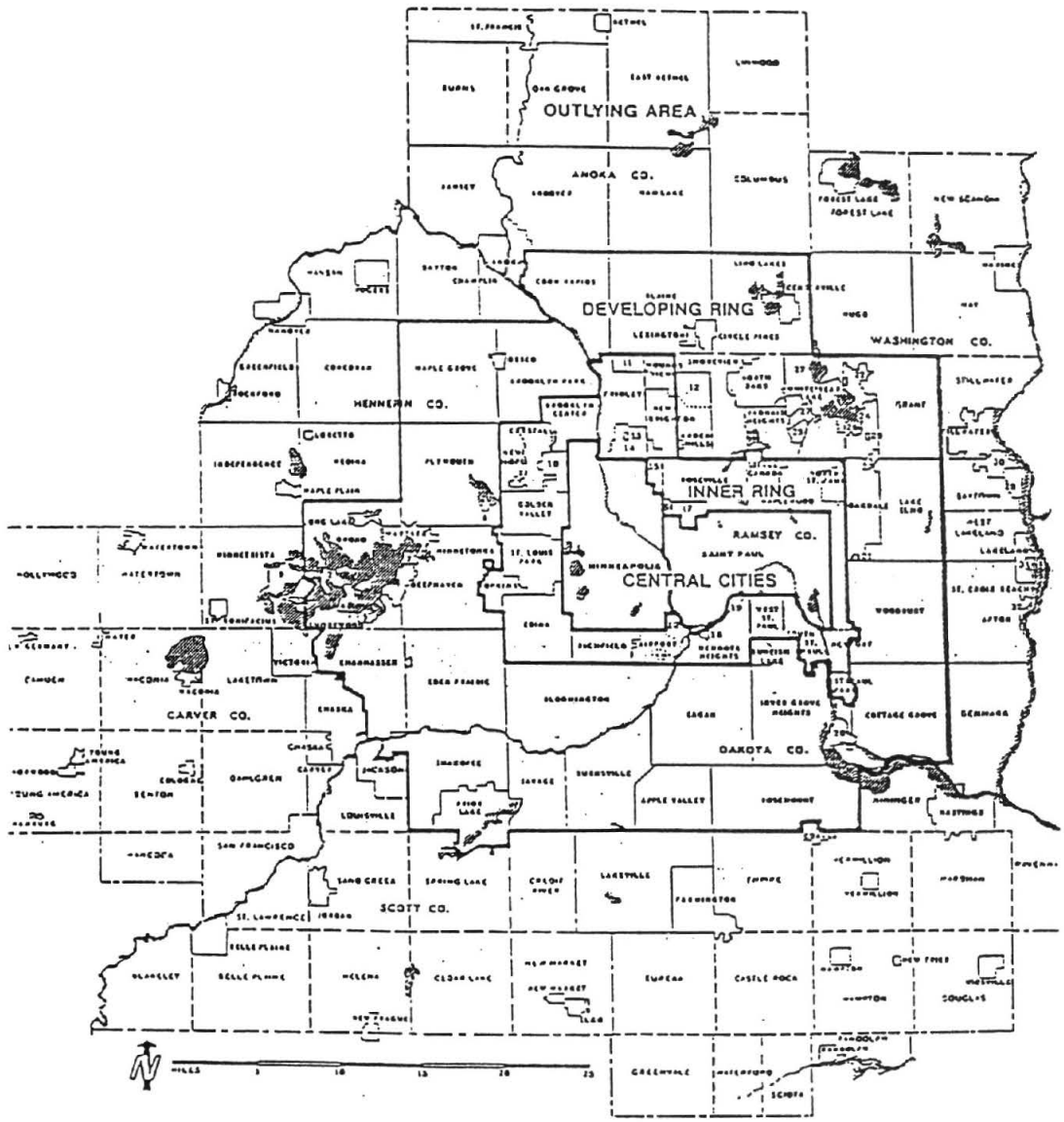
This chapter presents a brief description of the changes that occurred in the Minneapolis/St. Paul metropolitan area in terms of population, employment, and transit service changes during the period 1985 through 1990.

DEMOGRAPHIC CHANGES

The population and employment of the Minneapolis/St. Paul metropolitan area increased 5.6 percent and 13.6 percent, respectively, between 1985 and 1990. While most of the jurisdictions experienced growth (Exhibit 32), the relative share of the area's population and employment in the fully developed area --- the central cities of Minneapolis and St. Paul and the inner ring of adjacent suburbs --- was reduced. The population of the developed area decreased by 5,000 people, totally due to lost population in the central cities. Employment in the developed area grew by 49,000 jobs, primarily due to job increases in the inner ring suburbs.

The developing ring suburbs have had the largest absolute increases in population and employment during the period. Population increased by 95,000 people and represented the majority of the growth in the area. Employment increased by 90,000

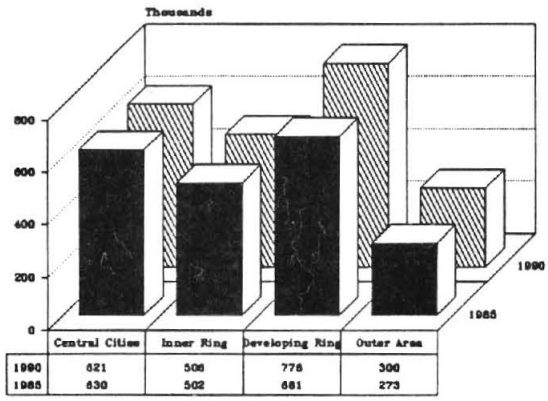
Exhibit 31
Metropolitan Council Policy Areas



Source: Metropolitan Council

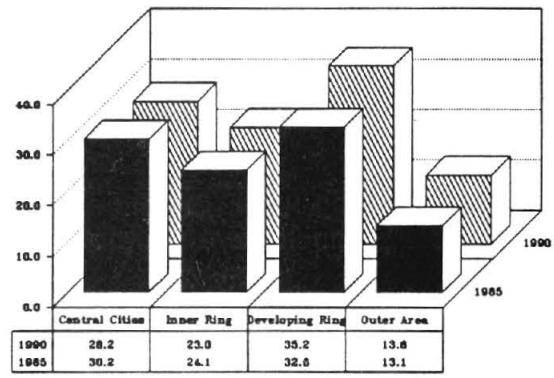
Exhibit 32
Minneapolis/St. Paul Metropolitan Area
Population and Employment

Population



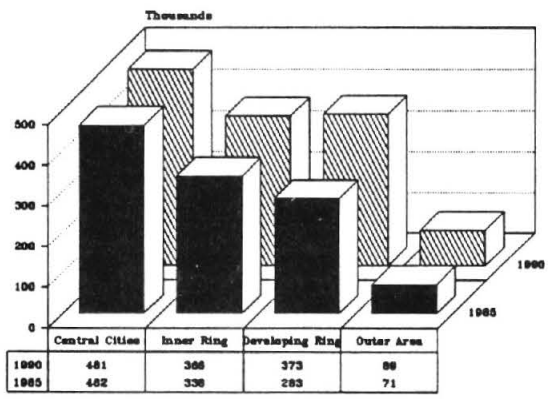
	Central Cities	Inner Ring	Developing Ring	Outer Area
1990	521	506	776	300
1985	630	502	681	273

Juridiction Population
as a Percent of Total Population



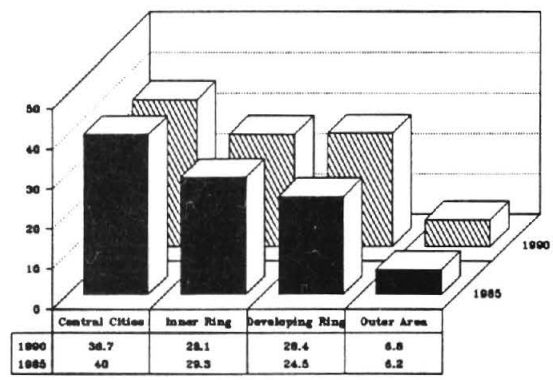
	Central Cities	Inner Ring	Developing Ring	Outer Area
1990	28.2	23.0	35.2	13.6
1985	30.2	24.1	32.6	13.1

Employment



	Central Cities	Inner Ring	Developing Ring	Outer Area
1990	481	366	373	89
1985	482	336	283	71

Jurisdiction Employment
as a Percent of Total Employment



	Central Cities	Inner Ring	Developing Ring	Outer Area
1990	36.7	28.1	28.4	6.8
1985	40	28.3	24.5	6.2

jobs and represented 57 percent of the metropolitan area's increase.

During the period of analysis, virtually all fixed-route service was provided in the fully developed and developing areas. If it had kept pace with population and employment increases in these areas, transit ridership would have increased between five and thirteen percent.

The outlying area had impressive population and employment growth during the period. However, the area has small percentages of the population and employment in the metropolitan area.

The outlying suburbs experienced the highest percentage of growth with increases in population of 27,000 people and employment of 18,000 jobs. Almost no transit service is provided to this area because it falls outside the Metropolitan Transit Taxing District. However, some residents of the outlying suburbs may have used transit service as park-and-ride passengers.

TRANSIT CHARACTERISTICS

The MTC is the predominant carrier in the area. It operates over 96 percent of the transit service in the region. Most of the service is operated and funded as MTC service. The MTC does provide a small amount of contract service for some suburban jurisdictions.

Between 1985 and 1990, the MTC operated about the same number of buses in service --- approximately 800 vehicles in peak periods. However, the total magnitude of MTC bus service decreased about 3.9 percent in bus hours. These decreases occurred because the MTC trimmed service in response to rider losses and because it no longer operates the express service to the University of Minnesota.

Besides the MTC, several suburban jurisdictions contract for transit services under the "opt-out" funding provisions recently passed by the State legislature. These provisions allow communities in the Metropolitan Transit Taxing District to use their transit taxes that formerly went to the MTC to provide transit services. These services consist of local suburban routes and commuter services to Minneapolis and St. Paul. The services have been competitively bid and are now operated by the successful biddor ---either private companies or the MTC.

Finally, the University of Minnesota contracts for express service for commuting students and distribution service on campus. The University service was operated by the MTC in 1985, but is now being provided by a private contractor.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in services levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

During the period FY85 to FY90, transit service in the metropolitan area (measured in vehicle hours) decreased almost three percent (Exhibit 33). The service decrease was entirely due to reductions in MTC bus service. The number of MTC peak vehicles decreased by one percent and vehicle hours of MTC service fell by four percent (Exhibit 34).

Transit service provided by other carriers, however, increased by nearly two-thirds as measured by vehicle hours. This growth was divided between adding new suburban-oriented services and taking over the operation of the University express services from the MTC.

MTC ridership fell over five percent during the period. Ridership on other carriers increased more than 75 percent during the same period.

FARE STRUCTURE

Fare levels and increases have been shown to have a significant impact on ridership. Since the MTC is the predominant provider in the area, this discussion of fare structure focuses on the MTC.

MTC's bus fares are based on a system of concentric zones around the two central cities of Minneapolis and St. Paul. MTC had four fare zones in 1985, but reduced the number of zones to two by 1990. MTC adds a surcharge to the local fare for express bus service.

MTC's fares remained stable during the analysis period and declined for some types of trips (Exhibit 35). The MTC reduced the fares for off-peak travel and for long-distance peak period travel on local services.

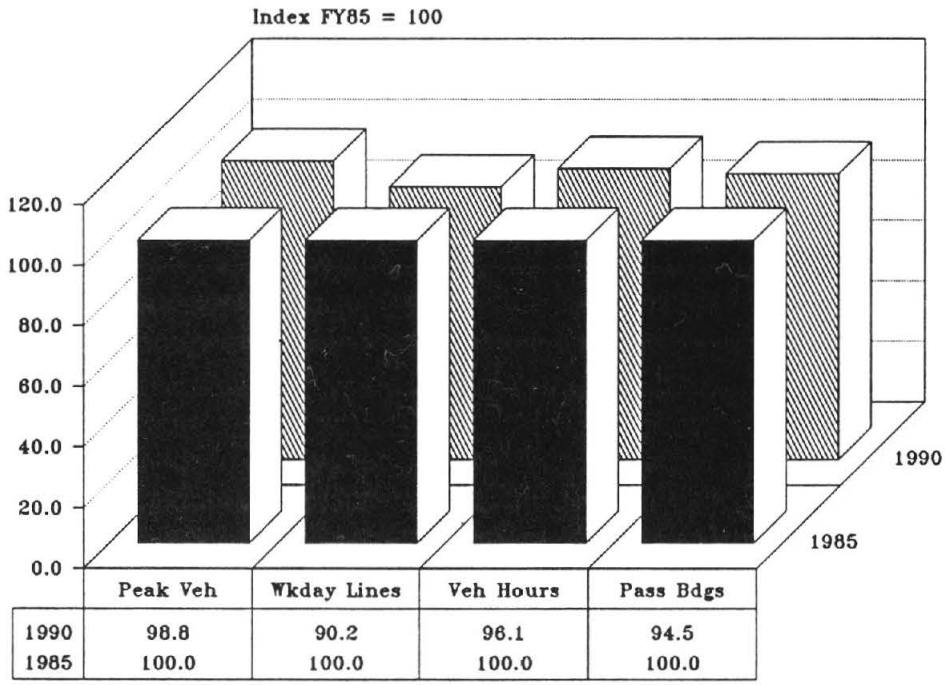
Since 1990, MTC has raised cash fares significantly as part of its deep discount fare program. The new fare structure encourages regular riders to purchase multiple-ticket media and charges higher fares to occasional, cash fare users.

Exhibit 33
FY85–FY90 Minneapolis/St. Paul Operating Performance

Operating Statistic	MTC			Other Carriers			Total		
	FY85	FY90	Change	FY85	FY90	Change	FY85	FY90	Change
Peak Vehicles	807	797	-1.2%	38	68	78.9%	845	865	2.4%
# Weekday Routes	122	110	-9.8%	7	22	214.3%	129	132	2.3%
Vehicle Hours	2,130,027	2,046,248	-3.9%	38,937	64,287	65.1%	2,168,964	2,110,535	-2.7%
Passenger Boardings	73,543,468	69,493,527	-5.5%	607,760	1,075,624	77.0%	74,151,228	70,569,151	-4.8%
Operating Cost	$92,454,324	$109,250,339	18.2%	$1,426,281	$3,242,100	127.3%	$93,880,605	$112,492,439	19.8%
Farebox Revenue	$31,981,892	$30,210,315	-5.5%	$478,081	$754,023	57.7%	$32,459,973	$30,964,338	-4.6%

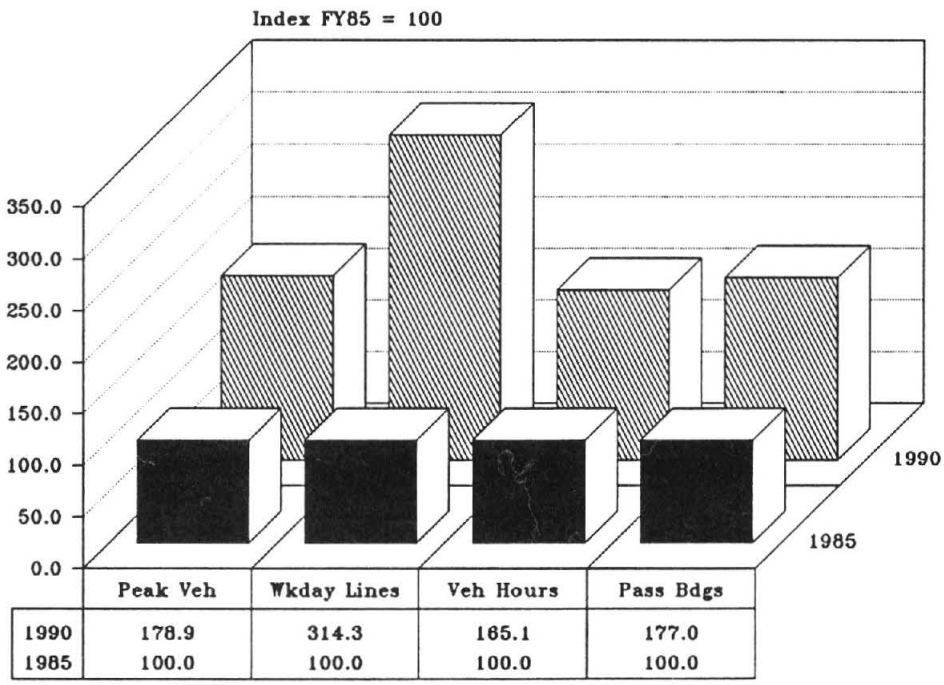
Source: UMTA Section 15 Reports and Regional Transit Board

Exhibit 34
FY85-FY90 Minneapolis/St. Paul Operating Trends
MTC



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
1990	98.8	90.2	96.1	94.5
1985	100.0	100.0	100.0	100.0

Other Carriers



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
1990	178.9	314.3	165.1	177.0
1985	100.0	100.0	100.0	100.0

Exhibit 35
MTC Fare Structure
Cash Fares

	1985		1990	
	Base	Maximum	Base	Maximum
Local				
Peak Periods	$0.75	$1.15	$0.75	$1.00
Off-Peak Periods	$0.60	$1.00	$0.50	$0.75
Express				
Peak Periods	$0.75	$1.25	$0.75	$1.25
Off-Peak Periods	NA	NA	NA	NA

Note: Peak Periods: Weekdays 6:00 AM to 9:00 AM; 3:30 PM to 6:30 PM

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service levels and performance by type of bus service provided. The scheme used to classify MTC's and the other carriers routes is first presented. This is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

The MTC and other area carriers offer the public a mixture of local, express, and crosstown fixed-route bus services. The MTC and other carriers classify their routes as either local or express. MacDorman & Associates used a more complex classification scheme that includes radial local, radial express, crosstown, local suburban, and university express. Therefore, while some terms used by MTC, the other carriers, and MacDorman & Associates appear the same, their definitions may differ.

MacDorman & Associates used five bus service classifications in this study. The comments in the following paragraphs are, in part, based on the results of the 1988 On-Board Transit Survey.

- **Radial Local** bus lines have one terminal within either the Minneapolis or St. Paul central business district (CBD) and do not restrict passenger boardings and alightings along their alignments. These services are used typically by low-to-moderate income riders primarily for work commuting, but also for other trip purposes.

- **Radial Express** bus lines have one terminal inside either of the CBDs and one outside. The direction of service travel is generally radial but some routes may have local circulatory travel paths at the termini. Passenger boardings and alightings are restricted along a portion or all its route. Moderate-to-upper income, choice riders use radial express services for work commuting.

- **Crosstown** bus lines have neither terminal inside the CBDs and the direction of travel service is generally cross-radial or like the circumference of a circle is to its radii. Passengers are not restricted from boarding or alighting along routes. Most lines operate within or across either Minneapolis or St. Paul and are used by low-to-moderate income, transit dependent riders for a variety of trip purposes.

- **Local Suburban** bus lines provide local service entirely in the suburban areas of the metropolitan area. The lines are used by low-to-moderate income, transit dependent riders primarily for work commuting.

- **University Express** bus lines are designed to provide service to the Minneapolis campus of the University of Minnesota. The routes operate in the express mode for most of their length, may have local circulatory travel paths at the termini. These services are used primarily by University students, but also by moderate income University workers.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

This section discusses trends in service levels and performance among the five bus types --- radial local, radial express, crosstown, local suburban, and university express. The trends were developed by comparing the performances during average weeks in FY85 and FY90. For the MTC, MacDorman & Associates took the mean of the results for six months during FY85 and FY90. For the other carriers, MacDorman & Associates divided the annual totals by 52 to produce an average week.

Radial Local

Radial local bus lines represented about 77 percent of the bus service provided in the area in FY90 (Exhibit 36). Among the service types, radial local bus service has the second lowest cost per vehicle hour and the highest passengers per vehicle hour (Exhibit 37). The combination of these two factors provides radial local service with the lowest operating cost per passenger and farebox recovery among the five service types.

Between FY85 and FY90, the number of radial local lines dropped slightly from 49 to 46 routes. Vehicle hours of service also marginally declined by approximately 2.5 percent (Exhibit 36). Passenger boardings declined by 8.1 percent and farebox revenues declined 2.5 percent. The drop in farebox revenues is due to falling passenger volumes and fare increases that were high enough to maintain current revenues.

Since passenger boardings declined faster than vehicle hours, the number of passenger boardings per vehicle hour declined by 5.7 percent (Exhibit 38). Since farebox revenues dropped 2.5 percent between FY85 and FY90 and the cost of service delivery increased by 21.2 percent per vehicle hour, the farebox recovery ratio declined by 17.5 percent.

Radial Express

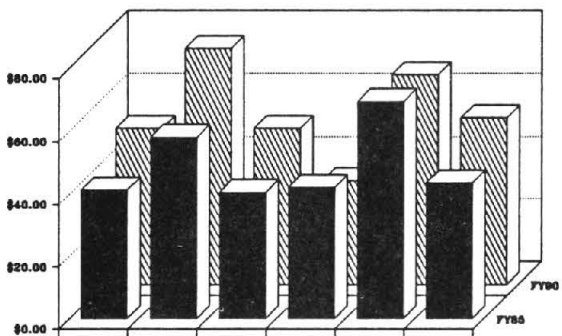
Radial express bus lines to the CBD, with restricted passenger boardings and alightings, represented about 13 percent of the bus service provided in FY90 (Exhibit 36). Radial express service has the second highest cost per vehicle hour among the service types (Exhibit 37). Its passengers per vehicle hour ranks in the middle of the five service types.

Exhibit 36
FY85–FY90 Minneapolis/St. Paul Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Vehicle Hours	Passenger Boardings	Operating Cost	Farebox Revenue
1985						
Radial Local (RL)	548	49	31,383	1,192,740	$1,296,194	$722,543
Radial Express (RE)	215	56	4,667	125,622	$271,090	$123,427
Crosstown (C)	46	11	2,671	65,050	$108,300	$38,883
Local Suburban (LS)	6	2	368	3,107	$15,503	$1,830
University Express (UE)	30	11	490	23,509	$33,998	$18,275
Totals	*845*	*129*	*39,579*	*1,410,028*	*$1,725,085*	*$904,958*
1990						
Radial Local (RL)	515	46	30,594	1,096,580	$1,531,145	$704,334
Radial Express (RE)	247	57	5,340	139,663	$402,410	$156,267
Crosstown (C)	45	12	2,552	63,075	$127,719	$38,990
Local Suburban (LS)	11	8	686	4,963	$22,941	$1,914
University Express (UE)	49	12	424	12,451	$28,421	$10,323
Totals	*867*	*135*	*39,596*	*1,316,732*	*$2,112,636*	*$911,828*
Percent Change						
Radial Local (RL)	-6.0	-6.1	-2.5	-8.1	18.1	-2.5
Radial Express (RE)	14.9	1.8	14.4	11.2	48.4	26.6
Crosstown (C)	-2.2	9.1	-4.5	-3.0	17.9	0.3
Local Suburban (LS)	83.3	300.0	86.4	59.7	48.0	4.6
University Express (UE)	63.3	9.1	-13.5	-47.0	-16.4	-43.5
Totals	*2.6*	*4.7*	*0.0*	*-6.6*	*22.5*	*0.8*

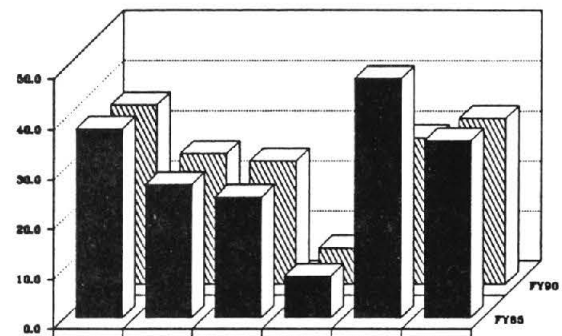
Exhibit 37
FY85-FY90 Minneapolis/St. Paul
Bus Service Type Performance Trends

Cost per Vehicle Hour



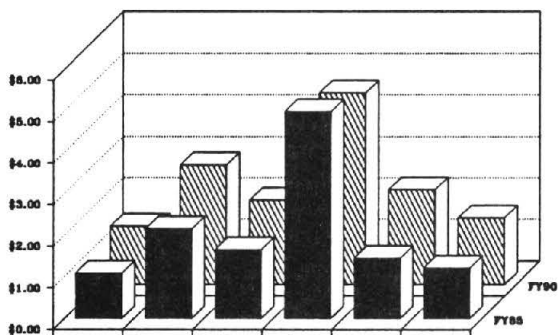
	Local	Express	Xtown	Suburb	Univ	Total
FY90	$50.05	$75.36	$50.06	$33.44	$67.03	$53.35
FY85	$41.30	$58.09	$40.55	$42.13	$69.38	$43.59

Passengers per Vehicle Hour



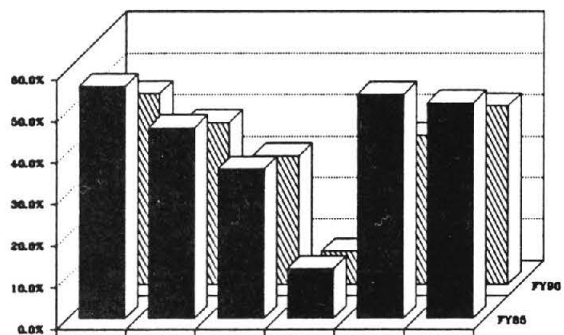
	Local	Express	Xtown	Suburb	Univ	Totals
FY90	35.8	28.1	24.7	7.2	29.4	33.3
FY85	38.0	26.9	24.4	8.4	48.0	35.8

Cost per Passenger Boarding



	Local	Radial	Xtown	Suburb	Univ	Totals
FY90	$1.46	$2.58	$2.02	$4.62	$2.28	$1.60
FY85	$1.08	$2.16	$1.66	$4.99	$1.45	$1.22

Percent Farebox Revenue of Cost



	Local	Radial	Xtown	Suburb	Univ	Totals
FY90	46.0%	38.0%	31.0%	8.0%	36.0%	43.0%
FY85	56.0%	48.0%	36.0%	12.0%	54.0%	52.0%

Exhibit 38
FY85-FY90 Minneapolis/St. Paul
Bus Service Type Performance Measures

Service Type	Cost/ Veh Hr	Pass/ Veh Hr	Cost/ Pass	Revenue/ Cost
1985				
Radial Local (RL)	$41.30	38.01	$1.09	55.74%
Radial Express (RE)	$58.09	26.92	$2.16	45.53%
Crosstown (C)	$40.55	24.35	$1.66	35.90%
Local Suburban (LS)	$42.13	8.44	$4.99	11.80%
University Express (UE)	$69.38	47.98	$1.45	53.75%
Totals	*$43.59*	*35.63*	*$1.22*	*52.46%*
1990				
Radial Local (RL)	$50.05	35.84	$1.40	46.00%
Radial Express (RE)	$75.36	26.15	$2.88	38.83%
Crosstown (C)	$50.05	24.72	$2.02	30.53%
Local Suburban (LS)	$33.44	7.23	$4.62	8.34%
University Express (UE)	$67.03	29.37	$2.28	36.32%
Totals	*$53.35*	*33.25*	*$1.60*	*43.16%*
Percent Change				
Radial Local (RL)	21.2	-5.7	28.4	-17.5
Radial Express (RE)	29.7	-2.9	33.3	-14.7
Crosstown (C)	23.4	1.5	21.7	-15.0
Local Suburban (LS)	-20.6	-14.3	-7.4	-29.3
University Express (UE)	-3.4	-38.8	57.2	-32.4
Totals	*22.4*	*-6.7*	*31.1*	*-17.7*

The combination of these two factors provides radial express service with second to the highest subsidy per passenger and the second highest farebox recovery. These results are a reflection of the MTC fare structure in which higher fares are charged for higher cost service.

MTC added one new radial express line while it increased service levels 14.4 percent from FY85 to FY90. Perhaps in response to service increases, passenger boardings also increased 11.2 percent during the period (Exhibit 38). Farebox revenues increased 26.6 percent probably because of increased ridership and a change in the composition of fares paid on the service.

Between FY85 and FY90, radial express service cost per vehicle hour increased 21.2 percent. Coupled with a 2.9 percent decline in passenger boardings per vehicle hour, the operating cost per passenger increased by one-third and the farebox recovery declined by almost 15 percent.

Crosstown

Six percent of the area's bus service is devoted to crosstown service (Exhibit 36). As might be expected by virtue of its operating parameters and its operation by MTC, the cost per vehicle hour of crosstown service is similar to that of radial local bus service (Exhibit 37). The passenger productivity of crosstown service, however, is lower than that of radial local service probably because this service operates in less densely populated areas. As a result, both the cost per passenger and the farebox recovery for crosstown service rank second lowest among the five service types.

The MTC added one crosstown route between FY85 and FY90, but reduced total service levels (vehicle hours) by 4.5 percent (Exhibit 36). Passenger boardings fell by three percent during the period, but farebox revenues remained stable.

Since level of service and passenger boardings declined at roughly the same rates, passenger boardings per vehicle hour remained stable between FY85 and FY90. Since the cost per vehicle hour increased by over 23 percent and the passengers per vehicle hour was stable, the cost per passenger boarding per vehicle hour increased by 21 percent and the farebox recovery dropped by 15 percent.

Local Suburban

The local suburban service is the second smallest category of service. In FY90, local suburban service represented less than two percent of the FY90 service (Exhibit 36).

The cost per vehicle hour for local suburban service is the lowest of any service type at $33.44 per vehicle hour (Exhibit 37) or 63 percent of overall area value (Exhibit 38). The passenger productivity is also the lowest of any service type and by a greater margin.

The passenger productivity of local suburban service is 7.23 passengers per vehicle hour or 21 percent of the area value.

The low passenger productivity was not offset sufficiently by the low cost per vehicle hour to produce cost per passenger and farebox recovery values close to those of other service types. The cost of local suburban services exceeded four dollars per passenger boarding in FY90. The farebox recovery ratio of eight percent was the lowest of any service type by a large margin.

While its passenger productivity is low compared to other service types, the percent increase in service on local suburban lines between FY85 and FY90 was the largest of any service type (Exhibit 36). Local jurisdictions added six new local suburban bus lines during the period.

Operating primarily during weekdays, the number of passenger boardings increased nearly 60 percent. Operating cost increased 48 percent while farebox revenues increased 4.6 percent.

The cost per vehicle service fell between FY85 and FY90 by over 20 percent. This occurred because the local jurisdictions could contract with private providers at rates lower than those offered by the MTC. This cost reduction helped mitigate the decline of 14 percent in passengers per vehicle hour. As a result, the cost per passenger fell only 7.4 percent. The farebox recovery fell by 29 percent because the local jurisdictions charged lower fares than those charged for comparable MTC services.

University Express

The university express service is the smallest category of service. In FY90, about one percent of the transit service was designed specifically for express travel to the University (Exhibit 36).

The university express cost per vehicle hour is the second highest of any service type (radial express is higher) at $67.03 per vehicle hour (Exhibit 37) or 21 percent higher than the area value (Exhibit 38). Passenger productivity is second highest of any service type. The combination of these two factors makes university express service perform in the middle of the service types in terms of cost per passenger boarding and farebox recovery.

University express vehicle hours decreased 13.5 percent between FY85 and FY90. Alarmingly, passenger boardings declined by nearly 50 percent. The corresponding farebox revenues also fell 43.5 percent.

Passenger productivity (passenger per vehicle hour) fell 39 percent between FY85 and FY90 because the size of the service reductions did not match the loss of ridership. Although the cost per vehicle declined 3.4 percent (maybe because it was competitively

contracted), the cost per passenger increased from $1.45 in FY85 to $2.28 in FY90 because of the 38 percent decline in passenger boardings per vehicle hour. During the same period, the farebox recovery declined from 54 percent to 36 percent.

St. Louis Metropolitan Area

SUMMARY

The total amount of transit service in the St.Louis area decreased significantly between FY80 and FY89. However, the size of the service changes differed by type of service. While local radial, local suburban, and crosstown service were all reduced, express service significantly increased during the latter half of the decade.

DEMOGRAPHIC CHANGES

The Bi-State service area includes three counties in Missouri and three counties in Illinois. The urban center of the region has the City of St. Louis, Missouri and its neighbor (on the other side of the Mississippi River) East St. Louis, Illinois.

While St. Louis has a vital downtown, East St. Louis suffers from severe economic problems and a very poor population. Minority and low income households are concentrated in the central areas, while the suburban areas are predominantly populated by white and middle-to-upper income households.

During the period of this case study, the St. Louis region experienced limited (less than three percent) population growth. However, total employment and median household income each increased at a much faster rate: 16-17 percent in each case between 1980 and 1989. There has been rapid growth in some parts of the region; for instance, St. Charles County (Missouri) was one of the fastest growing counties in the nation during the late 1980's.

TRANSIT SERVICE CHANGES

Bi-State significantly reduced its transit service between FY80 and FY89. The total number of revenue hours declined by 21 percent between FY80 and FY84. Service was further reduced between FY84 and FY89 with revenue hours decreasing by 14 percent. The numbers of routes and peak vehicles similarly decreased over this period with a greater decrease occurring during the first half of the decade.

Bi-State's ridership also declined considerably during the 1980's, with most of the decrease occurring between FY80 and FY84. Ridership reached a high of 76.3 million in FY80, following an extensive expansion of service. However, demand dropped steadily between FY80 and FY84, due primarily to the combination of: 1) two major fare increases; and 2) the reduction in service.

Ridership dropped to 46.8 million in FY84, nearly a 40 percent decrease from 1980. Ridership grew slightly over the next two years, but then decreased again -- to 46 million in FY89 (a 1.7 percent loss) -- following a fare increase in mid-1988.

As showed by comparing the changes in ridership with those in service, however, Bi-State succeeded in improving the passengers per hour of its service between FY84 and FY89, as compared to FY80-84. Bi-State did this by significantly revamping its service structure during the mid-1980's. The agency reevaluated all routes as part of its Transit Action Plan (TAP). The service revisions included routing changes, schedule changes, and the introduction of new park-and-ride lots and timed transfer centers.

The TAP changes were instituted during 1985 and 1986. The TAP changes included the deletion of some low-productivity routes, creation of several new routes, and revision of other routes. For instance, the "limited" routes (peak only routes called "rapids") were either deleted or reclassified as express routes; several new express routes were also added to serve the new park and ride lots.

Local radial service continued to be the single largest service category and accounted for 63 percent of the total revenue hours and 68 percent of the total passengers in FY89. It is followed by crosstown service (18 percent and 23 percent), local suburban service (12 percent and four percent) and express (seven percent and four percent).

Local radial service has the lowest cost per hour followed closely by crosstown service. Crosstown service actually had the lowest cost per hour in FY84 and FY80 (except the single local distributor route, since discontinued).

Crosstown service now has the highest passengers per hour, as it was in the two earlier years. Local radial service has the second highest passengers per hour. These two types of service tend to be predominantly used by transit dependent riders --- i.e., low income, elderly and youths.

In contrast, express service is more often used by "choice" riders living in suburban areas. Express service has by far the highest cost per hour of the service types, and has the second lowest passengers per hour.

Local suburban service has the lowest passengers per hour although its cost per hour is considerably lower than that of express service. Local suburban service is typically used by both choice and transit dependent riders although they tend to be from moderate-to-high income households; elderly and young people make up the bulk of this ridership group.

The patterns among routes are very similar for cost per passenger and farebox recovery ratio (revenue as a percentage of cost). Crosstown service had the lowest cost per passenger in both FY84 and FY89 due to relatively high passengers per hour and low cost per hour. It was slightly ahead of local radial service although this rank was

reversed in FY80. In terms of farebox recovery, crosstown service ranked highest for all three years with local radial service just trailing each measurement year.

As expected from the cost per hour and passengers per hour measures, express and local suburban services have higher cost per passenger than the other categories, and are actually very close in this measure. Express service had a slightly higher cost per passenger than local suburban in FY89, while the order was reversed in FY84. Local suburban service ranked last in farebox recovery in all three measurement years.

FUNCTIONAL CHANGES

There has been a decline in the past decade in the transit services offered in the St. Louis metropolitan area. FY89 service levels are about two-thirds of the service operated in FY80. The largest part of these cuts occurred between FY80 and FY84.

Transit carries only two of the three passengers it carried in FY80. This decline uniformly affected all service types and both transit dependent and choice riders. The largest ridership loses involved low-to-moderate income riders traveling to work.

Most service is still oriented toward travel to and from St. Louis. Most passengers use transit to travel to work in the city. There are limited crosstown and local suburban service for the transit dependent population that does not travel to St. Louis.

BACKGROUND

The Bi-State Development Agency provides bus transportation for the St. Louis region, which spans across eastern Missouri and western Illinois. In 1990, Bi-State's service area had a total population of approximately 2.5 million people, and covered about 3,600 square miles. The service area includes the Missouri counties of St.Charles, Jefferson and St.Louis (including St.Louis City), and the Illinois counties of St.Clair (including E. St. Louis), Monroe and Madison (Exhibit 39).

DEMOGRAPHIC CHANGES

The Bi-State service area experienced only a moderate increase in population, but more dramatic increases in employment and median household income during the study period. While population increased by only 2.8 percent between 1980 and 1990, employment and median household income increased by 16.4 and 17.1 percent, respectively (Exhibit 40).

The economic growth varied, however, among different parts of the region. In 1989, St. Louis ranked third among the nation's metropolitan areas in terms of headquarters for major corporations and ranked first in terms of renovations underway. The general revitalization of the St. Louis central business district prompted the expansion of various services including hotels, restaurants, entertainment and shopping centers. However, this revitalization did not spread to East St. Louis, which continues to experience severe economic problems.

Demographic characteristics also vary considerably across the region. For example, in 1980, only fourteen and four percent of the population in suburban St.Clair County was low income and minority, respectively, while only seven percent of the residents did not own a car. In the same year, East St.Louis' population was 62 and 74 percent low income and minority, respectively, with zero car ownership running to 41 percent.

TRANSIT CHARACTERISTICS

Bi-State provides bus service in the region through local radial, local suburban, crosstown, and express routes. In FY 84, Bi-State reevaluated all its routes and the total system structure to meet current market travel needs while eliminating unproductive service lines. Many significant service revisions were introduced in 1985 and 1986.

Exhibit 39
St. Louis Metropolitan Area

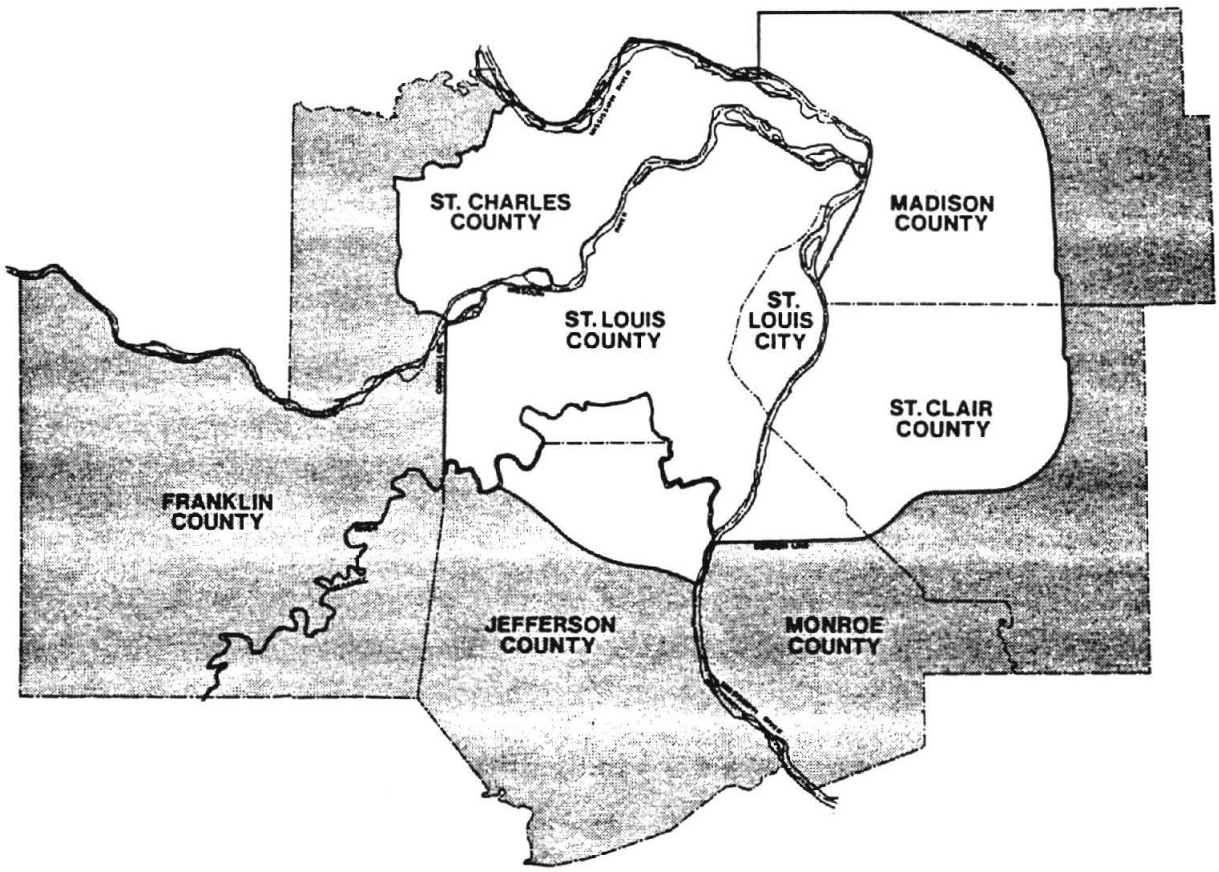
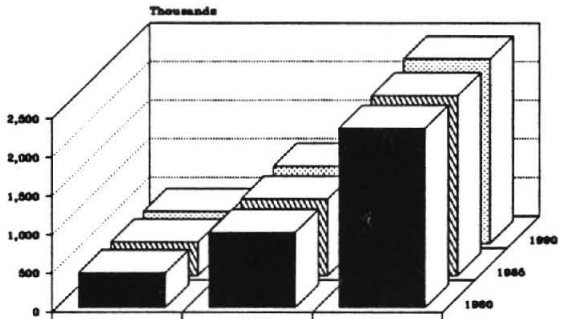


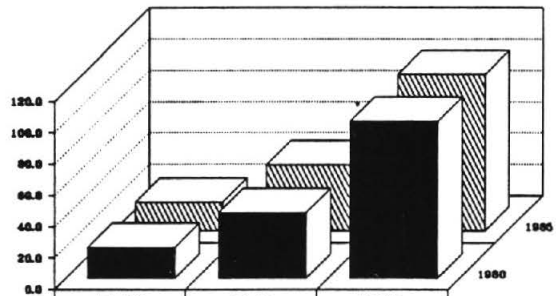
Exhibit 40
St. Louis Metropolitan Area
Population and Employment

Population



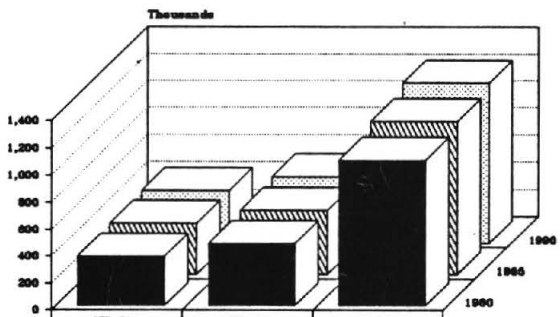
	STL City	STL Co	Region
1990	416	1,003	2,366
1985	436	991	2,334
1980	453	974	2,324

Juridiction Population
as a Percent of Total Population



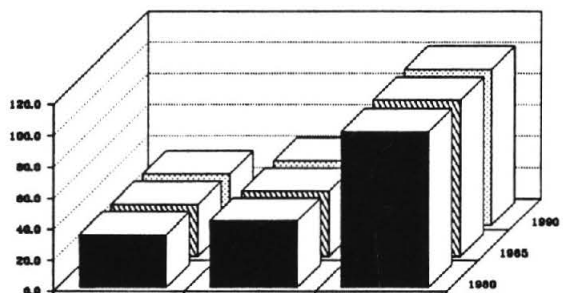
	STL City	STL Co	Region
1990	17.4	42.0	100.0
1985	18.7	42.5	100.0
1980	19.5	41.9	100.0

Employment



	STL City	STL Co	Region
1990	390	486	1,181
1985	382	480	1,132
1980	367	484	1,077

Jurisdiction Employment
as a Percent of Total Employment



	STL City	STL Co	Region
1990	33.0	41.5	100.0
1985	33.7	42.4	100.0
1980	34.1	43.1	100.0

Source: Capital Regional Planning Comm.

With the restructuring, Bi-State, with the assistance of an ad hoc group of downtown civic leaders (the Downtown Transit Committee), created a Ride Free Zone (RFZ) in June 1986. This helped alleviate downtown traffic congestion and encouraged circulation between businesses.

Bi-State attempted to further enhance the attractiveness of several express bus routes by adding 40 new commuter, over-the-road buses in FY 89. In addition, 117 new lift-equipped buses were added during this period. With 40 percent of rush hour buses made accessible to persons with disabilities during FY 89, a 450 percent increase in wheelchair passengers was recorded in FY 89 over FY 88. A Call-A-Ride Plus van service dedicated to disabled persons was also initiated during this period.

While Bi-State currently provides bus service only, an 18-mile light rail line is currently under construction. That line, Metro Link, will run from East St. Louis, through downtown St. Louis and out to Lambert International Airport. Metro Link is scheduled to begin operations in mid-1993. Studies are also underway exploring the potential for expanding light rail to other corridors in the region.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between FY80 and FY89.

OPERATING CHARACTERISTICS

During the period FY80 to FY89, Bi-State's total service decreased considerably (Exhibit 41). Revenue hours of service declined by nearly a third (1.9 to 1.3 million) and peak vehicles decreased by just under 30 percent (Exhibit 42). The numbers of routes, revenue miles, and peak vehicles similarly decreased over this period, with a greater decrease occurring during the first half of the decade.

Ridership experienced an even greater decline --- nearly 40 percent -- during this period. However, the bulk of the ridership decrease occurred during the first half of the decade. While service was reduced in both halves of the decade, Bi-State reduced the extent of the drop in patronage between FY84 and FY89. The TAP restructuring apparently made the total service have higher passengers per hour than it had between FY80 and FY84.

The revenue produced by the fare increases out paced ridership losses and service curtailment. Farebox revenues increased by 64 percent during the 9 year study period. Most of this increase in revenue (60 percent) occurred between FY80 and FY84 despite dramatic decreases in passenger boardings and revenue hours.

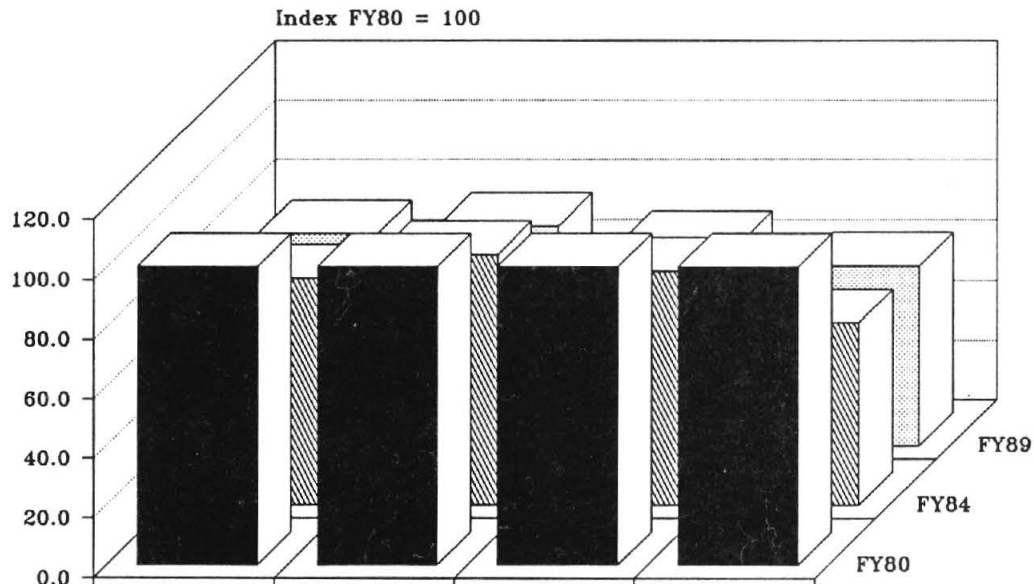
FARE STRUCTURE

Fares increased dramatically during the study period (Exhibit 43). Adult fares for local and express Missouri lines increased by 70 and 53 percent, respectively, between FY80 and FY89 while fares for local and express lines in the Illinois area increased by 50 and 67 percent, respectively. Fare increases were implemented during FY81, FY82 (two during this fiscal year), and FY89.

Exhibit 41
FY80–FY89 Bi-State Operating Performance

Operating Statistic	FY80	FY84	FY89	Change FY80–FY84	Change FY84–FY89	Change FY80–FY89
Peak Vehicles	783	596	556	-23.88%	-6.71%	-28.99%
# Weekday Lines	162	136	119	-16.05%	-12.50%	-26.54%
Revenue Hours	1,902,224	1,495,138	1,284,665	-21.40%	-14.08%	-32.47%
Revenue Miles	23,944,384	19,536,882	18,724,978	-18.41%	-4.16%	-21.80%
Passenger Boardings	76,320,400	46,790,200	46,019,187	-38.69%	-1.65%	-39.70%
Operating Cost	$79,993,502	$83,240,409	$88,137,504	4.06%	5.88%	10.18%
Farebox Revenue	$13,924,215	$22,302,575	$22,769,380	60.17%	2.09%	63.52%

Exhibit 42
FY85-FY89 Bi-State Operating Trends



	Peak Veh	Wkday Lines	Rev Hours	Pass Bdgs
FY89	71.0	73.5	67.5	60.3
FY84	76.1	84.0	78.6	61.3
FY80	100.0	100.0	100.0	100.0

Exhibit 43 Bi-State Fare Structure					
	FY80	**FY85**	**FY89**	**Change FY80-FY89**	**Change FY85-FY89**
Missouri					
Local	$0.50	$0.75	$0.85	70.0%	13.3%
Express	$0.75	$1.00	$1.15	53.3%	15.0%
Illinois					
Local	$0.50	$0.50	$0.75	50.0%	50.0%
Express	$0.75	$1.00	$1.25	66.7%	25.0%

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service level and performance by type of bus service provided. The categories and scheme used to classify Bi-State's bus lines is presented first. This is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

Bi-State provides a mix of local, express, and crosstown bus service. Since there is currently no rail system, no feeder lines exist. The following categories of service were used in this case study:

- **Local radial** routes have terminals both within and outside the CBD and do not restrict boardings and alightings along the route. These services tend to be used by transit dependent riders (i.e., low income, elderly, and young people) for work and other trip purposes.

- **Express/Limited** routes have one terminal inside the CBD and one outside. The direction of travel is generally radial. Boardings and alightings are generally restricted along all or a portion of the route. These services tend to be used by moderate income choice riders for work trip commuting.

- **Local Distributor** routes circulate within the CBD. These services are used by all types of riders, and are often predominantly used in off-peak periods.

- **Crosstown** routes have neither terminus inside the CBD, but often pass through the central city. The direction of travel is generally "cross-radial." Boardings and alightings are not restricted along the route. These services tend to be used by transit dependent riders (i.e., low income, elderly, and young people) for work and other trip purposes.

- **Local Suburban** routes operate within suburban areas and do not enter the central city. These services are used by both transit dependent and choice riders for a variety of trips.

Bus line classifications were determined by Bi-State staff.

TRENDS IN SERVICE LEVEL AND PERFORMANCE

This section discusses trends in service levels and performance among the bus service types.

Local Radial

Local radial service represents by far the largest service category. Local radial service had about two-thirds of the revenue hours in FY89 (Exhibit 44). Revenue hours of local radial service declined by 30 percent between FY80 and FY89. Most of this decline occurred between FY80 and FY84.

Local radial service represented approximately one-quarter of the number of bus lines in FY89. The number of bus lines did not decline as fast as the decline in revenue hours. The number of bus routes went from 35 (FY80) to 37 (FY84) to (FY89). This suggests that Bi-State reduced revenue hours primarily by reducing service frequencies and service spans instead of reducing area coverage by eliminating routes.

Boarding passengers on local radial services declined by 40 percent between FY80 and FY84, but rebounded slightly between FY84 and FY89. Farebox revenues increased 80 percent over the nine-year period due to fare increases.

Local radial service has the lowest cost per hour (Exhibit 45) and ranks second (to crosstown service) in passengers per hour, cost per passenger, and farebox recovery ratio. Local radial service improved in the four performance measures between FY84 and FY89 (Exhibit 46). In fact, operating costs per hour for local radial service actually decreased during the FY84-FY89 period. These measures --- except farebox recovery ratio --- declined between FY80 and FY84.

Express/Limited

Express service represents the smallest category of Bi-State service. Operating primarily during peak weekday time periods, express routes accounted for only about seven percent of system revenue hours in FY89 (Exhibit 44). Revenue hours on express/limited services declined by 68 percent between FY80 and FY84, but increased in the next five years so that FY89 service levels were 53 of FY80 service.

The number of express service routes in FY89 represented 43 percent of the total number of routes. The number of express and limited routes (the limited category was subsequently eliminated in FY84) started at 51, declined to 47 in FY84 and rebounded to 56 in FY89.

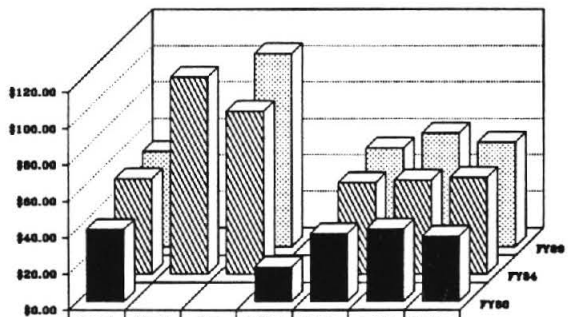
Over five million passengers on express/limited services were lost between FY80 and FY84. Ridership rebounded slightly during the next five years by 500,000 passengers.

Exhibit 44
FY80–FY89 Bi-State Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Revenue Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY80						
Local	525	35	1,114,880	47,548,784	$44,375,637	$8,512,305
Limited	NA	10	29,642	1,149,979	NA	$240,312
Express	NA	41	128,714	5,227,203	NA	$1,113,571
Local Distributor	0	1	7,175	190,072	$137,447	$19,007
Crosstown	145	21	355,666	16,676,289	$13,279,086	$2,904,702
Local Suburban	116	51	254,148	5,150,994	$10,149,243	$828,792
Total Bi-State Bus	NA	159	1,890,225	75,943,321	$67,941,413	$13,618,689
FY84						
Local	373	37	877,375	28,622,099	$45,964,867	$12,837,097
Limited	4	13	2,891	44,470	$313,225	$35,204
Express	50	34	47,206	1,369,311	$4,230,668	$1,087,903
Local Distributor	0	0	0	0	0	0
Crosstown	129	17	334,271	12,543,922	$16,883,875	$5,687,210
Local Suburban	63	39	159,028	2,138,742	$8,220,300	$911,521
Total Bi-State Bus	619	140	1,420,771	44,718,544	$75,612,935	$20,558,935
FY89						
Local	287	32	775,599	30,379,465	$40,561,254	$14,423,440
Limited	0	0	0	0	0	0
Express	107	56	84,614	1,832,567	$8,969,105	$1,718,583
Local Distributor	0	0	0	0	0	0
Crosstown	90	13	219,616	10,402,192	$11,924,071	$4,909,796
Local Suburban	73	29	146,553	1,898,917	$9,149,849	$869,224
Total Bi-State Bus	557	130	1,226,382	44,513,141	$70,604,279	$21,921,043
Percent Change FY80 to FY89						
Local	-45.3%	-8.6%	-30.4%	-36.1%	-8.6%	69.4%
Limited	NA	-100.0%	-100.0%	-100.0%	ERR	-100.0%
Express	NA	36.6%	-34.3%	-64.9%	ERR	54.3%
Local Distributor	0.0%	-100.0%	-100.0%	-100.0%	-100.0%	-100.0%
Crosstown	-37.9%	-38.1%	-38.3%	-37.6%	-10.2%	69.0%
Local Suburban	-37.1%	-43.1%	-42.3%	-63.1%	-9.8%	4.9%
Total Bi-State Bus	NA	-18.2%	-35.1%	-41.4%	3.9%	61.0%

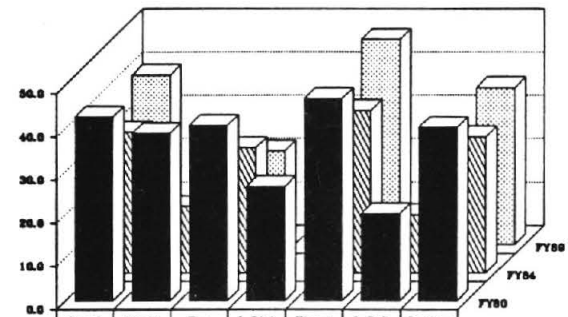
Exhibit 45
FY85-FY90 Bi-State Bus Service Type Performance Trends

Cost per Vehicle Hour



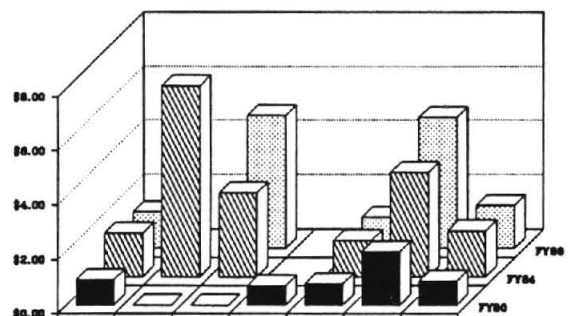
	Local	Limit	Exp	L Dist	Xtown	L Sub	System
FY89	$52.30		$106.00		$54.30	$62.43	$57.57
FY84	$52.39	$108.34	$89.62		$50.51	$51.69	$53.22
FY80	$39.80			$19.16	$37.34	$39.93	$35.94

Passengers per Vehicle Hour



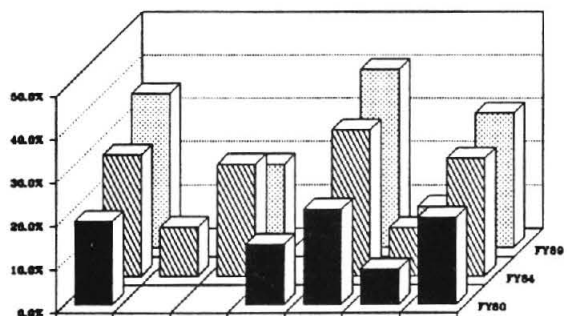
	Local	Limit	Exp	L Dist	Xtown	L Sub	System
FY89	39.2		21.7		47.4	13.0	36.3
FY84	32.6	15.4	29.0		37.5	13.4	31.5
FY80	42.8	36.8	40.6	26.5	46.9	20.3	40.2

Cost per Passenger Boarding



	Local	Limit	Exp	L Dist	Xtown	L Sub	System
FY89	$1.34		$4.89		$1.15	$4.82	$1.59
FY84	$1.61	$7.04	$3.09		$1.36	$3.84	$1.69
FY80	$0.93	$0.00	$0.00	$0.72	$0.86	$1.97	$0.89

Percent Farebox Revenue of Cost



	Local	Limit	Exp	L Dist	Xtown	L Sub	System
FY89	35.6%		19.2%		41.2%	9.5%	31.0%
FY84	27.9%	11.2%	25.7%		33.7%	11.1%	27.2%
FY80	19.2%			13.8%	21.9%	8.2%	20.0%

Exhibit 46
FY80-FY89 Bi-State Bus Service Type Performance Measures

Service Type	Cost/ Rev Hr	Pass/ Rev Hr	Cost/ Pass	Revenue/ Cost
FY80				
Local	$39.80	42.6	$0.93	19.18%
Limited	NA	38.8	NA	NA
Express	NA	40.6	NA	NA
Local Distributor	$19.16	26.5	$0.72	13.83%
Crosstown	$37.34	46.9	$0.80	21.87%
Local Suburban	$39.93	20.3	$1.97	8.17%
Total Bi-State Bus	*$35.94*	*40.2*	*$0.89*	*20.04%*
FY84				
Local	$52.39	32.6	$1.61	27.93%
Limited	$108.34	15.4	$7.04	11.24%
Express	$89.62	29.0	$3.09	25.71%
Local Distributor	NA	NA	NA	NA
Crosstown	$50.51	37.5	$1.35	33.68%
Local Suburban	$51.69	13.4	$3.84	11.09%
Total Bi-State Bus	*$53.22*	*31.5*	*$1.69*	*27.19%*
FY89				
Local	$52.30	39.2	$1.34	35.56%
Limited	NA	NA	NA	NA
Express	$106.00	21.7	$4.89	19.16%
Local Distributor	NA	NA	NA	NA
Crosstown	$54.30	47.4	$1.15	41.18%
Local Suburban	$62.43	13.0	$4.82	9.50%
Total Bi-State Bus	*$57.57*	*36.3*	*$1.59*	*31.05%*
Percent Change FY80 to FY89				
Local	31.4%	-8.2%	43.1%	85.4%
Limited	NA	NA	NA	NA
Express	NA	-46.7%	NA	NA
Local Distributor	NA	NA	NA	NA
Crosstown	45.4%	1.0%	44.0%	88.2%
Local Suburban	56.3%	-36.1%	144.5%	16.3%
Total Bi-State Bus	60.2%	-9.7%	77.3%	54.9%

Farebox revenues increased 27 percent over the nine-year period due to fare increases.

Express service has by far the highest cost per hour of the service categories with a FY89 cost per hour of $109 (Exhibit 45). This figure escalated from nearly $90 in FY84.

The passengers per hour rate of 22 exceeds only that for local suburban service. The express service passengers per hour declined during the study period as the FY84 figure was 29 and the FY80 figure was 41.

The combination of high cost per hour and low passengers per hour makes the express service cost per passenger the highest of the Bi-State services. Although higher, it is comparable to local suburban service.

Finally, the farebox recovery ratio for express service ranks just ahead of local suburban service. The ratio declined by 25 percent between FY84 and FY89 (Exhibit 46). There is no figure for FY80 since cost data could not be derived for this category in that year.

Local Distributor

A single local distributor route was offered in FY80, but was eliminated by FY84. This line constituted a very small portion of the total bus service provided (Exhibit 44) and is not discussed further in this report.

Crosstown

Crosstown service comprised about one-fifth of the system revenue hours and represented the second largest portion of the Bi-State system in FY89 (Exhibit 44). Crosstown service remained constant between FY80 and FY 84, but decreased by one-third by FY89. The numbers of crosstown lines and boarding passengers each declined by 39 percent between FY80 and FY89, mirroring the decrease in revenue hours over the period.

Farebox revenues increased 69 percent over the nine-year period. This increase occurred due to the fare increases.

Crosstown service had the second lowest cost per hour in FY89, just below local radial service (Exhibit 45). Crosstown ranked first in the other three performance measures in that year and in the prior two study years.

All measures but cost per hour improved between FY84 and FY89 (Exhibit 46). Passengers per hour and farebox recovery ratio increased by 24 and 22 percent, respectively. Cost per hour was not as low in FY89 as in FY84 and showed an eight percent increase during the period.

Local Suburban

Local suburban service represents the second smallest (to express service) proportion of service provided by Bi-State at 12 percent of system revenue hours in FY89 (Exhibit 44). Revenue hours of local suburban service declined by 42 percent between FY80 and FY89. Most of this decline occurred between FY80 and FY84. The number of crosstown lines declined by 43 percent between FY80 and FY89, mirroring the decrease in revenue hours over the period.

In Fy 89, this category carried only 63 percent of the passengers carried in FY80. Most of this loss occurred between FY80 and FY84. Despite these losses, farebox revenues increased five percent over the nine-year period. This increase occurred due to the fare increases.

Local suburban service had the lowest passengers per hour and farebox recovery ratio of all the service types in FY89 (Exhibit 45). It ranked next to last (to express service) in cost per hour and cost per passenger, with FY89 figures of $62.43 per revenue hour and $4.82 per passenger. While passengers per hour remained even between FY84 and FY89, the other three performance measures experienced significant declines between FY84 and FY89. Only farebox recovery ratio had improved during the FY80-FY84 period.

San Antonio Metropolitan Area

SUMMARY

Transit service in metropolitan San Antonio registered impressive gains in ridership with only modest increases in service between 1985 and 1990. While the community experienced growth in both population and employment over the five-year analysis period, public transportation usage increased about four times more rapidly.

DEMOGRAPHIC CHANGES

Despite the slowing of the economy in the latter 1980's, San Antonio continues to be one of America's most dynamic urban communities. The central city continues to account for an overwhelming share of metropolitan area population and employment principally as a result of an aggressive policy of annexation.

In 1990, the City of San Antonio accounted for 79.0 percent of area population (935,900 of 1,185,400 residents) and 80.1 percent of area employment (409,400 of 510,800 jobs). Transit service has expanded in the community with new lines added in the rapidly growing northeastern and northwestern sections of the metropolitan area. In the central business district, improvements in street and traffic conditions have positively impacted the speed of service to and from downtown San Antonio.

TRANSIT SERVICE CHANGES

Over the five-year analysis period, the quantity of service increased by a modest three to four percent. In contrast, passenger boardings advanced by a more robust 22 percent.

Radial bus service continues to be the major thrust of public transportation in metropolitan San Antonio. More area is served, more hours are operated, more passengers are carried, and more farebox revenue is generated by this route category than by all of the other route classes combined. In 1990, radial bus service accounted for more than 76 percent of overall bus usage and about 69 percent of all bus service revenue hours provided.

Radial bus service generally consists of the mainstay lines that are typically used by low-to moderate-income, transit captives. Not surprisingly, radial bus service has one of the highest passengers per revenue hour and lowest cost per passenger. Radial bus service also ranks the highest in farebox recovery as measured by the revenue-to-cost.

Express bus service, in contrast, has the highest cost per revenue hour of the route classes. Express bus operation offers high-speed, travel time competitive service that appeals to middle-and higher-income choice users. Yet, the ridership of this mode is effected by its limited-stop character and the concentration of service that typically occurs during peak periods.

In light of these considerations, express bus service has the lowest cost per passenger and second lowest passengers per revenue hour. However, with the near uniform increase in farebox revenue and operating costs, the revenue-to-cost basically remained unchanged during the five-year time frame.

Local distributor bus service is the smallest category of bus service in metropolitan San Antonio. However, it is the only service that is used significantly by tourists who contribute to the economic vitality of the community.

With very low fares and high passenger turnover, this route class has the highest passengers per revenue hour. On the other hand, the nominal fares charged on this service also contributes to low farebox recovery as measured by the revenue-to-cost.

Crosstown bus service accounts for only about nine percent of regional bus service, but it is one of the more dynamic route categories. Crosstown bus service is heavily used by low-income, transit dependents for connections to radial services or for travel to major generators throughout the region.

Substantial increases in revenue hours were more than offset by gains in passenger boardings and farebox revenue. Thus, this route class showed considerable increases in passengers per revenue hour and reductions in cost per passenger.

Local suburban/feeder bus service, like crosstown bus service, experienced rapid growth between 1985 and 1990. This service attracts a broad spectrum of socio-economic groups including higher-income, suburban riders using the service for local trip making and for connections to radial and express bus service as well as lower-income, inner city patrons using the service for "reverse" direction travel to jobs in the suburbs.

With considerable increases in passenger boardings and farebox revenue, local suburban/feeder bus service achieved impressive gains in a number of key indicators during the five-year time frame. The passengers per revenue hour increased more than 40 percent while, at the same time, the cost per passenger declined by nearly 13 percent.

FUNCTIONAL CHANGES

Metropolitan San Antonio continues to be one of America's more attractive areas with population and employment continuing to climb to new heights. At the same time, prudent and measured investments in transit service have generated more than a commensurate increase in ridership.

Most increases in service have focused on the developing sections of the community. Although radial bus service continues to be the backbone of public transportation in the metropolitan area, crosstown and local suburban/feeder bus lines have been established to accommodate additional trip making in these areas. These new services, coupled with the apparent policy of fare stabilization, have made transit a viable alternative for travel in San Antonio.

BACKGROUND

Public transit in the San Antonio area is provided by VIA Metropolitan Transit in a zone that covers approximately 1,232.5 square miles of substantially all of Bexar County (Exhibit 47). The service area has remained virtually unchanged during the study period with only the community of St. Hedwig (25.2 square miles) added between 1985 and 1990.

This chapter presents a brief description of the changes that occurred in the San Antonio metropolitan area in terms of population, employment, and transit service during the period 1985 through 1990.

DEMOGRAPHIC CHANGES

The population in Bexar County increased from approximately 1,128,900 residents in 1985 to 1,185,400 residents as reported in the 1990 Census or by about 5 percent (Exhibit 48). In striking contrast to other urban areas across the nation, nearly all of the population growth occurred in the central city rather than in the suburbs. This unusual situation can be attributed to an aggressive policy of annexation pursued by the City of San Antonio.

San Antonio's population is estimated to have increased by about 56,400 residents over the five-year analysis period and, in relative terms, the city's proportion of the overall area population grew from about 77.9 percent in 1985 to 79.0 percent in 1990. During the five-year time frame, the number of residents in the suburban jurisdictions remained virtually unchanged. As a result, the relative share of the Bexar County's population in the suburbs decreased from about 22.1 percent in 1985 to 21.0 percent in 1990.

During the period of analysis, employment in Bexar County increased from approximately 483,200 jobs in 1985 to a projected 510,800 jobs in 1990 or by nearly 6 percent, thereby, paralleling the overall growth in population. While both jurisdictions registered a gain in the number of employment opportunities, most of the new jobs were created in the central city probably as a result of annexation.

San Antonio added about 22,100 jobs during the five-year analysis period and, the central city's relative share of Bexar County's employment decreased marginally from about 80.2 percent in 1985 to 80.1 percent in 1990. Likewise, employment in the suburban jurisdictions increased by about 5,500 jobs during the same time period and the relative share of Bexar County's employment in the suburban areas increased marginally from about 19.8 percent in 1985 to 19.9 percent in 1990.

Exhibit 47
San Antonio Metropolitan Area

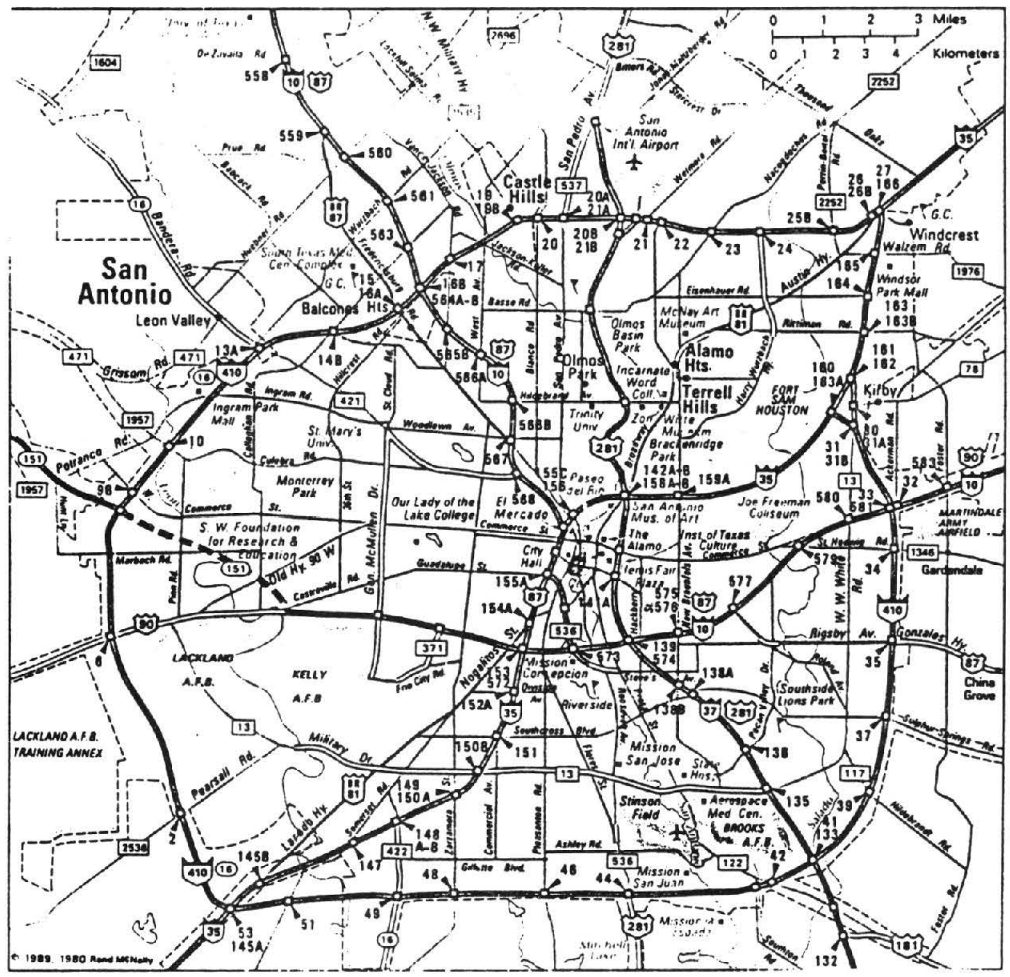
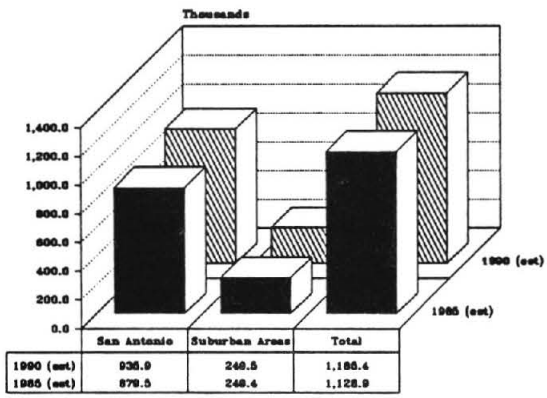


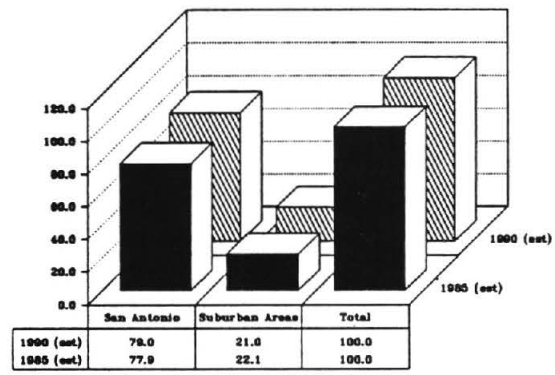
Exhibit 48
San Antonio Metropolitan Area
Population and Employment

Population



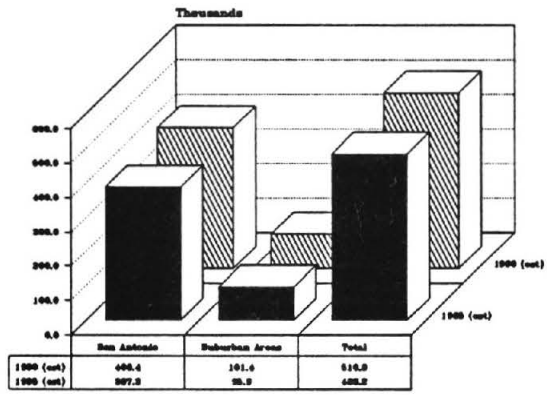
Source: San Antonio–Bexar County MPO

Jurisdiction Population
as a Percent of Total Population



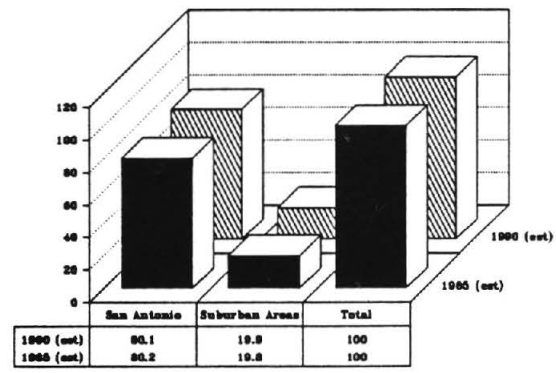
Source: City of San Antonio Plng. Dept.

Employment



Source: Texas Employment Commission

Jurisdiction Employment
as a Percent of Total Employment



Source: Texas Employment Commission

TRANSIT CHARACTERISTICS

VIA Metropolitan Transit provides an integrated network of surface transit operations in the community. VIA is the only carrier that offers regularly-scheduled public transit service in metropolitan San Antonio.

Major changes in service have been principally confined to rapidly growing areas situated northeast and northwest of the central business district. For example, between 1985 and 1990, one express line, one crosstown route, and several local suburban/feeder services were implemented in the northeastern and northwestern sections of the community.

Major thoroughfare re-construction occurred in downtown San Antonio in 1989 and 1990 including the installation of contra-flow and bus priority lanes in order to expedite the flow of transit through the core. After completion, a number of radial routes were re-combined to improve operations and the speed of delivery in the central business district.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between 1985 and 1990.

OPERATING CHARACTERISTICS

During the five-year analysis period, the amount of service provided in metropolitan San Antonio grew by a modest three percent to four percent when considering the number of revenue hours or revenue miles scheduled (Exhibit 49). In contrast, during the same time frame, ridership increased by nearly 23 percent -- a rate approximately six times higher than the change in service provided (Exhibit 50).

Between 1985 and 1990, operating expenses grew by approximately one-third while farebox revenues increased by only about 10 percent. This lag in revenue growth may be attributable to several factors including a change in ridership composition (e.g., a higher proportion of discount riders and free transfers), a change in ridership distribution (i.e., a greater relative use of crosstown and local/suburban feeder bus services where flat fares prevail), and the policy of fare stabilization as discussed below.

FARE STRUCTURE

Both distance-based and flat fares are charged by VIA. Actual fares are stratified by type of service (Exhibit 51).

Zone fares are charged on radial and express bus services with boundaries formed by two circumferential highways that are located about 8 and 16 miles from the central business district. Flat fares prevail on all other services.

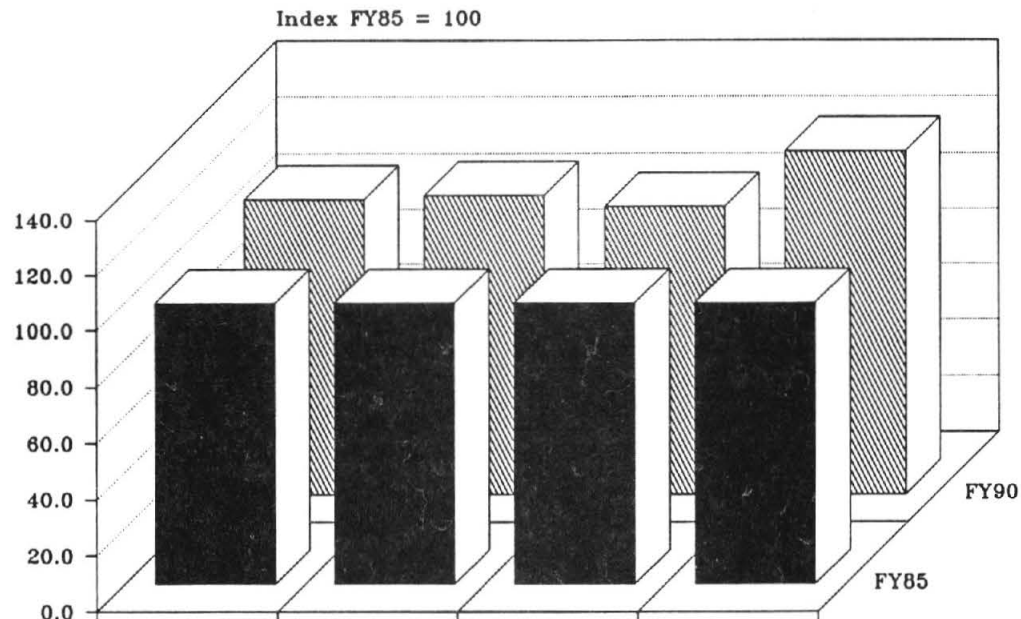
Between 1985 and 1990, user charges remained unchanged on all service types suggesting that fare stabilization is a major policy objective in metropolitan San Antonio.

Exhibit 49
FY85-FY90 VIA Operating Performance

Operating Statistic	FY85	FY90	Change
Peak Vehicles	410	433	5.6%
# Weekday Lines	86	92	7.0%
Revenue Hours	1,031,740	1,063,061	3.0%
Revenue Miles	14,632,151	15,183,771	3.8%
Passenger Boardings	34,837,576	42,724,018	22.6%
Passenger Miles	114,203,124	163,868,306	43.5%
Operating Cost	$36,165,698	$48,082,675	33.0%
Farebox Revenue	$9,252,616	$10,208,173	10.3%

Source: Statistical material provided by VIA Metropolitan Transit.

Exhibit 50
FY85-FY90 VIA Operating Trends



	Peak Veh	Wkday Lines	Rev Hours	Pass Bdgs
FY90	105.6	107.0	103.0	122.6
FY85	100.0	100.0	100.0	100.0

Exhibit 51
VIA Fare Structure

	1985		1990		Change 1985-1990	
	Base	Maximum	Base	Maximum	Base	Maximum
Radial	$0.40	$0.60	$0.40	$0.60	0.0%	0.0%
Express	$0.75	$1.00	$0.75	$1.00	0.0%	0.0%
Local Distributor	$0.10	$0.10	$0.10	$0.10	0.0%	0.0%
Crosstown	$0.40	$0.40	$0.40	$0.40	0.0%	0.0%
Local Suburban/ Feeder	$0.40	$0.40	$0.40	$0.40	0.0%	0.0%

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service levels and performance by type of fixed-route service provided. The scheme used to classify bus service in metropolitan San Antonio is presented first. This description is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

VIA Metropolitan Transit offers a diverse mix of services which consists of radial, express, local distributor, crosstown, and local suburban/feeder operations. Generally, VIA's bus services fall within the suggested route typology with the exception of the radial routes which may also include limited-stop operations in some instances. In addition, local suburban/feeder routes encompass both local suburban service as well as feeder service to radial and express bus operations.

The following route classification scheme was used in this study:

- **Radial bus service** operates to and through downtown San Antonio from outlying residential districts that are principally within the central city or the more populated sections of Bexar County. Radial bus service is available for passenger pick-up and discharge along the full length of each route. These lines are typically used by low-to moderate-income, transit dependent riders for work commuting and other trip purposes.

- **Express bus service** also operates to the San Antonio central business district although circumferential express bus service is also provided on Interstate 410. Unlike radial bus service, some express lines are scheduled only during weekday peak hours. These long-distance routes are operated largely non-stop from concentrated pick-up points such as park-and-ride facilities that may be located on the fringes of the central city or in other sections of Bexar County. Since their high-speed service is competitive with the automobile, this feature appeals to middle-income and high-income commuters.

- **Local distributor bus service** operates entirely within downtown San Antonio. These services are used by several market groups including residents for personal business, shopping and other purposes as well as by tourists to such destinations as the Alamo and the San Antonio Riverwalk.

- **Crosstown bus service** operates primarily in the central city, but these routes do not serve downtown San Antonio. These services typically connect radial lines

as well as major trip generators in San Antonio. Crosstown lines permit passengers to board and alight along the full length of service. These services tend to be more heavily patronized by low-income, transit dependent riders.

- **Local suburban/feeder bus service** typically operates to park-and-ride facilities and major radial bus route terminal locations outside of the central business district. Local suburban/feeder lines offer local service along their full length and ridership composition tends to reflect their location in the community as well as passenger travel patterns. Thus, these services tend to be patronized by higher-income, suburban residents given their location in the outlying sections of the service area. However, they may also be used by lower-income persons traveling in the "reverse" direction to job opportunities in the suburbs.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

This section discusses trends in service levels and performance among the five bus types --- radial, express, local distributor, crosstown, and local suburban/feeder operations.

Radial Bus Service

Radial bus service represents the backbone of public transportation in San Antonio and accounts for nearly 73 percent of all regional bus service as measured by the number of peak vehicles (Exhibit 52). More hours and passengers are attributed to this mode than to all of the other route classes together. Not surprisingly, radial bus service accounts for the bulk of operating costs and farebox revenue in metropolitan San Antonio.

During the five-year analysis period, there were notable increases in passenger boardings and operating costs while farebox revenue increased only marginally (Exhibit 53). Passenger boardings grew by over 14 percent while operating costs increased by nearly 25 percent. Farebox revenue, on the other hand, increased by less than 2 percent possibly as a result of a substantial increase in transfer passengers, monthly pass users, and discount riders. During the same time period, revenue hours decreased by nearly 5 percent.

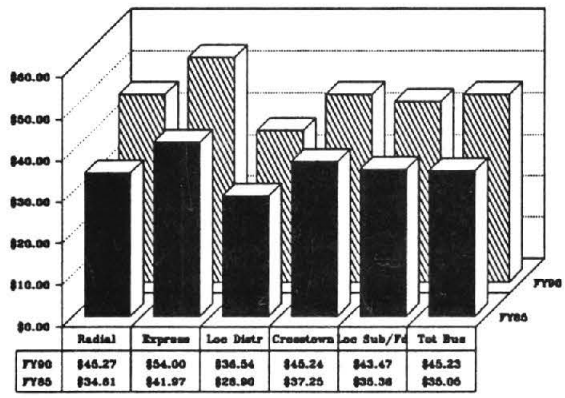
Radial bus service achieved the highest farebox recovery as measured by the revenue-to-cost (Exhibit 54). However, since the increase in operating costs outpaced the growth in farebox revenue between 1985 and 1990, the revenue-to-cost declined by nearly 19 percent. Even so, radial bus service ranks high in terms of two other indicators: the passengers per revenue hour and the cost per passenger. Since passenger boardings increased while revenue hours declined, the resultant passenger per revenue hour grew by nearly 20 percent between 1985 and 1990. And with patronage increasing about three-fifths as fast as operating costs, the cost per passenger grew by about nine percent

Exhibit 52
FY85–FY90 VIA Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Revenue Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Radial Bus	308	46	765,173	28,521,713	$26,482,160	$7,677,781
Express Bus	26	8	71,356	1,356,501	$2,944,636	$614,930
Local Distributor Bus	18	5	46,375	1,945,289	$1,340,387	$145,449
Crosstown Bus	32	10	71,622	1,755,108	$2,667,949	$494,051
Local Suburban/Feeder Bus	26	17	77,214	1,258,965	$2,730,566	$320,405
Total Bus	410	86	1,031,740	34,837,576	$36,165,698	$9,252,616
FY90						
Radial Bus	315	46	730,276	32,584,203	$33,061,406	$7,797,717
Express Bus	29	9	68,424	1,583,012	$3,694,673	$750,275
Local Distributor Bus	18	5	50,052	2,289,232	$1,829,006	$185,732
Crosstown Bus	40	11	102,165	3,699,960	$4,622,255	$888,421
Local Suburban/Feeder Bus	31	21	112,144	2,567,611	$4,875,335	$586,028
Total Bus	433	92	1,063,061	42,724,018	$48,082,675	$10,208,173
Percent Change FY85 to FY90						
Radial Bus	2.3%	0.0%	-4.6%	14.2%	24.8%	1.6%
Express Bus	11.5%	12.5%	-4.1%	16.7%	25.5%	22.0%
Local Distributor Bus	0.0%	0.0%	7.9%	17.7%	36.5%	27.7%
Crosstown Bus	25.0%	10.0%	42.6%	110.8%	73.3%	79.8%
Local Suburban/Feeder Bus	19.2%	23.5%	45.2%	103.9%	78.5%	82.9%
Total Bus	5.6%	7.0%	3.0%	22.6%	33.0%	10.3%

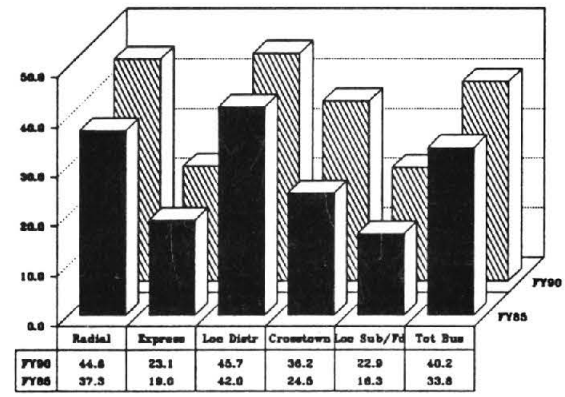
Exhibit 53
FY85-FY90 VIA Bus Service Type Performance Trends

Cost per Revenue Hour



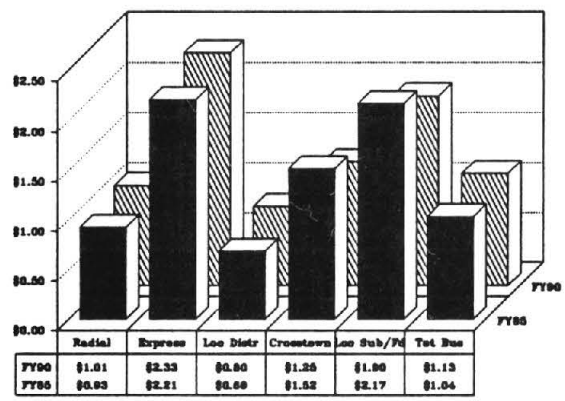
	Radial	Express	Loc Distr	Crosstown	Loc Sub/Fd	Tot Bus
FY90	$46.27	$54.00	$36.54	$45.24	$43.47	$45.23
FY85	$34.61	$41.97	$28.90	$37.25	$35.38	$35.06

Passengers per Revenue Hour



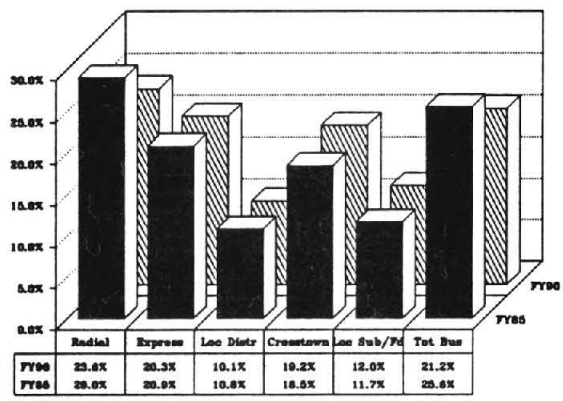
	Radial	Express	Loc Distr	Crosstown	Loc Sub/Fd	Tot Bus
FY90	44.8	23.1	45.7	36.2	22.9	40.2
FY85	37.3	19.0	42.0	24.5	16.3	33.8

Cost per Passenger Boarding



	Radial	Express	Loc Distr	Crosstown	Loc Sub/Fd	Tot Bus
FY90	$1.01	$2.33	$0.80	$1.25	$1.98	$1.13
FY85	$0.93	$2.21	$0.68	$1.52	$2.17	$1.04

Percent Farebox Revenue of Cost



	Radial	Express	Loc Distr	Crosstown	Loc Sub/Fd	Tot Bus
FY90	23.6%	20.3%	10.1%	19.2%	12.0%	21.2%
FY85	29.0%	20.9%	10.8%	16.5%	11.7%	25.6%

Exhibit 54
FY85-FY90 VIA Bus Service Type Performance Measures

Service Type	Cost/ Rev Hr	Pass/ Rev Hr	Cost/ Pass	Revenue/ Cost
FY85				
Radial Bus	$34.61	37.27	$0.93	28.99%
Express Bus	$41.97	19.01	$2.21	20.88%
Local Distributor Bus	$28.90	41.95	$0.69	10.85%
Crosstown Bus	$37.25	24.51	$1.52	18.52%
Local Suburban/Feeder Bus	$35.36	16.30	$2.17	11.73%
Total Bus	$35.05	33.77	$1.04	25.58%
FY90				
Radial Bus	$45.27	44.62	$1.01	23.59%
Express Bus	$54.00	23.14	$2.33	20.31%
Local Distributor Bus	$36.54	45.74	$0.80	10.15%
Crosstown Bus	$45.24	36.22	$1.25	19.22%
Local Suburban/Feeder Bus	$43.47	22.90	$1.90	12.02%
Total Bus	$45.23	40.19	$1.13	21.23%
Percent Change FY85 to FY90				
Radial Bus	30.8%	19.7%	9.3%	-18.6%
Express Bus	28.7%	21.7%	5.7%	-2.8%
Local Distributor Bus	26.4%	9.0%	16.0%	-6.4%
Crosstown Bus	21.5%	47.8%	-17.8%	3.8%
Local Suburban/Feeder Bus	22.9%	40.4%	-12.5%	2.4%
Total Bus	29.0%	19.0%	8.4%	-17.0%

during the study period.

Express Bus Service

Presently, express bus service represents less than seven percent of all metropolitan area bus service as measured by the number of peak vehicles (Exhibit 52).

Although revenue hours decreased by approximately four percent between 1985 and 1990, passenger boardings, farebox revenue and operating costs all recorded gains (Exhibit 53). Passenger boardings increased by nearly 17 percent while farebox revenue grew at a more accelerated 22 percent, possibly as a result of more longer-distance passenger trips. At the same time, operating costs advanced by nearly 26 percent.

Express bus service has the highest the cost per revenue hour and the cost per passenger (Exhibit 54). But, with farebox revenue rising nearly as rapidly as operating costs, the revenue-to-cost showed little change during the five-year analysis period.

Local Distributor Bus Service

Local distributor bus service represents the smallest component of public transportation in metropolitan San Antonio by any measure. Currently, this route class accounts for only about 4 percent of the regional peak vehicle fleet (Exhibit 52).

Between 1985 and 1990, the character and quantity of this service category changed only modestly (Exhibit 53). Nonetheless, passenger boardings, operating costs, and farebox revenue grew more notably during the five-year analysis period. Operating costs increased by nearly 37 percent while passenger boardings and farebox revenue gained nearly 18 percent and 28 percent, respectively.

With very low flat fares and high passenger turnover, local distributor bus service has the highest passengers per revenue hour and the lowest farebox recovery, as measured by the revenue-to-cost (Exhibit 54). Since passenger boardings increased while revenue hours declined, passengers per revenue hour increased by about nine percent. Yet, farebox recovery declined between 1985 and 1990 since operating costs advanced at a faster rate than farebox revenue.

Crosstown Bus Service

Crosstown bus service presently represents about nine percent of regional bus service in San Antonio as measured by the number of peak vehicles (Exhibit 52).

Between 1985 and 1990, increases were registered across-the board in all of the absolute measures of performance (Exhibit 53). The most substantial gains occurred in

passenger boardings, operating cost and farebox revenue. While the latter measures increased on-the-order of 73 percent to 80 percent, passenger boardings leaped ahead by nearly 111 percent.

Crosstown bus service ranks in the middle of the four categories of service when viewing the key measures of performance (Exhibit 54). For example, the cost per revenue hour for crosstown bus service is comparable to radial service while the revenue-to-cost for crosstown bus service is slightly lower than express bus service. With the growth in passenger boardings and farebox revenue outstripping the increase in operating costs, the passenger per revenue hour and cost per passenger improved nearly 48 percent and 18 percent, respectively. And, in spite of no change in the fare structure between 1985 and 1990, the revenue-to-cost increased by nearly 4 percent.

Local Suburban/Feeder Bus Service

Currently, local suburban/feeder bus service accounts for approximately seven percent of all bus service provided in metropolitan San Antonio as measured by the number of peak vehicles (Exhibit 52). However, local suburban/feeder bus service is the most rapidly growing group of the five route categories under study when considering the number of lines added and the consequent increases in operating costs.

Like its crosstown bus service counterpart, impressive gains were recorded in all absolute measures of performance (Exhibit 53). Owing to the increase in service in both the northeast and northwest sections of the region, passenger boardings, farebox revenue, and operating costs all increased considerably between 1985 and 1990. While operating costs increased by nearly 79 percent, more than commensurate gains of 83 percent and 104 percent were registered by farebox revenue and passenger boardings, respectively.

The fast growth of ridership and farebox revenue were largely responsible for significant improvements in most of the key performance indicators (Exhibit 54). Although local suburban/feeder bus service has the lowest passengers per revenue hour, this indicator increased by over 40 percent during the five-year analysis period. Likewise, the cost per passenger, while relatively high for this route category, declined by nearly 13 percent between 1985 and 1990.

San Diego Metropolitan Area

SUMMARY

Transit service in metropolitan San Diego increased substantially between 1985 and 1990 with impressive gains registered by rail and suburban bus service. These increases in service were designed to accommodate higher levels of trip making caused by burgeoning population and employment growth in the San Diego area.

DEMOGRAPHIC CHANGES

San Diego is now America's sixth largest central city. However, in spite of the city's significant increase in population, the metropolitan area is decentralizing like many other slower-growth urban centers across the nation.

While the city still accounts for 44.5 percent of area population (1,105,000 of 2,498,000 residents) and 58.4 percent of area employment (641,200 of 1,098,300 jobs), the suburbs are growing more rapidly than the city. Perhaps this continuing trend in decentralization and robust growth has led to the development of a multitude of public transportation carriers in metropolitan San Diego. Although San Diego Transit continues to play a dominant role in the community, other carriers are accounting for an increasing proportion of transit users.

TRANSIT SERVICE CHANGES

Fixed-route bus and light rail transit expanded in metropolitan San Diego even more rapidly than changes in the area's demographics. Over the five-year analysis period, passenger boardings on all modes jumped by nearly 62 percent or nearly twice as fast as the 32 percent increase in service. While the San Diego Trolley and the other carriers in the region accounted for a higher proportion of the growth in ridership, usage on San Diego Transit increased by nearly 27 percent between FY85 and FY90.

Radial bus service continues to be the backbone of public transportation in metropolitan San Diego. More area is served, more hours are operated, and more passengers are carried by this route class than by any other. In FY90, radial bus service accounted for nearly three-quarters of total bus usage and about 63 percent of total bus service revenue hours provided.

Radial bus service may have the highest passenger per revenue hour because low to moderate income, transit captives use it. In addition, radial bus service registers the lowest cost per passenger and the highest revenue-to-cost of the route types under study.

Express bus service, on the other hand, has the highest cost per revenue hour of the route classes. This service, which is on the street during peak hours, provides high-speed, home-to-work service that is particularly appealing to middle and higher income, choice riders.

Unfortunately, the limited-stop character of this mode somewhat limits its ability to generate riders and the resultant passengers per hour is the second lowest of the route types under analysis. Express bus service is the only mode where the level of service declined during the five-year period possibly because of the opening of light rail service in the east corridor and the consequent discontinuation of some service.

Crosstown bus service is the smallest category of bus service in metropolitan San Diego, but it provides a vital function by linking radial bus service and light rail service at strategic locations. This service is used by all income groups depending on the location of service. Crosstown bus service ranks in the middle of the four bus categories and was marked by stability with respect to the cost per passenger and the revenue-to-cost during the five-year analysis period.

Local suburban/feeder bus service is the most rapidly growing segment of bus service under study. This service attracts a broad spectrum of socio-economic groups with service in the inlying suburbs patronized by more transit dependents than service in the outlying suburbs. Between FY85 and FY90, passenger boardings increased by 45 percent, farebox revenue increased by 61 percent, and revenue hours jumped by 70 percent. Operating costs, on the other hand, increased by 29 percent suggesting that competitive pressures may have influenced the results. These changes in performance, taken together, reduced the cost per revenue hour and cost per passengers during the five-year period.

FUNCTIONAL CHANGES

Metropolitan San Diego is one of America's most rapidly growing areas with increases in population and employment occurring in both the central city and the suburbs. Clearly, the transit agencies in the region have responded to the challenge of serving this dynamic environment.

While population and employment have increased significantly, transit service and usage have grown even more rapidly. The family of service types offered by the carriers appear to be working in concert. Radial service has been expanded to accommodate trip making to the central city. Light rail service has been extended, evidently allowing the discontinuation of some costly express service. Also, crosstown linkages have been improved and local suburban/feeder service has been expanded to provide mobility alternatives in areas beyond the central city.

BACKGROUND

The public transit carriers in metropolitan San Diego provide fixed-route service in a zone that covers about 570 square miles in the southwestern section of San Diego County (Exhibit 55). Major communities that are encompassed in the service area include Chula Vista, Coronado, Del Mar, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, San Diego, and Santee.

This chapter presents a brief description of the changes that occurred in the San Diego metropolitan area in terms of population, employment, and transit service during the period 1985 through 1990.

DEMOGRAPHIC CHANGES

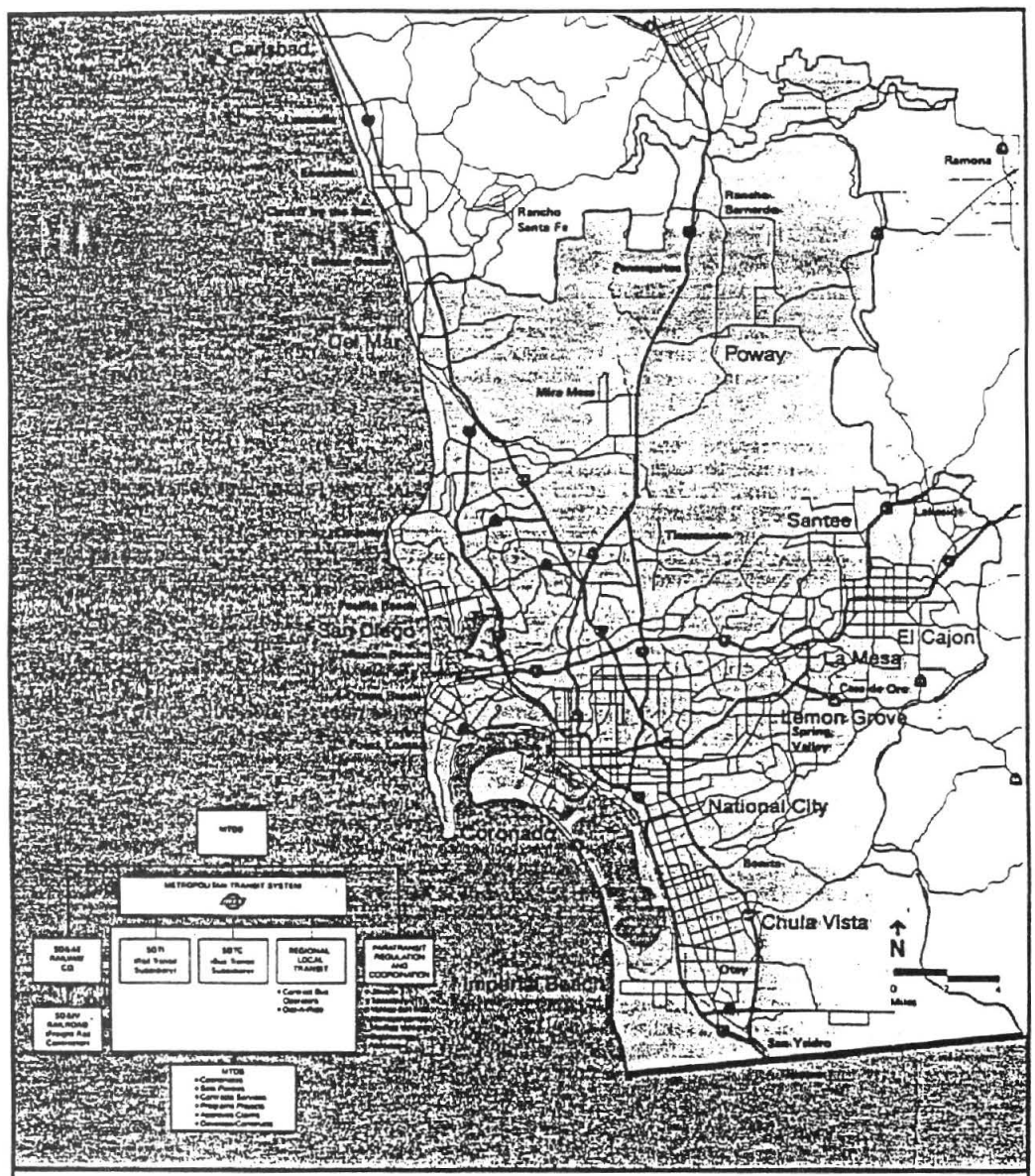
The population in San Diego County increased from approximately 2,097,300 residents in 1985 to a projected 2,498,000 residents in 1990 or by somewhat more than 19 percent (Exhibit 56). Given the dynamic characteristics of the area, population growth occurred in both the central city and the suburbs.

San Diego City's population is estimated to have increased by 126,000 residents over the five-year analysis period but, in relative terms, the city's proportion of the total area population decreased from about 46.7 percent in 1985 to 44.5 percent in 1990. During the five-year period, the suburban jurisdictions added about 269,200 residents or more than twice the increase experienced by the central city. As a result, the relative share of the County's population in the suburban jurisdictions grew from about 53.3 percent in 1985 to 55.5 percent in 1990.

During the period of analysis, County employment increased from approximately 927,300 jobs in 1985 to a projected 1,098,300 jobs in 1990 or by more than 18 percent, thereby, paralleling the total growth in population. While both jurisdictions registered a gain in the number of employment opportunities, most of the new jobs were created in the suburban areas.

San Diego City added about 44,200 jobs during the five-year analysis period but, the central city's relative share of County employment declined from about 64.4 percent to 58.4 percent in 1985 and 1990, respectively. In contrast, employment in the suburban jurisdictions increased by 126,800 jobs during the same period or about three times as fast as the central city. As a result, the relative share of County employment in the suburban areas grew from about 35.6 percent in 1985 to approximately 41.6 percent in 1990.

Exhibit 55
San Diego Metropolitan Area

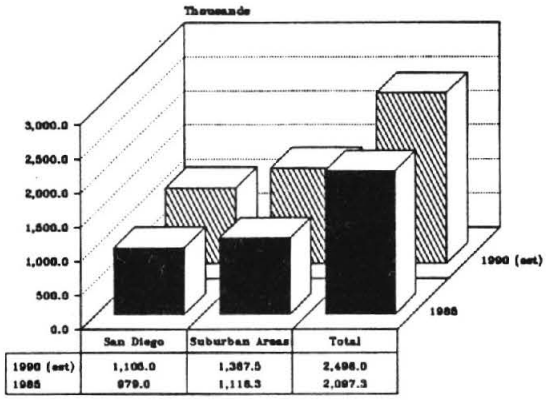


MTDB Figure 2-1

MTDB AREA ORGANIZATION, JURISDICTION AND FUNCTION

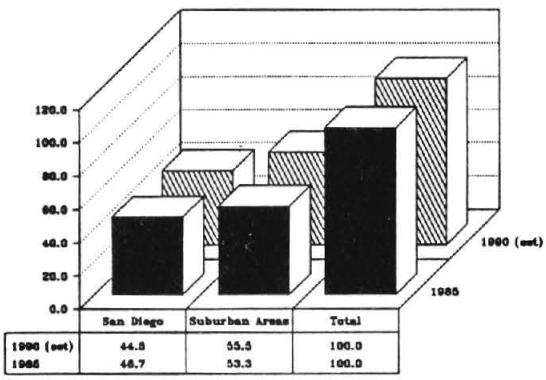
Exhibit 56
San Diego Metropolitan Area
Population and Employment

Population



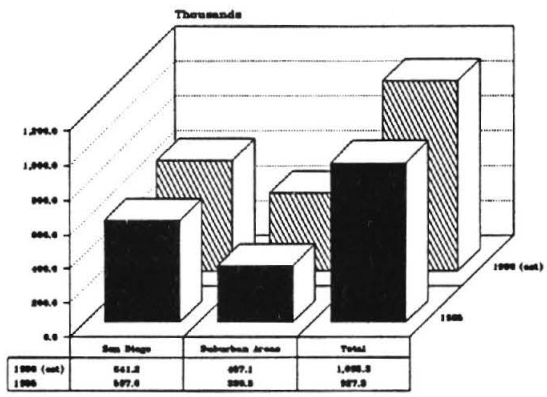
	San Diego	Suburban Areas	Total
1990 (est)	1,105.0	1,387.5	2,496.0
1985	979.0	1,118.3	2,097.3

Jurisdiction Population
as a Percent of Total Population



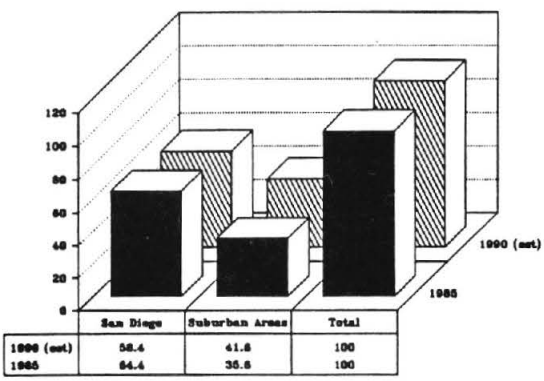
	San Diego	Suburban Areas	Total
1990 (est)	44.8	55.5	100.0
1985	46.7	53.3	100.0

Employment



	San Diego	Suburban Areas	Total
1990 (est)	641.2	857.1	1,498.3
1985	597.0	330.3	927.3

Jurisdiction Employment
as a Percent of Total Employment



	San Diego	Suburban Areas	Total
1990 (est)	58.4	41.6	100
1985	64.4	35.6	100

Source: San Diego Assn. of Govts.

TRANSIT CHARACTERISTICS

A multiplicity of carriers provides fixed-route bus and light rail service in metropolitan San Diego. These operators include:

- **Chula Vista Transit.** Chula Vista Transit is primarily a municipal-based operation that provides a network of local suburban/feeder routes that are geared to serving this south county community.

- **Metropolitan Transit Development Board.** Some radial and crosstown services are operated by the Metropolitan Transit Development Board in various sections of metropolitan San Diego. Certain evening only operations are also provided by this agency.

- **National City Transit.** Similar to Chula Vista Transit, local suburban/feeder service provided by National City Transit focuses on this community situated south of San Diego.

- **San Diego County Transit System.** San Diego County Transit provides local suburban/feeder service within the eastern suburbs of El Cajon, Lakeside, La Mesa, Lemon Grove, Poway, Santee, and Spring Valley. Express service is also offered between various locations in the northern suburbs and downtown San Diego.

- **San Diego Transit Corporation.** San Diego Transit Corporation is the largest carrier in the metropolitan area. While radial, express, and crosstown operations tend to focus on the central city, service is also provided in Chula Vista, El Cajon, La Mesa, Lemon Grove, and National City.

- **San Diego Trolley, Inc.** San Diego Trolley, Inc. operates two light rail lines oriented to downtown San Diego. The first line originates at the International Border in San Ysidro while the second line begins in El Cajon.

During the five-year analysis period, there were significant increases in service provided by San Diego Trolley and San Diego County Transit. Rail system route mileage more than doubled between FY85 and FY90. At the beginning of the study period, San Diego Trolley provided service over the 15.9 mile South Line between Centre City San Diego and the International Border in San Ysidro. Five years later, the system also included the 17.5 mile East Line between downtown San Diego and El Cajon. In addition, a 1.25 mile extension to the East Line, known as the Bayside Segment, was completed in FY90. During the same time, some express bus service to the El Cajon area was apparently discontinued.

Impressive gains in service were also registered by San Diego County Transit. While the number of routes operated by County Transit remained unchanged during the analysis period, service frequencies and hours of operation were generally increased.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in service levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

During the five-year analysis period, transit service increased on all services throughout the metropolitan area (Exhibit 57). Further analysis shows that the increase in service occurred mostly on the San Diego Trolley and the other carriers. While service on the San Diego Trolley and the other carriers more than doubled, San Diego Transit recorded less than a 12 percent gain in the number of revenue hours provided (Exhibit 58).

Likewise, ridership grew at differential rates between FY85 and FY 90. Passenger boardings increased by nearly 27 percent on San Diego Transit --- an impressive gain by itself. Nonetheless, usage on the San Diego Trolley and the other carriers more than doubled during the five-year analysis period.

Overall, the increase in transit service in metropolitan San Diego generated more than a corresponding growth in patronage. Thus, it would appear that these operations responded favorably to the increase in population and employment being experienced by the area.

FARE STRUCTURE

Bus and rail carriers in metropolitan San Diego follow a unified fare structure. This fare structure is stratified by service type (Exhibit 59).

Flat fares prevailed on all bus services in 1985 with base charges ranging from $0.75 on local suburban/feeder service to $1.00 on express operations. San Diego Trolley fares, on the other hand, were distance-based with charges varying from $0.50 to $1.50.

Between 1985 and 1990, base fares were raised by at least 25 percent on all bus service categories except for local suburban/feeder operations. In addition, a zone fare system was implemented on all express bus services. Fares now range from $1.25 to $2.25 on high-speed operations depending on distance traveled. While San Diego Trolley base fares remained unchanged during the five-year analysis period, maximum charges were increased from $1.50 to $2.00.

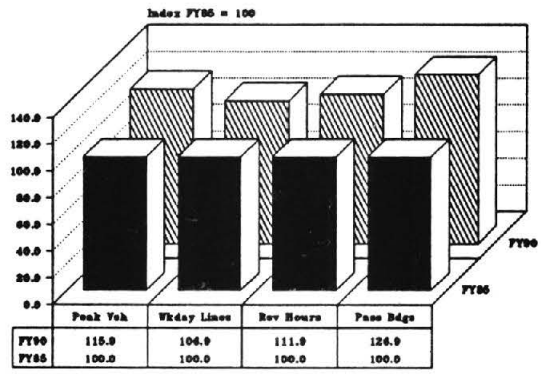
Exhibit 57
FY85–FY90 San Diego Operating Performance

	San Diego Transit			San Diego Trolley			Other Carriers		
Operating Statistic	FY85	FY90	Change	FY85	FY90	Change	FY85	FY90	Change
Peak Vehicles	195	226	15.9%	18	45	150.0%	38	82	115.8%
# Weekday Lines	29	31	6.9%	1	2	100.0%	21	31	47.6%
Revenue Hours	756,760	846,825	11.9%	34,438	82,033	138.2%	118,890	270,841	127.8%
Revenue Miles	9,778,514	10,377,891	6.1%	1,600,228	4,014,744	150.9%	1,934,985	3,999,374	106.7%
Passenger Boardings	23,921,446	30,367,406	26.9%	5,973,965	16,005,726	167.9%	2,952,693	6,836,990	131.6%
Passenger Miles	121,394,796	135,156,362	11.3%	45,999,529	108,358,765	135.6%	15,731,771	41,815,072	165.8%
Operating Cost	$34,236,585	$44,636,034	30.4%	$5,516,600	$13,320,475	141.5%	$4,701,215	$8,727,682	85.6%
Farebox Revenue	$13,417,760	$18,904,453	40.9%	$4,753,300	$12,431,220	161.5%	$1,403,892	$4,000,004	184.9%

Source: Statistical material provided by the San Diego Association of Governments, San Diego Transit and the Metropolitan Transit Development Board.

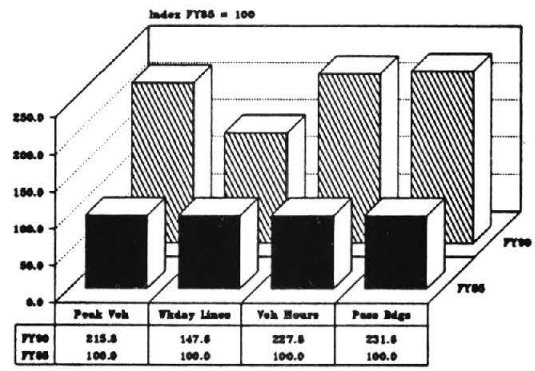
Exhibit 58
FY85-FY90 San Diego Operating Trends

San Diego Transit



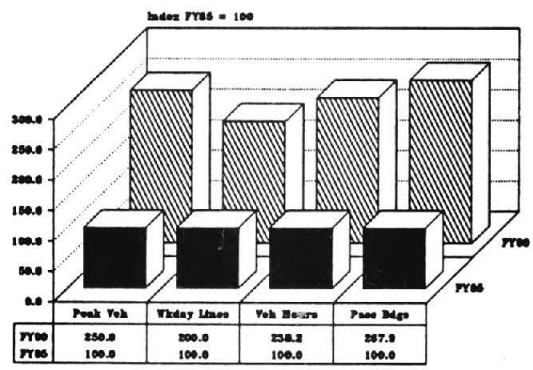
	Peak Veh	Wkday Lines	Rev Hours	Pass Bdgs
FY90	115.0	106.9	111.0	126.9
FY85	100.0	100.0	100.0	100.0

Other Carriers



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	215.8	147.6	227.8	231.6
FY85	100.0	100.0	100.0	100.0

San Diego Trolley



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	250.0	200.0	238.2	267.9
FY85	100.0	100.0	100.0	100.0

Exhibit 59
San Diego Unified Bus and Trolley Fare Structure

	1985		1990		Change 1985-1990	
	Base	Maximum	Base	Maximum	Base	Maximum
BUS						
Radial	$0.80	$0.80	$1.00	$1.00	25.0%	25.0%
Express	$1.00	$1.00	$1.25	$2.25	25.0%	125.0%
Crosstown	$0.80	$0.80	$1.00	$1.00	25.0%	25.0%
Local Suburban/ Feeder	$0.75	$0.75	$0.75	$0.75	0.0%	0.0%
TROLLEY	$0.50	$1.50	$0.50	$2.00	0.0%	33.3%

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service levels and performance by type of fixed-route service provided. The scheme used to classify bus service in metropolitan San Diego is presented first. This description is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

Fixed-route carriers in metropolitan San Diego provide a family of services that consists of radial, express, crosstown, and local suburban/feeder operations. Generally, metropolitan area bus services fall within the suggested route typology except for the express routes that may include some limited-stop operations. In addition, local suburban/feeder routes encompass both suburban service and also feeder service to light rail or radial bus operations.

The following route classification scheme was used in this study:

- **Radial bus service** operates to and through downtown (Centre City) San Diego from outlying residential districts that are principally within the central city or the more populated sections of San Diego County. Radial bus service is available for passenger pick-up and discharge along the full length of each route. These lines are typically used by low to moderate income, transit dependent riders for work commuting and other trip purposes.

- **Express bus service** also operates to Centre City San Diego. Unlike radial service, some express lines are scheduled only during weekday peak hours. These long-distance routes are operated largely non-stop from concentrated pick-up points such as park-and-ride facilities. Since their high-speed service is competitive with the automobile, this feature appeals to middle-income and high-income commuters.

- **Crosstown bus service** operates both in the central city and in the suburban areas, but the routes do not serve downtown San Diego. These services typically connect radial lines in the central city and also major trip generators in the suburbs. City and suburban crosstown lines permit passengers to board and alight along the full length of service. While certain urban lines tend to be more heavily patronized by low-income, transit dependent riders, the suburban lines tend to accommodate a broader cross-section of socioeconomic groups.

- **Local Suburban/Feeder bus service** typically operates to light rail stations and to major radial bus routes outside the central business district. Local suburban/feeder lines offer local service along their full length and ridership composition often reflects their location in the community. Thus, local suburban/feeder services operating near to downtown tend to be patronized by low income, captive riders while local suburban/feeder operations at greater distances from Centre City serve a wider diversity of income groups.

If the San Diego Trolley was considered in this route classification scheme, it would be categorized as an express service. However, sections on C Street in downtown San Diego also provide local distributor service and the low initial fare is designed to encourage this short-distance trip making.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

This section discusses trends in service levels and performance among the four bus types --- radial, express, crosstown, and local suburban/feeder operations.

Radial Bus Service

Radial bus service presently represents about 55 percent of total bus service in metropolitan San Diego as measured by the number of peak vehicles (Exhibit 60). More hours and passengers are attributed to this group of lines than any other route class. Not surprisingly, radial service generates the highest level of farebox revenue and accounts for the greatest amount of operating cost of any group of lines.

Between FY85 and FY90, the number of radial lines changed modestly but, notable increases were recorded in passenger boardings, operating cost, and farebox revenue (Exhibit 61). Passenger boardings and operating cost both increased by 43 percent and 46 percent, respectively. Farebox revenue jumped by nearly 63 percent possibly because of the strong showing in ridership and the increase in fares.

Radial bus service has the most passengers per revenue hour (Exhibit 62). Since passenger boardings increased faster than revenue hours, the passengers per revenue hour of radial service increased by 13 percent during the five-year analysis period. In addition, radial bus service has the lowest cost per passenger and the highest revenue-to-cost. Since passenger boardings and operating cost grew at about the same rate, the resultant cost per passenger remained almost unchanged between FY85 and FY90. Also, because the growth in farebox revenue outpaced the increase in operating cost, the revenue-to-cost improved by over 11 percent during the five-year period.

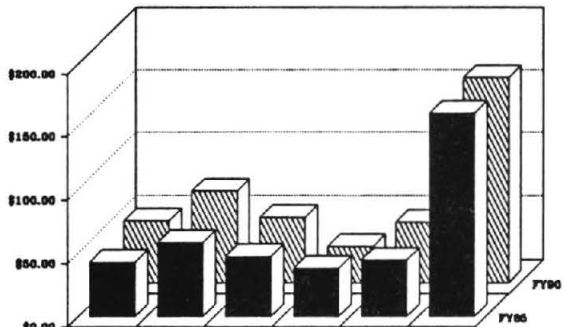
Exhibit 60

FY85–FY90 San Diego Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Revenue Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Radial Bus	123	16	554,509	18,993,657	$23,542,007	$10,277,258
Express Bus	57	10	112,727	2,645,309	$6,572,620	$1,952,445
Crosstown Bus	27	6	100,458	2,513,731	$4,740,061	$1,414,042
Local Suburban/Feeder Bus	26	18	107,956	2,721,442	$4,083,112	$1,177,907
Total Bus	233	50	875,650	26,874,139	$38,937,800	$14,821,652
Total San Diego Trolley	*18*	*1*	*34,438*	*5,973,965*	*$5,516,600*	*$4,753,300*
FY90						
Radial Bus	170	19	706,628	27,237,708	$34,349,367	$16,722,819
Express Bus	56	11	99,828	2,553,989	$7,180,635	$2,293,605
Crosstown Bus	33	8	127,324	3,462,651	$6,560,017	$1,991,588
Local Suburban/Feeder Bus	49	22	183,886	3,950,048	$5,273,697	$1,896,445
Total Bus	308	60	1,117,666	37,204,396	$53,363,716	$22,904,457
Total San Diego Trolley	*45*	*2*	*82,033*	*16,005,726*	*$13,320,475*	*$12,431,220*
Percent Change FY85 to FY90						
Radial Bus	38.2%	18.8%	27.4%	43.4%	45.9%	62.7%
Express Bus	-1.8%	10.0%	-11.4%	-3.5%	9.3%	17.5%
Crosstown Bus	22.2%	33.3%	26.7%	37.7%	38.4%	40.8%
Local Suburban/Feeder Bus	88.5%	22.2%	70.3%	45.1%	29.2%	61.0%
Total Bus	32.2%	20.0%	27.6%	38.4%	37.0%	54.5%
Total San Diego Trolley	*150.0%*	*100.0%*	*138.2%*	*167.9%*	*141.5%*	*161.5%*

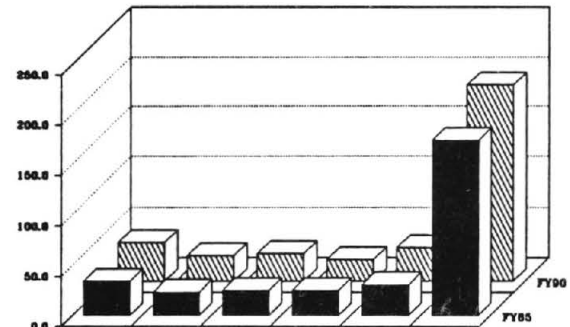
Exhibit 61
FY85-FY90 San Diego Bus Service Type Performance Trends

Cost per Revenue Hour



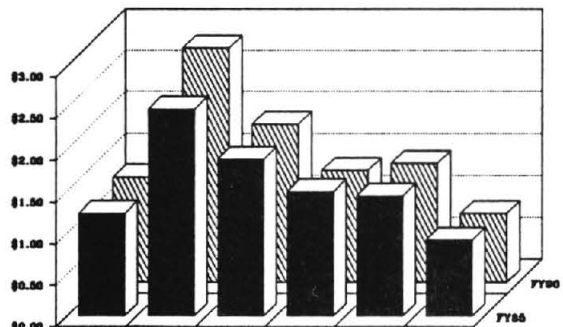
	Radial	Express	Crosstown	Loc Sub/Fd	Tot Bus	Tot Trolley
FY90	$48.61	$71.93	$51.52	$28.68	$47.75	$162.36
FY85	$42.46	$56.31	$47.18	$37.62	$44.47	$160.19

Passengers per Revenue Hour



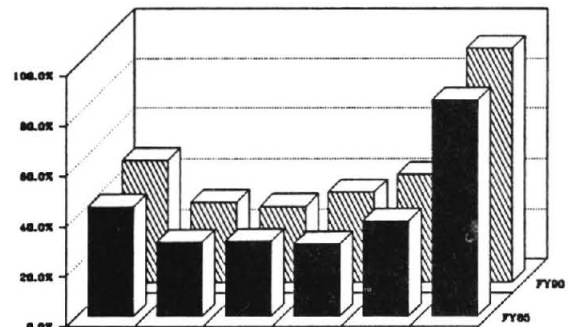
	Radial	Express	Crosstown	Loc Sub/Fd	Tot Bus	Tot Trolley
FY90	38.5	28.6	27.2	21.5	33.3	195.1
FY85	34.3	23.5	25.0	25.2	30.7	173.5

Cost per Passenger Boarding



	Radial	Express	Crosstown	Loc Sub/Fd	Tot Bus	Tot Trolley
FY90	$1.26	$2.01	$1.89	$1.34	$1.43	$0.83
FY85	$1.24	$2.48	$1.89	$1.50	$1.45	$0.92

Percent Farebox Revenue of Cost



	Radial	Express	Crosstown	Loc Sub/Fd	Tot Bus	Tot Trolley
FY90	48.7%	31.9%	30.4%	36.0%	42.9%	93.3%
FY85	43.7%	29.7%	29.8%	28.9%	36.1%	86.2%

Exhibit 62
FY85-FY90 Bus Service Type Performance Measures

Service Type	Cost/ Rev Hr	Pass/ Rev Hr	Cost/ Pass	Revenue /Cost
FY85				
Radial Bus	$42.46	34.25	$1.24	43.65%
Express Bus	$58.31	23.47	$2.48	29.71%
Crosstown Bus	$47.18	25.02	$1.89	29.83%
Local Suburban/Feeder Bus	$37.82	25.21	$1.50	28.85%
Total Bus	$44.47	30.69	$1.45	38.06%
San Diego Trolley	*$160.19*	*173.47*	*$0.92*	*86.16%*
FY90				
Radial Bus	$48.61	38.55	$1.26	48.68%
Express Bus	$71.93	25.58	$2.81	31.94%
Crosstown Bus	$51.52	27.20	$1.89	30.36%
Local Suburban/Feeder Bus	$28.68	21.48	$1.34	35.96%
Total Bus	$47.75	33.29	$1.43	42.92%
San Diego Trolley	*$162.38*	*195.11*	*$0.83*	*93.32%*
Percent Change FY85 to FY90				
Radial Bus	14.5%	12.5%	1.7%	11.5%
Express Bus	23.4%	9.0%	13.2%	7.5%
Crosstown Bus	9.2%	8.7%	0.5%	1.8%
Local Suburban/Feeder Bus	-24.2%	-14.8%	-11.0%	24.7%
Total Bus	7.4%	8.5%	-1.0%	12.8%
San Diego Trolley	*1.4%*	*12.5%*	*-9.9%*	*8.3%*

Express Bus Service

Currently, express bus service represents over 18 percent of all metropolitan area bus service as measured by the number of peak vehicles (Exhibit 60). However, since most express bus service is scheduled only during peak hours, this route class accounts for a far lesser proportion of revenue hours.

During the five-year analysis period, express bus service was the only route type to experience a decrease in service possibly in response the opening of light rail service to El Cajon and the consequent discontinuation of some service in the east corridor. Revenue hours declined by 11 percent while usage dropped by a more modest 4 percent (Exhibit 61). Farebox revenue increased by 18 percent possibly because of the implementation of zonal fares in spite of the decline in usage.

Express bus service has the highest cost per revenue hour and the cost per passenger (Exhibit 62). But, with farebox revenue rising more rapidly than operating cost, the revenue-to-cost showed some improvement during the five-year analysis period.

Crosstown Bus Service

Crosstown bus service is the smallest category of bus service in metropolitan San Diego. In FY90, crosstown bus service accounted for about 11 percent of all bus service as measured by the number of peak vehicles (Exhibit 60).

Between FY85 and FY90, increases were registered in all absolute measures of performance (Exhibit 61). Like its radial bus service counterpart, the most substantial gains occurred in passenger boardings, operating cost, and farebox revenue which, taken together, grew on-the-order of 38 percent to 41 percent.

Crosstown bus service ranks in the middle of the four categories of service when viewing the key measures of performance (Exhibit 62). For example, the cost per revenue hour for crosstown service is comparable to radial service while the passenger per revenue hour is slightly higher than express bus service. With relatively uniform gains in ridership, operating cost, and revenue, the cost per passenger and the revenue-to-cost were relatively stable during the five-year analysis period.

Local Suburban/Feeder Bus Service

Local suburban/feeder bus service presently accounts for nearly 16 percent of all bus service provided in metropolitan San Diego as measured by the number of peak vehicles (Exhibit 60). However, local suburban/feeder service is the most rapidly growing group of the four route categories under study.

During the five-year analysis period, impressive gains were recorded in all absolute measures of performance with two exceptions (Exhibit 61). The number of lines grew by 22 percent while operating costs grew by 29 percent. The relatively small change in operating cost was particularly noteworthy considering that revenue hours increased by more than 70 percent. Also, passenger boardings grew by 45 percent and farebox revenue increased by 61 percent.

Owing to the significant changes noted above, the relative measures of performance showed more variation than the corresponding measures of any other route category (Exhibit 62). For example, the cost per revenue hour and the cost per passenger decreased by 24 percent and 11 percent, respectively, possibly because of competitive pressures. In addition, because of the substantial increase in service, the passenger per revenue hour declined by 15 percent. Yet, since the growth in ridership was greater than the increase in operating cost, the revenue-to-cost increased by nearly 25 percent.

Washington Metropolitan Area

SUMMARY

The transit service in the Washington area increased between 1985 and 1990. This change occurred in both the transit service provided by WMATA and the suburban jurisdictions in their efforts to meet population and employment growth.

DEMOGRAPHIC CHANGES

The central area is still a dominant population and employment center in the Washington metropolitan area. This area is best served by WMATA and covers the District of Columbia, Arlington County, and the City of Alexandria. It contains almost a quarter of the area's population and over 40 percent of the area's jobs.

The central area jurisdictions had almost no population increase and approximately half the employment increase of the inner suburbs. Employment growth between 1985 and 1990 was estimated to be 90,000 jobs (9.6 percent) in the central area and 194,000 jobs (19.9 percent) in the inner suburbs.

However, the greatest absolute increase of population and employment in the Washington metropolitan area between 1985 and 1990 occurred in the inner suburbs of Fairfax, Montgomery, and Prince George's counties. WMATA serves these suburbs, but not to the degree it serves the central area. Transit service in the suburbs also is provided by several local jurisdictions including Montgomery County (Ride-On), the City of Alexandria (DASH), Fairfax County (CONNECTOR), and the City of Fairfax (CUE) who have replaced existing Metro bus service and provided service in new areas. They also have provided new feeder service to Metro rail stations.

TRANSIT SERVICE CHANGES

WMATA's fixed route service, including both bus and rail, increased about 17 percent between 1985 and 1990. Two-thirds of the service increase occurred on the rail system as service was extended on the Red and Orange Lines into the suburbs.

Total passenger boardings increased by 15 percent. This increase was due to an increase of approximately 57,000 annual rail passengers, which overshadowed the loss of about 8,000 annual bus passengers. The rail extensions probably reduced bus ridership in these areas as former bus riders switched to rail.

In FY90, passengers using radial bus, express/limited bus, feeder bus, and rail system service, constituted about 81 percent of total WMATA passenger boardings. The same values for FY85 were 77. This finding shows that WMATA's radially-oriented transit service, including both radial and express/limited bus service, is the service predominately used by the public and that its dominance grew between 1985 and 1990. This increase in passenger use is no doubt attributable to both the extensions of rail service (an additional 388,000 service hours and 9 million service miles) and the significant employment growth in central area and inner suburbs.

Local and radial bus service has the highest cost per vehicle hour and passengers per vehicle hour. These services are used typically by low-to-moderate income, transit dependent riders for work commuting and other trip purposes. The combination of these two factors makes local and radial service have the lowest operating cost per passenger and highest farebox recovery of the WMATA bus services.

Between FY85 and FY90, the number of local and radial lines and vehicle hours remained relatively constant. Unfortunately, about eight million annual passengers were lost from these two service types in this period. It is not known how many may have been diverted to the rail system.

Express/limited and rail feeder bus service have the highest costs per vehicle hour and the lowest passengers per vehicle hour. These services are used by moderate-to-upper income choice riders in the suburbs (rail feeder bus) and transit dependent riders and moderate income, choice riders in the central area (express/limited) primarily for work commuting. The combination of relatively high cost service and low ridership makes express/limited and rail feeder bus service have the highest operating cost per passenger and lowest farebox recovery of the WMATA bus services.

WMATA added a limited amount of new express/limited and rail feeder service between FY85 and FY90. Passenger productivity improved on the express/limited services, but declined on the rail feeder bus services.

WMATA increased its crosstown bus service by around 16 percent during the period with a patronage increase of 7 percent, mostly in the growing inner suburbs. Most of the lines operate within the central area and inner suburb jurisdictions and are used by low income, transit dependent riders for a variety of trip purposes. The performance of the crosstown services falls between the local and radial services and the express/limited and rail feeder services.

Fixed-route service provided by suburban jurisdictions increased almost 40 percent between 1985 and 1990. The service increase occurred on local bus routes and feeder service to the WMATA rail system as service was extended on the Red and Orange Lines into the suburbs. These services are used by moderate-to high income persons for work commuting and low income persons for other trip purposes.

The suburban systems have maintained a balance between increasing costs and passenger generated revenues. As a result, both farebox return and cost per passenger were stable over the analysis period.

For the suburban bus systems, both the cost per vehicle hour and the passengers per vehicle hour are about two-thirds that of WMATA's. As a result, the cost per passenger on the suburban systems is similar to that for the WMATA bus system.

FUNCTIONAL CHANGES

There has been limited growth in transit services in the Washington area. Most service is still oriented toward travel to, from, and within the central area.

The limited service growth has occurred in crosstown services operated by WMATA and suburban services provided by suburban jurisdictions. These services are used by moderate-to high income persons for work commuting and low income persons for other trip purposes.

It is unclear how central area residents were affected during the period. While there was a significant drop in their use of local bus service, it is not known how many passengers were lost and how many simply switched to using the rail system.

BACKGROUND

The Washington Metropolitan Area Transit Authority (WMATA) provides fixed-route services in the Washington metropolitan in an area covering approximately 1,489 square miles. The service area covers all or major portions of the District of Columbia; Montgomery and Prince George's counties in Maryland; and Arlington and Fairfax counties and the cities of Alexandria, Fairfax, and Falls Church in Virginia.

This chapter presents a brief description of the changes that occurred in the Washington metropolitan area in terms of population, employment, and transit service changes during the period 1985 through 1990.

DEMOGRAPHIC CHANGES

The population and employment of the Washington metropolitan area are estimated to have increased between 1985 and 1990 approximately 10 percent and 15 percent, respectively. While all jurisdictions experienced growth (Exhibit 63), the relative share of the area's population and employment in the central area jurisdictions of the District of Columbia, Arlington, and Alexandria was reduced. Nonetheless, the central area increased in population by 11,000 people and in employment by 91,000 jobs.

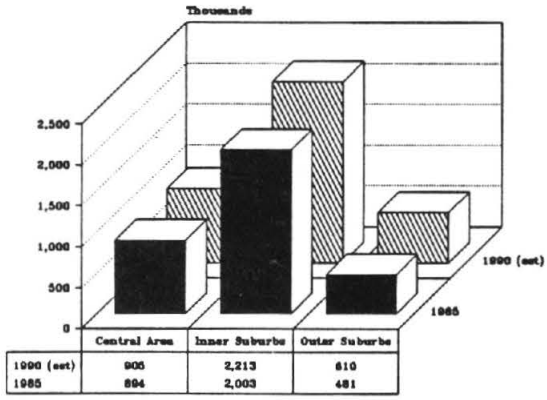
The inner suburbs experienced the largest absolute increases in population and employment during the period. The inner suburbs consist of Montgomery and Prince George's counties in Maryland and Fairfax County and the cities of Fairfax and Falls Church in Virginia. Population and employment increased by 210,000 and 194,000, respectively.

During the period of analysis, WMATA provided fixed-route service to the central area and inner suburb jurisdictions, but none to the outer suburbs, which are not part of the WMATA Compact Service Area. If it had kept pace with population and employment increases in the central area and inner suburbs, transit ridership would have increased between seven and fourteen percent.

The outer suburbs experienced the highest percentage of growth with increases in population of 129,000 people and employment of 36,000 jobs. The outer suburbs are defined as Charles and Frederick counties in Maryland and Loudoun and Prince William counties in Virginia. Although WMATA does not provide service to this area, some residents of the outer suburbs may have patronized WMATA service as park-and-ride passengers.

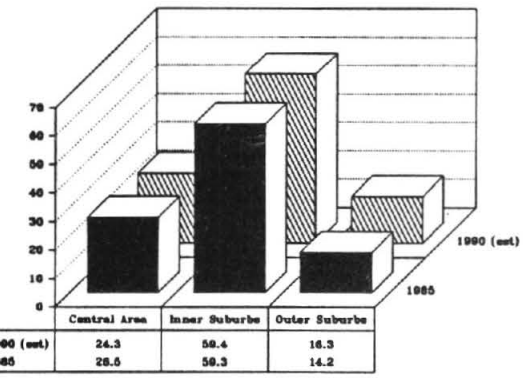
Exhibit 63
Washington Metropolitan Area
Population and Employment

Population



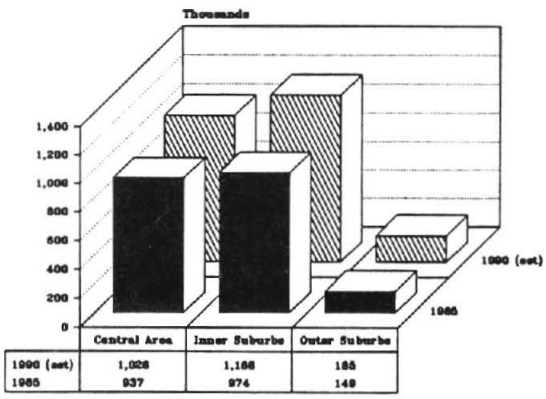
	Central Area	Inner Suburbs	Outer Suburbs
1990 (est)	905	2,213	610
1985	864	2,003	481

Juridiction Population
as a Percent of Total Population



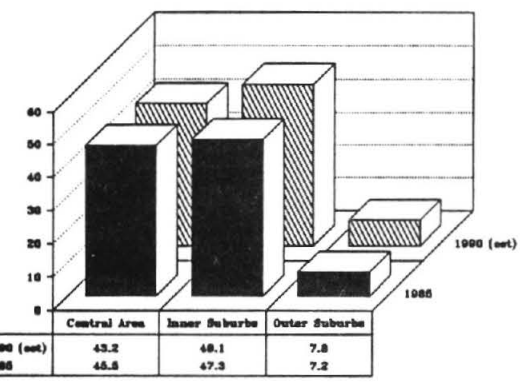
	Central Area	Inner Suburbs	Outer Suburbs
1990 (est)	24.3	59.4	16.3
1985	28.5	58.3	14.2

Employment



	Central Area	Inner Suburbs	Outer Suburbs
1990 (est)	1,028	1,168	185
1985	937	974	149

Jurisdiction Employment
as a Percent of Total Employment



	Central Area	Inner Suburbs	Outer Suburbs
1990 (est)	43.2	48.1	7.8
1985	45.5	47.3	7.2

Source: Metropolitan Washington COG

TRANSIT CHARACTERISTICS

WMATA provides rail and fixed-route bus transit service. The 103-mile radial rail system (Exhibit 64) has been under construction since 1969 and will have five lines, all that serve the Washington central business district.

Rail service increased by nearly 50 percent during the analysis period. At the beginning of the analysis period (July 1, 1984), 46.5 miles of the system were in operating service. At the end of the analysis period (June 30, 1990), 69.5 miles of the system were in operating service.

The increases in rail service occurred on the Metrorail Red and Orange Lines. The Metrorail Red Line was extended from the Van Ness-UDC station in northwest Washington DC to the Shady Grove station in Montgomery County, Maryland, a distance of 13.8 miles. The Metrorail Orange Line was also extended westerly from the Ballston station in Arlington, Virginia to the Vienna station in Fairfax County, Virginia, a distance of 9.1 miles. These line extensions added 13 passenger stations to the existing 48 stations, for a total of 61.

The rail extensions probably reduced bus ridership in these corridors. In early FY85, transit passengers traveling in the Wisconsin Avenue corridor between suburban Maryland and the District of Columbia used WMATA bus service. After the Red Line rail opening in the same corridor to Shady Grove, many bus passengers became rail passengers. While some of these new rail riders may still use WMATA buses to access the rail system, they are travelling fewer miles in the bus.

Similarly, bus ridership declined with the extension of the Orange Line from Ballston to Vienna. Also, WMATA bus passengers who transferred to the Orange Line at Ballston in FY85 may now be travelling to westerly stations by private automobiles since the extension to Vienna has improved the availability of paid-parking spaces.

Between FY85 and FY90, WMATA operated about the same number of buses in service --- approximately 1,400 vehicles in peak periods. However, the total magnitude of WMATA bus service increased about 3.5 percent in service miles and 10 percent in service hours. These increases were made primarily to coordinate with the opening of new rail stations in suburban Maryland and Virginia and to meet the growth and changes in the patterns of area population and employment. WMATA converted some line haul service to rail feeder service to conform it's policy of not operating bus service that duplicates its rail service.

Besides WMATA, suburban jurisdictions of the Washington metropolitan area provide about 15 percent of the bus service in the area. Montgomery County operates the Ride-On system with more than 200 fixed-route buses and more than 100 paratransit vehicles in peak service. Ride-On's fixed-route revenue service hours are comparable to the transit system serving Indianapolis. Additionally, smaller fixed-route transit systems are provided by the City of Alexandria (DASH), Fairfax County (CONNEC-

Exhibit 64
WMATA Rail System
February 1991

TOR), and the City of Fairfax (CUE).

For local suburban travel, these systems replaced existing Metro bus service and provided service in new areas. They also provided new feeder service to Metro rail stations.

DESCRIPTION OF TRANSIT SERVICES

This chapter provides an overview of the changes in services levels, ridership, and fares that occurred between FY85 and FY90.

OPERATING CHARACTERISTICS

During the period FY85 to FY90, WMATA's total systemwide service increased (Exhibit 65). Most of the service increase occurred on the rail service. The number of peak rail vehicles expanded by almost 50 percent and rail vehicle hours of service increased by one-third (Exhibit 66). The level of bus service remained almost constant with an increase of only 4.2 percent in bus vehicle service hours.

Transit service provided by suburban jurisdictions, however, increased by nearly 40 percent[1]. Most of this growth was devoted to providing new local suburban services.

WMATA ridership increased 16 percent during the period. This increase was due to an increase of approximately 57 million annual rail passengers, which overshadowed the loss of about eight million annual bus passengers. Suburban ridership more than doubled during the same period as large amounts of new service was provided as the WMATA rail lines were extended.

FARE STRUCTURE

WMATA's fares are distance-based, i.e., the longer the trip, the higher the fare. Rail fares, paid through magnetically-encoded fare cards, are uniform throughout the system. Fares between stations are established on a base amount for boarding plus a unit cost per mile. Bus fares are based on a system of zones formed as concentric rings around the District of Columbia but vary by state because of the local funding policies.

WMATA remained relatively stable during the analysis period (Exhibit 67). WMATA increased fares on July 1, 1989. This increase, the first since June 30, 1984, averaged about 7.5 percent for rail service and 5 percent for bus service. There were a few cases for bus travel between the inner Virginia suburbs and the District where they declined.

[1] *The statistics do not include the City of Fairfax CUE system since data were not available for FY85.*

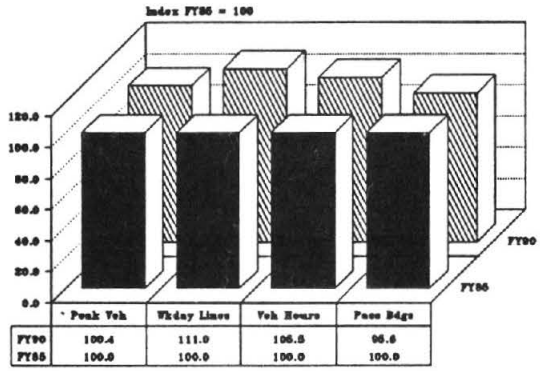
Exhibit 65
FY85–FY90 Washington Operating Performance

Operating Statistic	WMATA Bus			WMATA Rail			Suburban Bus		
	FY85	FY90	Change	FY85	FY90	Change	FY85	FY90	Change
Peak Vehicles	1,405	1,410	0.4%	288	429	49.0%	238	317	33.2%
# Weekday Lines	154	171	11.0%	4	4	0.0%	64	82	28.1%
Vehicle Hours	3,851,889	4,063,816	5.5%	1,179,903	1,578,330	33.8%	486,575	677,179	39.2%
Vehicle Miles	48,305,179	50,335,688	4.2%	25,329,351	34,568,913	36.5%	6,376,338	9,335,455	46.4%
Passenger Boardings	183,554,918	175,503,340	-4.4%	125,180,993	182,005,851	45.4%	9,868,990	18,454,638	87.0%
Passenger Miles	586,979,451	563,688,216	-4.0%	599,848,282	994,186,877	65.7%	NA	NA	NA
Operating Cost	$227,573,154	$272,655,461	19.8%	$153,204,545	$243,472,032	58.9%	$4,503,923	$8,164,039	81.3%
Farebox Revenue	$79,686,794	$86,131,811	8.1%	$102,880,147	$178,241,129	73.3%	$16,509,460	$29,965,898	81.5%

Source: UMTA Section 15 Reports and MetroBus Service Productivity Reports

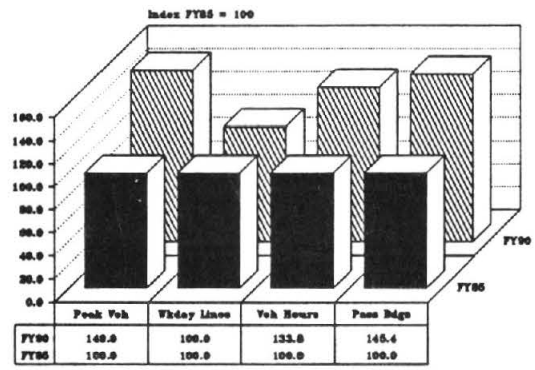
Exhibit 66
FY85-FY90 Washington Operating Trends

WMATA Bus



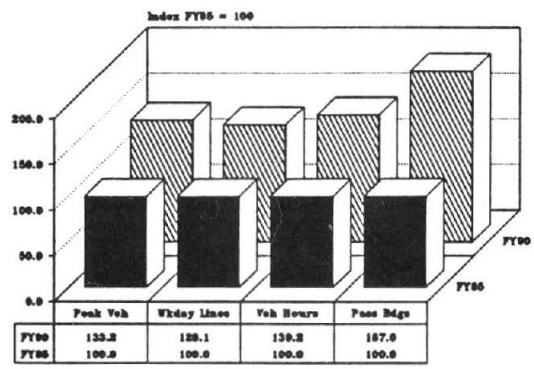
	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	100.4	111.0	105.5	95.6
FY85	100.0	100.0	100.0	100.0

WMATA Rail



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	140.0	100.0	133.8	145.4
FY85	100.0	100.0	100.0	100.0

Suburban Bus



	Peak Veh	Wkday Lines	Veh Hours	Pass Bdgs
FY90	133.2	128.1	139.2	167.0
FY85	100.0	100.0	100.0	100.0

Exhibit 67
Washington Bus and Rail Adult Fare Structure

	1985		1990	
	Base	Maximum	Base	Maximum
WMATA BUS				
Peak Periods[1]	$0.80	$2.50	$0.85	$2.55
Off-Peak Periods	$0.75	$1.60	$0.85	$1.65
WMATA RAIL				
Peak Periods[1]	$0.80	$2.40	$1.00	$2.85
Off-Peak Periods	$0.80	$1.10	$1.00	$1.50
ALEXANDRIA, VIRGINIA (DASH)				
Peak Periods	$0.50	$0.50	$0.65	$0.95
Off-Peak Periods	$0.50	$0.50	$0.65	$0.95
FAIRFAX COUNTY (CONNECTOR)				
Peak Period	$0.80	$1.40	$0.25	$1.70
Off-Peak Period	$0.80	$1.40	$0.25	$1.70
MONTGOMERY COUNTY, MARYLAND (RIDE-ON)				
Peak Period	$0.60	$0.60	$0.85	$0.85
Off-Peak Period	$0.60	$0.60	$0.70	$0.70

[1] *1985 Peak Periods: Weekdays 6:00 AM to 9:30 AM; 3:00 PM to 6:30 PM*
1990 Peak Periods: Weekdays 5:30 AM to 9:30 AM; 3:00 PM to 7:00 PM

With the fare increase, WMATA extended the lengths of the AM and PM peak periods each by one-half hour. This time increase may have increased farebox revenue.

The suburban fares are generally flat fares. The Fairfax CONNECTOR includes distance-based zone fares for some of its express services.

Both DASH and RIDE-On have raised fares between 30 and 40 percent between 1985 and 1990. The Fairfax CONNECTOR reduced the fare for its rail feeder service from $0.90 to $0.25 and eliminated the zone charges on the feeder services to relieve parking at the WMATA Metro rail parking lot.

MIX OF FIXED-ROUTE SERVICES

This chapter examines the trends in service levels and performance by type of bus service provided. The scheme used to classify WMATA's and the suburban bus lines is first presented. This is followed by a discussion of trends by service type.

BUS SERVICE CLASSIFICATION

WMATA offers a mixture of local, express, and crosstown fixed-route bus services in coordination with its rail service to provide transit services to the public. MacDorman & Associates modified WMATA's classification of bus lines as presented in their Metrobus Service Productivity Reports. The modified classification of bus lines includes local, radial, express/limited, crosstown, and rail feeder. Therefore, while the terms used by WMATA and MacDorman & Associates are the same, their definitions may differ.

Six bus service classifications were used in this study:

- **Local** bus lines have terminals both within and outside the central business district (CBD) and do not restrict passenger boardings and alightings along circulatory routes of service. All the lines operate in the central area and inner suburb jurisdictions. These services are used typically by low income, transit dependent riders for work commuting and other trip purposes.

- **Radial** bus lines have one terminal inside the CBD and one outside. The direction of service travel is oriented like the radius of a circle and passengers are not restricted from boarding or alighting along the routes. Most lines operate within the central area jurisdictions. These services are used typically by low-to-moderate income, transit dependent riders for work commuting.

- **Express/Limited** bus lines have one terminal inside the CBD and one outside. The direction of service travel is generally radial but some routes may have local circulatory travel paths at the termini. Passenger boardings and alightings are restricted along a portion or all its route. Most lines operate within the central area jurisdictions. Both transit dependent riders and moderate income, choice riders primarily for work commuting and other trip purposes.

- **Crosstown** bus lines have neither termini inside the CBD and the direction of travel service is generally cross-radial or like the circumference of a circle is to its radii. Passengers are not restricted from boarding or alighting along routes. Most of the lines operate within the central area and inner suburb jurisdictions

and are used by low income, transit dependent riders for a variety of trip purposes.

- **Rail Feeder** bus lines, while providing some local service, are principally designed to provide service to and from rail stations outside the CBD and generally in the inner suburbs of the metropolitan area. Rail feeder lines may provide either restricted or unrestricted passenger boardings along routes. Most of the lines operate within the inner suburbs of the metropolitan area and are used by moderate-to-upper income choice riders.

- **Suburban** bus lines are designed to provide local service including service to and from WMATA rail stations. These services are used by moderate-to high income persons for work commuting and low income persons for other trip purposes.

If WMATA's rail system was considered in this scheme, it would be classified in bus terms as an express/limited service. However, portions of the system located in the central business district also might be considered as local, circulatory service.

TRENDS IN SERVICE LEVELS AND PERFORMANCE

This section discusses trends in service levels and performance among the five bus types --- local, radial, express/limited, crosstown, rail feeder, and suburban.

Local

Local bus lines represent about 19 percent of the bus service provided by WMATA (Exhibit 68). Local bus service has the lowest cost per vehicle hour and the second highest passengers per vehicle hour in 1990 (Exhibit 69). The combination of these two factors helps WMATA local bus service, with its radial service, have the lowest operating cost per passenger and highest farebox recovery.

Between FY85 and FY90, the number of local lines remained constant at 27 while vehicle hours of service on the lines declined by approximately 2.3 percent (Exhibit 68). Passenger boardings declined by 13.6 percent but farebox revenue remained about the same. The stability of revenue may, in part, be due to the fare increase beginning in FY90.

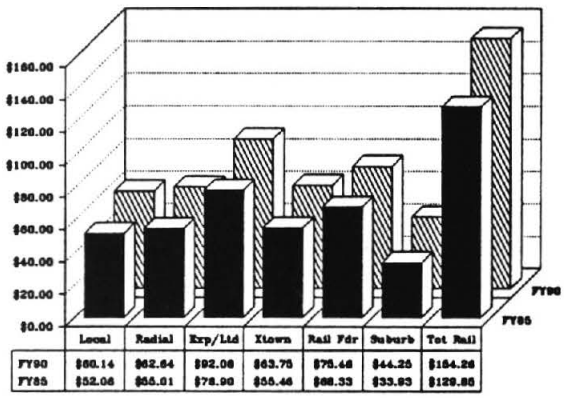
Since passenger boardings declined more than vehicle hours, the number of passenger boardings per vehicle hour declined by 11.5 percent. Since farebox revenues remained somewhat stable between FY85 and FY90 and the cost of service delivery increased by 15.5 percent per vehicle hour, the farebox recovery declined by 11.5 percent (Exhibit 68).

Exhibit 68
FY85–FY90 Washington Bus Service Type Operating Performance

Service Type	Peak Vehicles	No. of Lines	Vehicle Hours	Passenger Boardings	Operating Cost	Farebox Revenue
FY85						
Local Bus	222	27	779,017	45,532,923	$40,552,316	$18,254,093
Radial Bus	430	34	1,201,225	70,058,142	$66,078,319	$28,407,958
Express/Limited Bus	71	8	97,947	2,875,088	$7,727,900	$1,562,433
Crosstown Bus	181	22	616,886	26,722,307	$34,210,591	$10,834,411
Rail Feeder Bus	495	63	1,156,814	38,366,458	$79,040,756	$20,627,899
Total WMATA Bus	1,399	154	3,851,889	183,554,918	$227,609,882	$79,686,794
Suburban Bus	238	64	486,575	9,868,990	$16,509,460	$4,503,923
Total WMATA Rail	*288*	*4*	*1,179,903*	*125,180,993*	*$153,204,545*	*$102,880,147*
FY90						
Local Bus	226	27	760,755	39,342,430	$45,748,256	$18,222,314
Radial Bus	435	37	1,251,004	68,189,462	$78,367,382	$32,693,983
Express/Limited Bus	83	10	114,163	3,448,480	$10,511,870	$1,983,920
Crosstown Bus	215	24	711,551	28,582,364	$45,358,320	$13,363,394
Rail Feeder Bus	508	73	1,226,343	35,939,603	$92,544,083	$19,868,200
Total WMATA Bus	1,467	171	4,063,816	175,502,340	$272,529,911	$86,131,811
Suburban Bus	317	82	677,179	18,454,638	$29,965,898	$8,164,039
Total WMATA Rail	*429*	*4*	*1,578,330*	*182,005,851*	*$243,472,032*	*$178,241,129*
Percent Change FY85 to FY90						
Local Bus	1.8	0.0	-2.3	-13.6	12.8	-0.2
Radial Bus	1.2	8.8	4.1	-2.7	18.6	15.1
Express/Limited Bus	16.9	25.0	16.6	19.9	36.0	27.0
Crosstown Bus	18.8	9.1	15.3	7.0	32.6	23.3
Rail Feeder Bus	2.6	15.9	6.0	-6.3	17.1	-3.7
Total WMATA Bus	4.9	11.0	5.5	-4.4	19.7	8.1
Suburban Bus	33.2	28.1	39.2	87.0	81.5	81.3
Total WMATA Rail	*49.0*	*0.0*	*33.8*	*45.4*	*58.9*	*73.3*

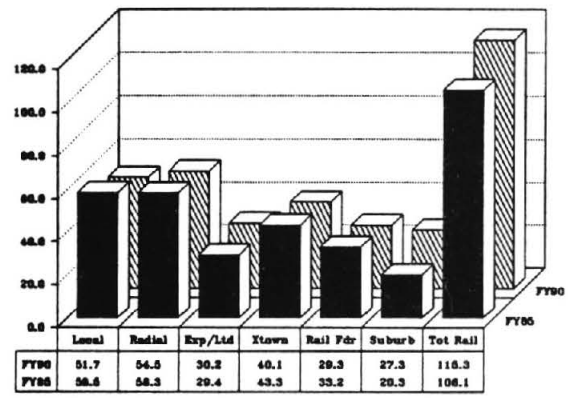
Exhibit 69
FY85-FY90 Washington Bus Service Type Performance Trends

Cost per Vehicle Hour



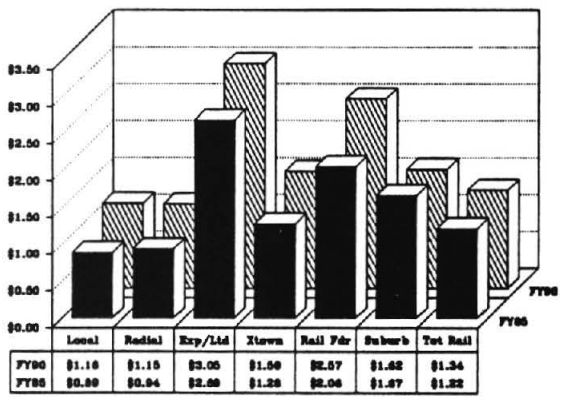
	Local	Radial	Exp/Ltd	Xtown	Rail Fdr	Suburb	Tot Rail
FY90	$60.14	$62.64	$92.06	$63.75	$75.46	$44.25	$164.26
FY85	$52.06	$55.01	$78.90	$55.46	$66.33	$33.93	$129.86

Passengers per Vehicle Hour



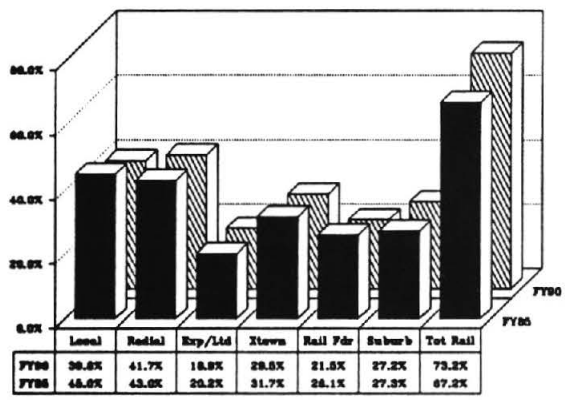
	Local	Radial	Exp/Ltd	Xtown	Rail Fdr	Suburb	Tot Rail
FY90	51.7	54.5	30.2	40.1	29.3	27.3	116.3
FY85	56.6	58.3	29.4	43.3	33.2	29.3	106.1

Cost per Passenger Boarding



	Local	Radial	Exp/Ltd	Xtown	Rail Fdr	Suburb	Tot Rail
FY90	$1.16	$1.15	$3.05	$1.50	$2.57	$1.62	$1.34
FY85	$0.99	$0.94	$2.69	$1.28	$2.06	$1.67	$1.22

Percent Farebox Revenue of Cost



	Local	Radial	Exp/Ltd	Xtown	Rail Fdr	Suburb	Tot Rail
FY90	50.6%	41.7%	18.8%	29.5%	21.5%	27.2%	73.2%
FY85	45.0%	43.0%	20.2%	31.7%	26.1%	27.3%	67.2%

Exhibit 70
FY85-FY90 Washington Bus Service Type Performance Measures

Service Type	Cost/ Veh Hr	Pass/ Veh Hr	Cost/ Pass	Revenue /Cost
FY85				
Local Bus	$52.06	58.45	$0.89	45.01%
Radial Bus	$55.01	58.32	$0.94	42.99%
Express/Limited Bus	$78.90	29.35	$2.69	20.22%
Crosstown Bus	$55.46	43.32	$1.28	31.67%
Rail Feeder Bus	$68.33	33.17	$2.06	26.10%
Suburban	$33.93	20.28	$1.67	27.28%
Total WMATA Rail	*$129.85*	*106.09*	*$1.22*	*67.15%*
FY90				
Local Bus	$60.14	51.71	$1.16	39.83%
Radial Bus	$62.64	54.51	$1.15	41.72%
Express/Limited Bus	$92.08	30.21	$3.05	18.87%
Crosstown Bus	$63.75	40.17	$1.59	29.46%
Rail Feeder Bus	$75.46	29.31	$2.57	21.47%
Suburban	$44.25	27.25	$1.62	27.24%
Total WMATA Rail	*$154.26*	*115.32*	*$1.34*	*73.21%*
Percent Change FY85 to FY90				
Local Bus	15.5	-11.5	30.6	-11.5
Radial Bus	13.9	-6.5	21.8	-3.0
Express/Limited Bus	16.7	2.9	13.4	-6.7
Crosstown Bus	14.9	-7.3	24.0	-7.0
Rail Feeder Bus	10.4	-11.6	25.0	-17.7
Suburban	30.4	34.4	-2.94	-0.13
Total WMATA Rail	*18.8*	*8.7*	*9.8*	*9.0*

Radial

Radial bus lines to the CBD, with unrestricted passenger boardings and alightings, represent about 31 percent of the bus service provided by WMATA (Exhibit 68). Radial bus service has a relatively low cost per vehicle hour and comparatively more passengers per vehicle hour (Exhibit 69). The combination of these two factors helps radial service, with local service, have lower subsidy per passenger and higher farebox recovery than other types of WMATA bus service.

WMATA added five new radial lines and increased radial service levels by a modest 4 to 5 percent from FY85 to FY90. While radial service carries the largest number of passengers of any service type, boardings still declined 2.7 percent during the period (Exhibit 68). Farebox revenues increased 15.1 percent probably due to the fare increase.

Between FY85 and FY90, radial bus service cost per vehicle hour increased 13.9 percent. Coupled with a 6.5 percent decline in passenger boardings per vehicle hour, the operating cost per passenger increased 21.8 percent, but is still the lowest among the WMATA services. It also has the highest farebox recovery of around 42 percent, which declined only three percent over the period (Exhibit 70).

Express/Limited

Express/limited service is the smallest category of WMATA service. Operating primarily in peak weekday time periods, it represents only two percent of the bus service provided by WMATA (Exhibit 68).

Express/Limited service cost per vehicle hour is the highest of any service type at $92.08 per vehicle hour (Exhibit 69). Its passenger productivity is the second lowest (rail feeder service is lower) of any service type. The combination of these two factors produces the highest cost per passenger of the WMATA bus services. The cost exceeded three dollars per passenger boarding in FY90, the highest of the transit services, and the farebox recovery was around 19 percent, the lowest of the transit services.

While it has the fewest passengers per vehicle hour, the percent increase in service on express/limited lines between FY85 and FY90 was the largest of any service type (Exhibit 68). WMATA added 12 new express/limited bus lines during the period.

Operating primarily in peak weekday time periods, the number of passenger boardings on the express/limited service increased nearly 20 percent. Operating cost increased 36 percent while farebox revenues increased 27 percent (Exhibit 68).

This service was the only type of service to show an increase in passenger per vehicle hour during the period at 2.9 percent. The cost per passenger increased 13.4 percent, the lowest of any service type increase between FY85 and FY90 (Exhibit 70).

Crosstown

Over 17 percent of WMATA's bus service is devoted to crosstown service (Exhibit 68). This level of service is comparable to that devoted to local service. The performance of the crosstown services (Exhibit 69) falls between the local and radial services and the express/limited and rail feeder services.

WMATA increased crosstown service hours by over 15 percent during the period FY85-FY90 (Exhibit 68). WMATA added 34 new crosstown lines during this period. This service increase resulted in a 7 percent increase in passenger boardings. Operating cost and farebox revenues increased 32.6 and 23.3 percent, respectively.

Since the level of service increased faster than the passenger boardings increased, passenger boardings per vehicle hour declined 7.3 percent between FY85 and FY90. Cost per vehicle hour increased by nearly 15 percent and coupled with the decline in passengers per vehicle hour resulted in an increase in the cost per passenger boarding per vehicle hour from $1.28 to $1.59. These costs per passenger boardings are about average for the total bus system.

Rail Feeder

Rail feeder service and radial service are the largest types of bus service provided by WMATA. Rail feeder service consumes over 30 percent of the vehicle hours provided by WMATA (Exhibit 68).

The rail feeder cost per vehicle hour is the second highest of any service type (express/limited service is higher) at $75.46 per vehicle hour (Exhibit 69). Unfortunately, its passengers per vehicle hour is the lowest of any WMATA service type in 1990. The combination of these two factors produces the second highest cost per passenger of the WMATA bus services. The cost, which exceeded $2.50 per passenger in FY90, was the second highest of the bus services and the farebox recovery of around 21 percent was the second lowest of the bus services.

Rail feeder vehicle hours increased 6 percent between FY85 and FY90 while vehicle miles increased only 0.5 percent. This occurred because WMATA shortened the rail feeder lines as it extended the rail service. Generally, these cuts were made to high-speed, line haul portions of the lines. Also, WMATA added 13 new feeder rail routes during this period.

Passenger boardings declined by 6.3 percent. This may have resulted from rail passengers switching their access modes from feeder bus to private automobile or using alternate suburban jurisdiction bus services. The corresponding farebox revenues fell by only 3.7 percent, perhaps because the fare increase reduced the impact of the ridership losses (Exhibit 68).

Passengers per vehicle hour fell 11.6 percent between FY85 and FY90 because WMATA increased service levels while passenger boardings declined. Because of a 10.4 percent increase in the cost per vehicle hour of service and the decline in passenger boardings per vehicle hour, the cost per passenger increased from $2.06 in FY85 to $2.57 in FY90. During the same period, the farebox recovery declined from 26.1 percent to 21.5 percent (Exhibit 70).

Suburban [2]

Suburban systems provide over 18 percent of the bus service in the Washington area. (Exhibit 68). The amount of service provided is about equal to the crosstown service that WMATA provides.

The suburban cost per vehicle hour is less than two-thirds of the cost of WMATA bus service (Exhibit 69). Similarly the suburban passengers per vehicle hour is also about two-thirds of the WMATA bus service. The balancing of these two factors makes suburban service about equal to the WMATA bus service in cost per passenger boarding. The cost was slightly higher than WMATA's at $1.62 per passenger boarding in FY90 and the farebox recovery of around 27 percent was slightly lower than WMATA's (Exhibit 70).

Suburban vehicle hours increased 39 percent between FY85 and FY90. Suburban systems added 18 new routes during this period.

Passenger boardings increased by 87 percent. This occurred in response to the service increases and the extension of the WMATA rail lines. The corresponding farebox revenues increased 81 percent suggesting that fares were set to keep pace with the increased service costs (Exhibit 68).

Passengers per vehicle hour increased between FY85 and FY90 at a rate slightly larger than the cost per vehicle hour of service. As a result, the farebox recovery was stable while the cost per passenger marginally declined (Exhibit 70).

[2] *The statistics do not include the City of Fairfax CUE system since data were not available for FY85.*

Appendix A

Exhibit 71
Three-Variable Cost Allocation Model
Basis for Expense Assignment

Expense Account	Hours	Miles	Peak Vehicles
VEHICLE OPERATIONS			
Operator Salaries & Wages	X		
Other Salaries & Wages			X
Fringe Benefits	X		X
Services			X
Fuel & Lubricants		X	
Tires & Tubes		X	
Other Materials & Supplies			X
Utilities			X
Casualty & Liability		X	
Taxes			X
Purchased Transportation	X		
Purchased Transportation	X		
Miscellaneous Expenses			X
Expense Transfers	X		
VEHICLE MAINTENANCE			
Operator Salaries & Wages		X	
Other Salaries & Wages		X	
Fringe Benefits		X	
Services		X	
Fuel & Lubricants		X	
Tires & Tubes		X	
Other Materials & Supplies		X	
Utilities			X
Casualty & Liability		X	
Taxes			X
Purchased Transportation		X	
Purchased Transportation		X	
Miscellaneous Expenses		X	
Expense Transfers		X	

Exhibit 71
Three–Variable Cost Allocation Model
Basis for Expense Assignment
(continued)

Expense Account	Hours	Miles	Peak Vehicles
NON–VEHICLE MAINTENANCE			
Operator Salaries & Wages			X
Other Salaries & Wages			X
Fringe Benefits			X
Services			X
Fuel & Lubricants			X
Tires & Tubes			X
Other Materials & Supplies			X
Utilities			X
Casualty & Liability			X
Taxes			X
Purchased Transportation			X
Purchased Transportation			X
Miscellaneous Expenses			X
Expense Transfers			X
GENERAL ADMINISTRATION			
Operator Salaries & Wages			X
Other Salaries & Wages			X
Fringe Benefits			X
Services			X
Fuel & Lubricants			X
Tires & Tubes			X
Other Materials & Supplies			X
Utilities			X
Casualty & Liability		X	
Taxes			X
Purchased Transportation			X
Purchased Transportation			X
Miscellaneous Expenses			X
Expense Transfers			X

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To classify transit services