MICHIGAN DEPARTMENT OF TRANSPORTATION

Operations Evaluation Study of the Harbor Transit System Final Report

December 1986

A Cooperative Effort
of
Bus Transit Division
and
Urban Transportation Planning Division

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ACKNOWLEDGMENTS

The mutual cooperation of the Bureau of Urban and Public Transportation (UPTRAN) and the Bureau of Transportation Planning (BTP) was facilitated by John Kiser and Renee Farnum.

Principal contributors were Julie Bildner and Judy Tanis of Harbor Transit, Jack Hayes and Dan Parras of the Bus Transit Division, and Marvin Harris of the Urban Transportation Planning Division.

Special thanks to the contributing staff of UPTRAN's Word Processing Unit.

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EXECUTIVE SUMMARY

Study Purpose

This report is the result of a request for state assistance by Harbor Transit in March 1986. UPTRAN was requested to perform an extensive analysis of the system's present efficiency and effectiveness. With federal subsidy decreases and insurance cost increases, the need to review alternative lower cost proposals became evident. The local governmental units need additional transit evaluation information to assist them in final budgeting decisions.

Background

Harbor Transit began service in 1975. It is operated by the City of Grand Haven and provides public transit service within Grand Haven, Ferrysburg, Spring Lake, and Spring Lake Township. The service area encompasses an approximate population of 18,000. Demand-response and fixed-route service is provided. Special services are also provided.

Summary of Major Findings

* Harbor Transit has not had a fare increase since 1982.
* The 1985 fiscal year farebox recovery rate of 9.4 percent is below the average farebox recovery rate of 20 percent.
* A general fare restructuring should be given strong consideration.
* Most of the riders are seniors and children.
* Charging one-half fare rates during off peak hours only should be explored.
* Alternative revenue sources such as contractual service may help generate more revenue.
* The existing route service in Grand Haven should be reviewed for possible alteration because of low productivity.
* Marketing of service adjustments and farebox recovery corrections prior to prepared changes should reduce passenger resistance.
* A connector service between the communities of Grand Haven, Ferrysburg, and Spring Lake should link the communities together and improve the service flow.
* Local financial support should be held to a minimum by instituting revenue and service adjustments.
* State and federal funding support should not be expected to increase at previous levels.

Recommendations

* A general fare increase should be given strong consideration.

* Additional contractual services should be pursued.

* Consideration should be given to establishing a peak period in which full fare would be charged for all riders.

* Alternative route structures should be considered to increase service delivery and productivity.

* Performance levels should be adopted as suggested in Exhibit 2 of the appendix.

Conclusions

* The study findings demonstrate the importance of the cooperative staff efforts of the transit agency and MDOT.

* Route design modifications, fare policy changes, and/or an increase in revenue generators should result in system improvement.

* Implementation of recommended service improvements will be at the discretion of the transit agency management.

* The findings of the study will serve as a basis for sound transit management decision regarding the Harbor Transit system.

INTRODUCTION

Harbor Transit requested assistance from UPTRAN in March 1986 to perform an extensive analysis of the system's present service in terms of transit efficiency and quality at present funding levels. The possibility of service alternatives in areas of demand-response and routes was suggested.

With the advent of decreasing federal subsidies and rising insurance costs, the need to review alternative lower cost proposals became evident. The local governmental units need additional transit evaluation information to assist them in final budgeting decisions.

A task of this magnitude involves a great deal of effort and research. Harbor Transit (Julie Bildner and Judy Tanis) provided valuable assistance in gathering pertinent ridership data by plotting demand patterns on several zone-type maps. A team of Michigan Department of Transportation (MDOT) employees was formed to compile system financial and ridership data, performance factors, and demographic and computer methods which would aid in developing future service alternatives. This team brings together two members of the Bus Transit Division, Jack Hayes of Technical Services and Dan Parras of Field Operations, and Marvin Harris of the Urban Transportation Planning Division.

The use of this approach allows for a pooling of extensive transit knowledge and experience for this effort. It also brings together the local, state, and federal outlooks regarding current and pending transit issues as well as the ability to offer solutions.

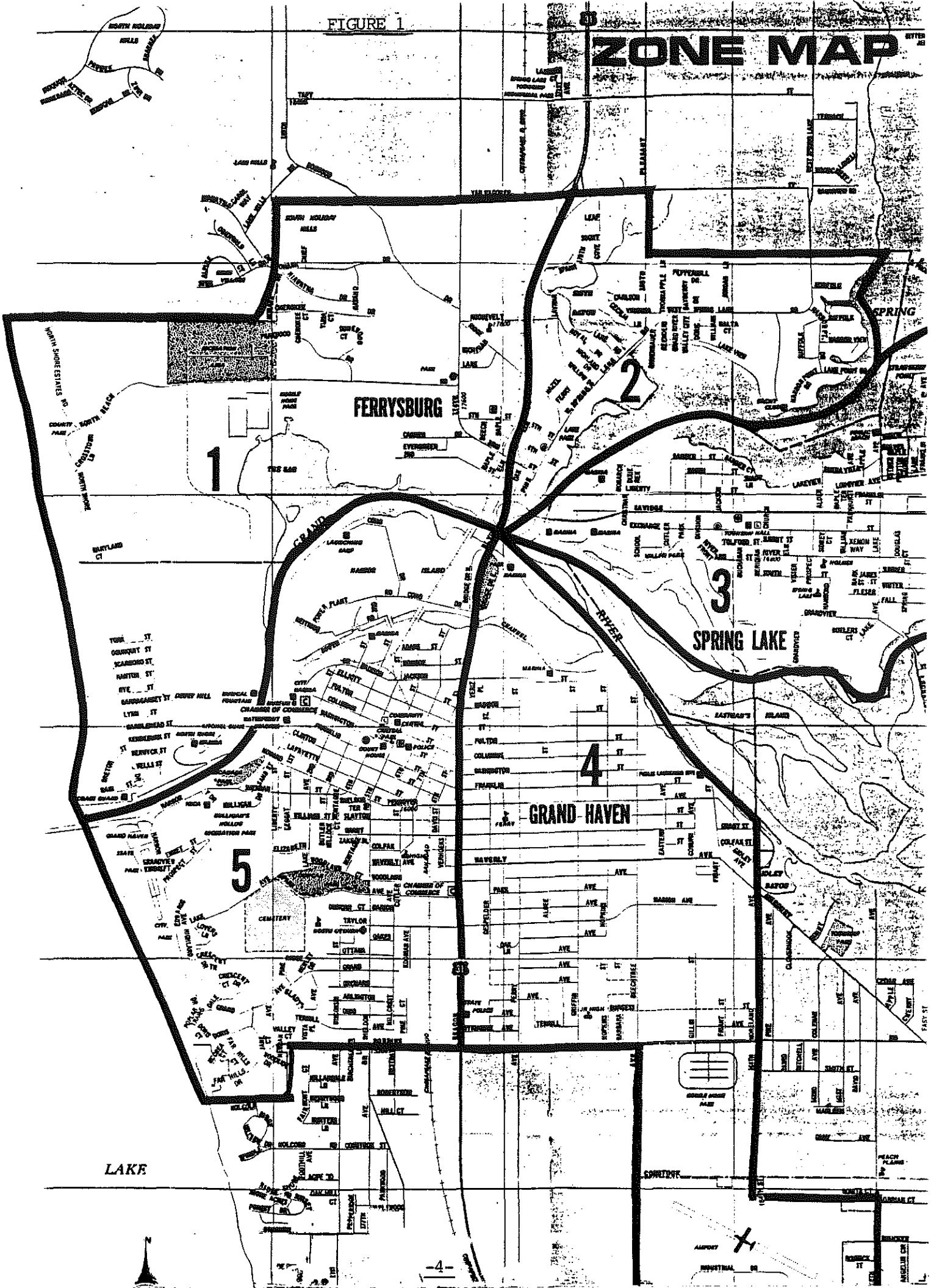
A preliminary report was developed and issued that alerted the local Harbor Transit units of government to the nature and methods of the evaluation as well as bringing them up to date on current matters affecting the transit system.

After the preliminary report was reviewed, the MDOT team explored in-depth the avenues leading to suggested alternative service methods and financial considerations. The final report has now been completed and is presented herein.

This final report will be presented to Harbor Transit for review by the local units of government involved for consideration and possible modification of existing service as outlined in the recommendations.

Figure 1 is a zone map of the Harbor Transit system. It divides the service area into five transit zones.

FIGURE 1


ZONE MAP
1
2
3
4
5
FERRYSBURG
SPRING LAKE
GRAND HAVEN
GRAND
RIVER
LAKE

SYSTEM BACKGROUND

Harbor Transit, formerly the Tri-Cities Dial-a-Ride which started service in 1975, is operated by the City of Grand Haven and currently provides public transit service within the city boundaries of Grand Haven, Ferrysburg, the village boundaries of Spring Lake, and a portion of Spring Lake Township. This service area encompasses an approximate population of 18,000.

System Characteristics

Regular Service - Demand-response, scheduled/flex routes, work trips, human service agency trips, advance reservation, and school runs.

Special Service

Contractual services, trolley (summer tourism).

Demographics

Location - City of Grand Haven
Service Area - Grand Haven, Spring Lake, Ferrysburg
Population - 18,000

Operating Parameters

Service hours: 6:00 a.m. to 5:30 p.m., Monday-Friday.
9:00 a.m. to 3:30 p.m., Saturday
Closed, Sunday

Fleet Size

Ten regular, two back-up units; total of twelve vehicles, with six being lift-equipped. All vehicles are equipped with two-way radios.

Number of Employees

Sixteen full-time.

Fare Structure	Demand Response	Route
Adults	.75	.50
Seniors/Handicappers	.35	.25
Children 5-15	.35	.25
Children 0-5	Free with adult fare	

Organizational Structure

Harbor Transit was formed under the provisions of Act 279 of 1909, as amended. The Act states: "Each municipality, under its charter, may make provision to establish municipal departments deemed necessary for the welfare of the local Community. This includes owning, constructing, and operating transportation facilities within its limits and ten miles outside its city limits."

Local Support

Presently one mill has been voted and is to continue indefinitely.

STUDY METHODOLOGY

The purpose of the operations evaluation (route study) is to collect and provide statistical data for analyzing the transit system bus operation and overall operation cost comparison between present bus deployment versus recommended alternative methods of bus operations. The ultimate goal is to maximize transit operations effectiveness and reduce costs while maintaining the current level of service.

The work was divided into two major tasks: operations and financial. Objective: To provide the data base for analysis and evaluation of current demand-response and route service. To assist in the development of transit service and plans to improve current transit system operations.

The review includes ridership data to identify ridership patterns. System operational reports were reviewed, including ridership records, deployment of buses, and driver trip log books. A six-day sample of transportation activity was analyzed. This sample consisted of two days of each of the four seasons. The sample represents the demand-response patterns throughout the entire service area. The route was analyzed to determine demand vs. route comparison. The maps showing passenger origin and destination, daily service hours, major routes, corridors, and demand-response density were plotted to determine traffic patterns.

Included in the scope of this service was the objective to examine the transit system's financial and operational data for the period of October 1, 1980 through September 30, 1985, and projected costs through September 30, 1986. The comparisons of Harbor Transit operating costs and performance data provided the basis for the analysis of transit system performance efficiency. The objective and ultimate goal is to improve performance level targets as outlined in Exhibits 1 to 3 in the appendix:

1. System Efficiency - Stabilize cost to revenue ratio.
2. System Effectiveness - Improve off-peak performance.
3. System Utilization - Maximize revenue passenger per vehicle hour.

SUMMARY OF MAJOR FINDINGS

- Harbor Transit has not had a fare increase since 1982.
- The 1985 fiscal year farebox recovery rate of 9.4 percent is below the average farebox recovery rate of 20 percent.
- A general fare restructuring should be given strong consideration.
- Most of the riders are seniors and children.
- Charging one-half fare rates during off peak hours only should be explored.
- Alternative revenue sources such as contractual service may help generate more revenue.
- The existing route service in Grand Haven should be reviewed for possible alteration because of low productivity.
- Marketing of service adjustments and farebox recovery corrections prior to prepared changes should reduce passenger resistance.
- A connector service between the communities of Grand Haven, Ferrysburg, and Spring Lake should link the communities together and improve the service flow.
- Local financial support should be held to a minimum by instituting revenue and service adjustments.
- State and federal funding support should not be expected to increase at previous levels.

SYSTEM ANALYSIS

A major task of the study group was to compile transit operating and financial data for the Harbor Transit system, to provide a basis for analysis. Exhibit 4 presents data for fiscal year ending September 30, 1986. It includes breakdowns of total passengers and revenues. Some 141,000 riders used Harbor Transit in FY 1986. Most of these riders were seniors and students. Contract service, which carried 20 percent of all passengers, generated 61 percent of the total passenger revenues. It is evident that contract service has made a significant impact on the system's revenue. Regular farebox receipts accounted for the 39 percent balance. The total passenger revenues were nearly $113,000.

Exhibit 6 compares city and county systems which had operating characteristics similar to Harbor Transit for fiscal year 1985. Of the 12 city systems examined, Harbor Transit carried 1.7 times the number of passengers as the average system. It cost 1.6 times the average to operate Harbor Transit, while the revenues were 1.8 times the average. Of the 12 county systems, Harbor Transit carried 1.5 as many passengers as the average. In addition, Harbor Transit costs and revenues were slightly higher than the county system average.

A financial review of the system revealed that the fare structure may need modification. The system has not had a fare increase since 1982. The study team developed statistics on the impact of fare increases in five amounts (5¢, 10¢, 15¢, 20¢, and 25¢). For each fare increase, the anticipated ridership loss and revenue gain were determined, by passenger type, along with the overall average total ridership loss and revenue gain. For instance, with a 15¢ fare increase for all riders, we can expect to lose up to 1,195 adults, 5,256 elderly and handicappers, and 6,327 students. At the same time, revenue gains would be up to $1,199 for adults, $3,513 for elderly and handicappers, and $3,603 for students. The amount of revenue gain is dependent upon the magnitude of ridership loss. The lesser the ridership loss, the greater the revenue gain will be. Overall, a 15¢ fare increase may result in an average total ridership loss of 11,480 and a revenue gain of $7,570. See Exhibit 5 for more details.

Exhibit 7 lists total eligible costs and revenues for fiscal years 1981 to 1986. Total eligible costs have increased 28 percent for the time period. At the same time, farebox revenues have increased 25 percent. The state share has increased steadily, while the local share has increased, at a similar pace, to offset declining federal dollars. Exhibits 11 through 16 are individual graphs of financial figures for fiscal years 1981 through 1986, while Exhibit 17 is a composite graph of those years.

A performance review for FY 1981 to FY 1986 is displayed in Exhibits 8 to 10. The number of passengers per vehicle hour and per vehicle mile remained fairly constant. The farebox-to-cost ratio has remained at about the same level, while the total revenue-to-cost ratio has increased 11.6 percentage points. The increase resulted from the acquisition of contractual service agreements. Total passengers carried, vehicle hours, and vehicle miles have declined over the time period.

Exhibit 18 presents a comparison of the demand and route services. A comparison is made of costs, vehicle miles, and vehicle hours. Although the figures are higher for the demand service, the productivity (passengers per vehicle hour) is higher for the demand service (7.9 PVH) than it is for the route service (5.3 PVH).

Exhibits 19 to 26 depict ridership patterns for four typical months. These months are May, July, and October 1985 and January 1986. Graphs show total passengers by service hours and by service type, total, and area.

CONCLUSIONS

The evaluation of public transit systems is an effort to promote the efficient and effective use of state funds. As a result of studying the Harbor Transit system, the study team was able to develop three alternative approaches in response to the legislative mandate above. The study findings demonstrate the importance of the cooperative staff efforts of the transit agency and MDOT.

It was determined that system improvement could result from the deployment of route design modifications, fare policy changes, and/or an increase in revenue generators, such as contractual agreements. The implementation of these service improvement actions will be at the discretion of the transit agency management.

In the final analysis, the findings of the study will serve as a basis for sound transit management decision regarding the Harbor Transit system. The study methodology will serve as the basis for future evaluation updates. Lastly, the study will provide a prototype for similar studies of other statewide transit system.

GENERAL RECOMMENDATIONS

Harbor Transit has not had a fare increase since 1982. The 1985 fiscal year farebox recovery rate of 9.4 percent is below the average farebox recovery rate of 20 percent for similar systems comparable to Harbor Transit.

Most of Harbor Transit riders are seniors and children. As a result, most of the passengers are paying considerably less than full fare. Michigan law obligates public transit systems to reduce Senior and Handicapper rates to one-half of the full rate during off peak hours. Consideration should be given to establishing peak hours of service from current ridership records. Farebox revenues could be increased by charging full fares to all riders during these hours. Heavy demand during peak periods may begin to decline as those riders eligible for one-half fare elect to ride during off peak hours to gain the benefit of the reduced fare.

During the past two years, Harbor Transit has began to establish more contractual types of service with local agencies requesting scheduled service for clients. This effort should continue and possibly even be expanded to generate more revenue. Rates for contractual service should be higher than normal rates because a specialized scheduled individual service has been provided and contracted for.

A general fare increase should also be given strong consideration regardless of service adjustments. Individual recommendation for the various alternatives are outlined in the narrative for each recommended alternative.

Performance levels should be adopted as suggested in Exhibit 2 of the appendix.

The above recommendations are valid regardless of the alternative selected for implementation.

Alternatives
(Assumptions)

The FY 1984/85 Cost Per Hour (CPH) of $21.57 is estimated to increase eight percent based on past years experience, therefore, a $23.30 CPH is anticipated for FY 1985/86.

The existing route service averages 430 service hours per month utilizing two vehicles.

Each of the three alternatives has an annual saving projection based upon required service and equipment adjustments necessary. Additionally, a revenue increase estimate combined with the annual saving projection gives an indication of total possible savings using the method.

Alternative A

Objective: To modify existing system to improve operating efficiency.

Route Configuration: Demand-response with modified fixed-route service.

Demand-response service would be provided to all communities within the service area. Along with demand-response service, a trunkline, fixed-route service would primarily operate along US-31 (see attached map). The trunkline along US-31 would be fed by connector service in and out of the communities of Ferrysburg, Spring Lake, and Grand Haven. This route design would extend coverage to communities that have never had route service. Route service would accommodate trips along US-31. In addition, demand-response buses would serve as feeders to the route service. Route service would provide a dedicated service for the communities of Ferrysburg, Spring Lake, and Grand Haven.

Demand-response service would be provided by a fleet of eight buses. The route segment would be serviced by one and one-half buses. Transfer points should be established along the trunkline to facilitate the feeder service (demand to route).

Suggested Farebox Restructure

Existing			Proposed	
Demand-Response	Route		Demand-Response	Route
.75	.50	Adults	.85	.50
.35	.25	Seniors/Handic.	.40	.25
.35	.25	Children 5-15	.40	.25
		Children 0-5		
-Free w/adult fare.			-Free w/adult fare. -One-half fare available during off-peak hours.	

*The trunkline route fare applies only to those riders boarding and deboarding along the route. All transfers to and from the demand-response service are provided at no charge.

Advantages

Current fixed route is changed to provide a more efficient service.

Restructured route service would connect communities more productively.

Overall system productivity should increase.

Redesigned route system should promote operating cost savings.

Disadvantages

Demand response service would be limited in Ferrysburg and Spring Lake.

Riders would have to transfer to travel between Grand Haven and Ferrysburg or Spring Lake.

Fare structure does not account for the fact that the majority of riders do not pay full fare.

Route system requires buses that would, otherwise, be used in demand-response service.

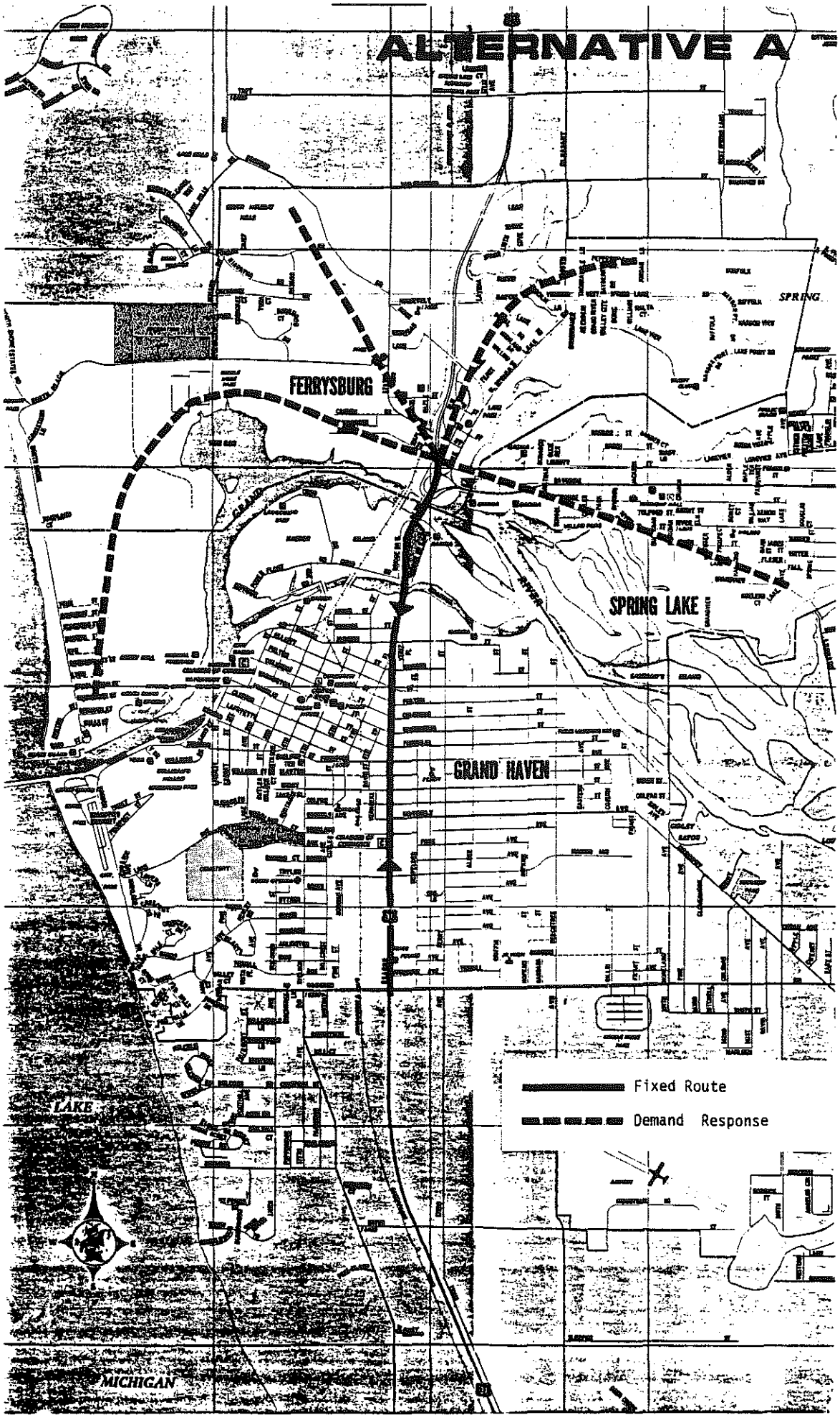
Estimated Financial Benefits

Existing Route Hours	430 hrs. per month
Proposed Route Hours	322 hrs. per month
Hours Saved	108 hrs. per month

Annual Savings per 12 months at $23.30 cost per hour - $30,197

Fare Change	Projected Ridership Loss		Projected Revenue Gain		Total Gain
	Number	Percent	Amount	Percent	$30,197+ Revenue
+5¢	-4,285	-3.8	+$2,930	+6.7	$33,127
+10¢	-8,345	-7.4	+5,445	+12.4	35,642
+15¢	-11,480	-10.2	+7,570	+17.2	37,767
+20¢	-14,512	-12.9	+9,626	+21.9	39,823
+25¢	-17,591	-15.6	+11,357	+25.8	41,554

FIGURE 2


ALTERNATIVE A
FERRYSBURG
SPRING LAKE
GRAND HAVEN
Fixed Route
Demand Response
LAKE
MICHIGAN

Alternative B

Objective: To eliminate inefficient route system and improve demand-response system.

Route Configuration: All demand-response system with no fixed-route service.

The entire transit system service would be operated as demand-response with this alternative. The existing fixed-route system would be eliminated. This would enable the system to provide service at a higher productivity level with better efficiency.

Present fixed-route service has a lower productivity level than demand response service. Fixed-route service for fiscal year 1985 operated with a passenger per vehicle hour (PVH) ratio of 5.3, while demand-response produced a PVH ratio of 7.9. This indicates more passengers were being transported by the demand-response service.

Productivity of the route service was low due to the circuitous route design. Excessive travel times discourage use of the system. Buses, currently being used in route service, would be transferred over to demand-response service. Nine buses would be available for demand-response and would be utilized as needed for peak and off peak hours. A PVH ratio above the existing ratio should be maintained.

Since the majority of the riders are seniors and children, it is not likely that improving the route service would improve overall system efficiency and service delivery. These riders prefer demand response service because of its door-to-door convenience.

Suggested Farebox Restructure

Existing			Proposed
Demand-Response	Route		Demand-Response
.75	.50	Adults	.80
.35	.25	Seniors/Handicappers	.40
.35	.25	Children 5-15	.40
		Children 0-5	
-Free w/adult fare.			-Free w/adult fare. -One-half fares available during off-peak hours.

Advantages

Eliminates fixed-route service which is not producing well.

Should increase overall system productivity due to availability of additional equipment.

Should eliminate duplication of service. Fixed routes will not serve in areas served by demand response routes.

Should improve convenience to passengers.

Should minimize the number of transfers.

Disadvantages

Costs more to operate than a system with some form of fixed-route service.

Increased subsidy per passenger.

No dedicated connector service between communities of Grand Haven, Ferrysburg, and Spring Lake.

Requests for rides have to be phoned in. Regular riders have to call in whenever they need a ride.

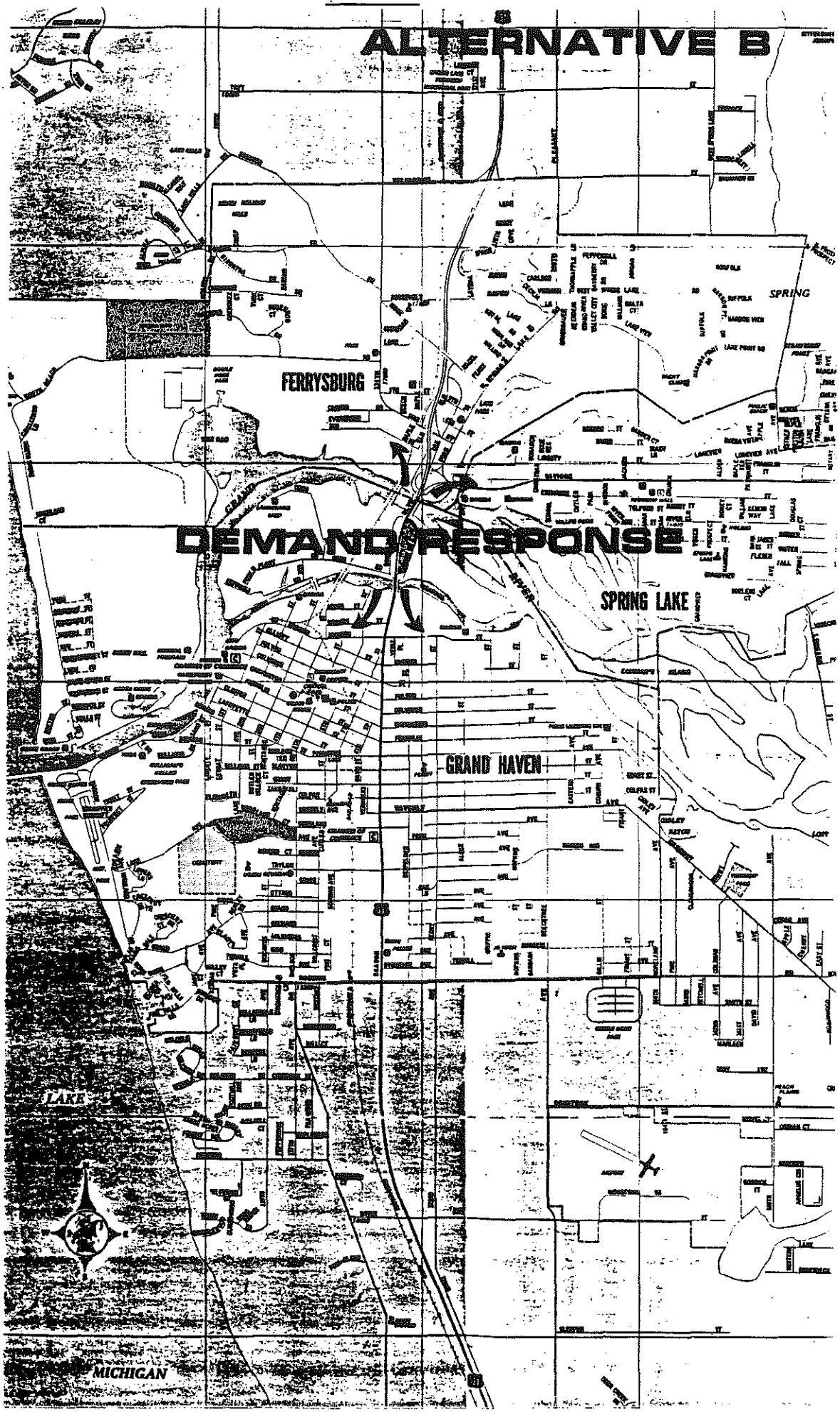
Estimated Financial Benefits

Existing Route Hours	430 hrs. per month
Proposed Route Hours	215 hrs. per month
Hours Saved	215 hrs. per month

Annual Savings per 12 months at $23.30 cost per hour - $60,114

Fare Change	Projected Ridership Loss		Projected Revenue Gain		Total Gain
	Number	Percent	Amount	Percent	$60,114+ Revenue
+5¢	-4,285	-3.8	+$2,930	+6.7	$63,044
+10¢	-8,345	-7.4	+5,445	+12.4	65,559
+15¢	-11,480	-10.2	+7,570	+17.2	67,684
+20¢	-14,512	-12.9	+9,626	+21.9	69,740
+25¢	-17,591	-15.6	+11,357	+25.8	71,471

FIGURE 3


ALTERNATIVE B
DEMAND RESPONSE
FERRYSBURG
SPRING
SPRING LAKE
GRAND HAVEN
LAKE
MICHIGAN

Alternative C

Objective: To maintain existing service conditions.

Route Configuration: Continue all service as now provided and adjust the farebox structure.

This alternative allows for continuation of the existing service structure with a farebox increase to help offset increasing costs and declining federal and state revenues.

Both the demand-response and fixed-route fares should be increased but a higher percentage increase for demand response could be initiated in hopes that more riders would switch to the route service, thereby freeing up demand-response service hours for use in other system service areas.

Suggested Farebox Restructure

Existing			Proposed	
Demand-Response	Route		Demand-Response	Route
.75	.50	Adults	.85	.50
.35	.25	Seniors/Handic.	.40	.25
.35	.25	Children 5-15	.40	.25
		Children 0-5		
-Free w/adult fare.			-Free w/adult fare. -One-half fare available during off-peak hours.	

Advantages

Farebox recovery rate would increase to approach the systemwide average.

Present travel patterns would not have to change.

A more equitable fare structure would be established.

Riders would assume more direct responsibility for service received.

Would help alleviate local fund increases.

Disadvantages

Potential short-term loss of ridership.

Inefficient route structure may continue to exist.

Would require a well planned marketing campaign.

Small transit system riders tend to resist fare increases more than larger systems.

Estimated Financial Benefits

Existing Service Remains Unchanges

Annual Savings $-0-

Fare Change	Projected Ridership Loss		Projected Revenue Gain		Total Gain
	Number	Percent	Amount	Percent	$-0- + Revenue
+5¢	-4,285	-3.8	+$2,930	+6.7	$ 2,930
+10¢	-8,345	-7.4	+5,445	+12.4	5,445
+15¢	-11,480	-10.2	+7,570	+17.2	7,570
+20¢	-14,512	-12.9	+9,626	+21.9	9,626
+25¢	-17,591	-15.6	+11,357	+25.8	11,357

FIGURE 4

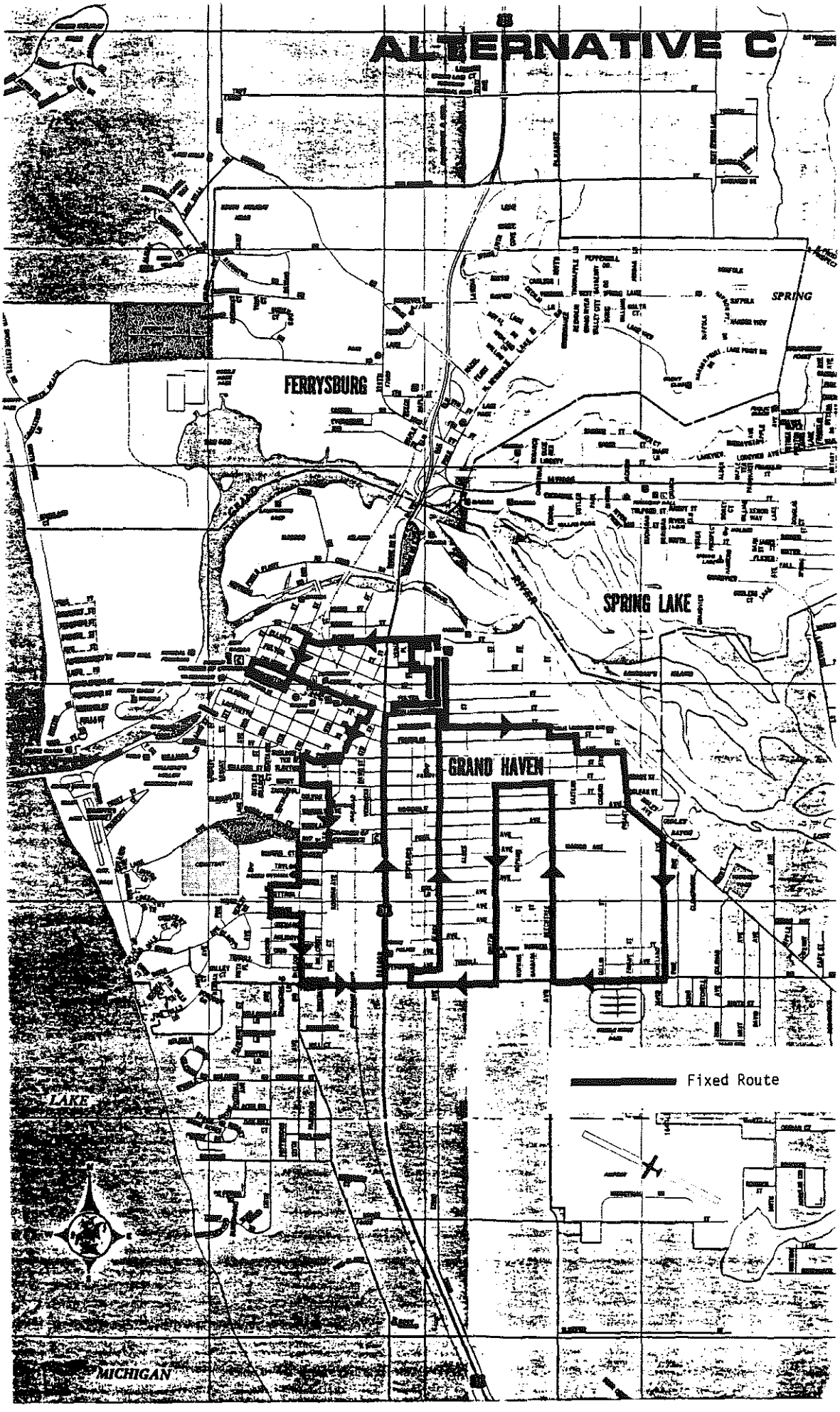

ALTERNATIVE C
FERRYSBURG
SPRING
SPRING LAKE
GRAND HAVEN
Fixed Route
LAKE
MICHIGAN

EXHIBIT 1

SYSTEM OBJECTIVES

System Efficiency

Improve system operating ratio.

System Effectiveness

Improve off-peak performance.

Increase coverage within service area.

System Utilization

Maximize revenue passengers per vehicle hour.

Fare Policy

Generate sufficient revenues to maintain financial stability of system.

Management

Establish and maintain stable service area coverage and maximize vehicle placement.

Marketing

Improve awareness and image of transit system through marketing.

EXHIBIT 2

PERFORMANCE LEVEL TARGETS

Objectives	Performance Levels
Improve system operating ratio.	System at 0.20 revenue ratio. 80% and better (0.16 and above) - okay. 60% to 80% (0.12 to 0.16) - review. below 60% (below 0.12) - adjust.
Improve off peak performance.	a) Peak - Ten passengers per hour b) Off-peak - Seven passengers per hour
Increase coverage within service area.	Provide contractual service to developing areas while maintaining miles and hours of service at existing levels.
Maximize revenue passengers per vehicle hour.	Systemwide - 8.5 passengers per vehicle hour. 80% and better (6.8 and above) - okay. 60% to 80% (5.1 to 6.8) - review. below 60% (below 5.1) - adjust.
Generate sufficient revenues to maintain financial stability of system.	Fares should be increased to maintain a 0.20 operating ratio.
Establish and maintain stable service area coverage and maximize vehicle placement.	Evaluate service levels and coordinate with required vehicles.
Improve awareness and image of transit system through marketing.	Market farebox increases through newspapers, radio, and agency news releases. Stress service availability.

EXHIBIT 3*

OPERATING RATIO SUMMARY
FY 1984/85

Service Type	Passengers Carried	Farebox Revenue	Total Costs	Operating Ratio
Route	27,215	$ 7,140	$111,172	0.064
D/R	106,779	31,464	292,558	0.107
TOTAL	133,994	$38,604	$403,730	0.096

*Annual estimates based on unaudited actual.

EXHIBIT 4*

Year Ending September 30, 1986
Harbor Transit for FY 1985/86 Statistics

Total Passengers:	140,576	
Full-fare (16 and older)	23,908	
Seniors (60 and older)	31,622	
Seniors-Handicappers	4,846	
Handicappers	7,335	
Students (15 and under)	45,191	
Contracts	27,674	
	140,576	
Total Revenues:	$112,839.68	
Regular Farebox	$ 43,934.73	= 38.9%
*Contracts	68,904.95	= 61.1%
	$112,839.68	

*Basis is $2.25/ride

Breakdown of Revenue Sources

Adults	23,908	= 21%
E&H	43.803	= 39%
Students	45,191	= 40%
Total	112,902	
Contracts	27,674	
	140,576	
Regular Farebox:	$43,934.73	Total
Adults	$ 9,226	
E&H	17,135	
Students	17,574	
Total Regular Farebox	$43,935	

*This information was not available during the compilation of the major data in this report.

EXHIBIT 5

HARBOR TRANSIT FARE INCREASE IMPACT

Amount of Fare Inc.	Ridership Loss						Revenue Gain						Average	
	Adults		E&H		Students		Adults		E&H		Students		Total Ridership Loss	Total Revenue Gain
+0.05	299	478	1,752	1,971	1,808	2,260	$ 461	$ 369	$1,371	$1,199	$1,406	$1,054	$ 4,285	$ 2,930
+0.10	598	956	3,285	3,942	3,389	4,519	830	692	2,570	2,228	2,636	1,933	8,345	5,445
+0.15	837	1,195	4,599	5,256	4,745	6,327	1,199	1,015	3,513	3,084	3,603	2,724	11,480	7,570
+0.20	1,076	1,674	5,694	6,570	5,875	8,134	1,568	1,292	4,569	3,427	4,455	3,941	14,512	9,626
+0.25	1,315	2,032	7,008	8,104	7,231	9,490	1,891	1,568	5,360	4,042	5,226	4,626	17,591	11,357

EXHIBIT 5a.

5¢ INCREASE

Annual ridership FY 1986 140,576

Adults: Demand-Response 5¢ fare increase

$\frac{80-75}{(80+75)/2} = \frac{5}{77.5} = 6.5\%$ fare change

Fare elasticity -0.20 to -0.30

Ridership loss = 1.25 to 20% = 299 to 478
Revenue gain = 5.0 to 4.0% = $461 to $369

Students: Demand-Response

$\frac{40-35}{(40+35)/2} = \frac{5}{37.5} = 13.3\%$ fare change

F.E. -0.30 to -0.40

Ridership loss = 4.0 to 5.0% = 1,808 to 2,260
Revenue gain = 8.0 to 6.0% = $1,406 to $1,054

E&H: Demand-Response

13.3% fare change (same as student fare)
F.E. -0.30 to -0.35

Ridership loss = 4.0 to 4.5% = 1,752 to 1,971
Revenue gain = 8.0 to 7.0% = $1,371 to $1,199

EXHIBIT 5b.

10¢ INCREASE

Annual ridership FY 1986 140,576

Adults: Demand-Response 10¢ fare increase

$$\frac{85-75}{(85+75)/2} = \frac{10}{80.0} = 12.5\% \text{ fare change}$$

Fare elasticity -0.20 to -0.30

Ridership loss = 2.5 to 4.0% = 598 to 956
Revenue gain = 9.0 to 7.5% = $830 to $692

Students: Demand-Response

$$\frac{45-35}{(45+35)/2} = \frac{10}{40.0} = 25.0\% \text{ fare change}$$

F.E. -0.30 to -0.40

Ridership loss = 7.5 to 10.0% = 3,389 to 4,519
Revenue gain = 15.0 to 11.0% = $2,636 to $1,933

E&H: Demand-Response

25.0% fare change (same as student fare)
F.E. -0.30 to -0.35

Ridership loss = 7.5 to 9.0% = 3,285 to 3,942
Revenue gain = 15.0 to 13.0% = $2,570 to $2,228

EXHIBIT 5c.

15¢ INCREASE

Annual ridership FY 1986 140,576

Adults: Demand-Response 15¢ fare increase

$$\frac{90-75}{(90+75)/2} = \frac{15}{82.5} = 18.2\% \text{ fare change}$$

Fare elasticity -0.20 to -0.30

Ridership loss = 3.5 to 5.0% = 837 to 1,195
Revenue gain = 13.0 to 11.0% = $1,199 to $1,015

Students: Demand-Response

$$\frac{50-35}{(50+35)/2} = \frac{15}{42.5} = 35.3\% \text{ fare change}$$

F.E. -0.30 to -0.40

Ridership loss = 10.5 to 14.0% = 4,745 to 6,327
Revenue gain = 20.5 to 15.5% = $3,603 to $2,724

E&H: Demand-Response

35.3% fare change (same as student fare)
F.E. -0.30 to -0.35

Ridership loss = 10.5 to 12.0% = 4,599 to 5,256
Revenue gain = 20.5 to 18.0% = $3,513 to $3,084

EXHIBIT 5d.

20¢ INCREASE

Annual ridership FY 1986 140,576

Adults: Demand-Response 20¢ fare increase

$$\frac{95-75}{(95+75)/2} = \frac{20}{85.0} = 23.5\% \text{ fare change}$$

Fare elasticity -0.20 to -0.30

Ridership loss = 4.5 to 7.0% = 1,076 to 1,674
Revenue gain = 17.0 to 14.0% = $1,568 to $1,292

Students: Demand-Response

$$\frac{55-35}{(55+35)/2} = \frac{20}{45} = 44.4\% \text{ fare change}$$

F.E. -0.30 to -0.40

Ridership loss = 13.0 to 18.0% = 5,875 to 8,134
Revenue gain = 26.0 to 19.5% = $4,569 to $3,427

E&H: Demand-Response

44.4% fare change (same as student fare)
F.E. -0.30 to -0.35

Ridership loss = 13.0 to 15.0% = 5,694 to 6,570
Revenue gain = 26.0 to 23.0% = $4,455 to $3,941

EXHIBIT 5e.

25¢ INCREASE

Annual ridership FY 1986 140,576

Adults: Demand-Response 25¢ fare increase

$\frac{100-75}{(100+75)/2} = \frac{25}{87.5} = 28.6\%$ fare change

Fare elasticity -0.20 to -0.30

Ridership loss = 5.5 to 8.5% = 1,315 to 2,032
Revenue gain = 20.5 to 17.0% = $1,891 to $1,568

Students: Demand-Response

$\frac{60-35}{(60+35)/2} = \frac{25}{47.5} = 52.6\%$ fare change

F.E. -0.30 to -0.40

Ridership loss = 16.0 to 21.0% = 7,231 to 9,490
Revenue gain = 30.5 to 23.0% = $5,360 to $4,042

E&H: Demand-Response

52.6% fare change (same as student fare)
F.E. -0.30 to -0.35

Ridership loss = 16.0 to 18.5% = 7,008 to 8,104
Revenue gain = 30.5 to 27.0% = $5,226 to $4,626

HIB

OPERATIONAL DATA COMPARISONS: LOCAL BUS SYSTEMS
PERIOD: OCTOBER 1984 TO SEPTEMBER 1985

CITY SYSTEMS	YEAR SERVICE STARTED	FLEET SIZE	SERVICE AREA POPULATION	PASSENGERS	VEHICLE HOURS	VEHICLE MILES	PASS. PER HOUR	COST	REVENUE	COST PER VEHICLE HOUR	COST PER VEHICLE MILE	COST PER PASSENGER
ALMA	1975	6	9,652	77,522	8,814	95,346	8.8	$222,256	$37,592	$25.22	$2.33	$2.87
BELDING	1975	3	5,634	53,368	4,680	62,933	11.4	$84,530	$11,000	$18.06	$1.34	$1.58
BIG RAPIDS	1975	8	14,361	106,765	13,497	140,529	7.9	$278,692	$62,884	$20.65	$1.98	$2.61
DOWAGIAC	1975	3	6,307	27,328	4,480	36,738	6.1	$76,866	$8,963	$17.16	$2.09	$2.81
HARBOR TRANSIT	1975	12	17,934	133,994	18,718	332,801	7.2	$403,730	$78,851	$21.57	$1.21	$3.01
HILLSDALE	1975	5	7,432	53,001	6,337	74,052	8.4	$112,732	$21,522	$17.79	$1.52	$2.13
HOLLAND	1974	10	26,281	112,124	20,712	268,431	5.4	$399,366	$55,345	$19.28	$1.49	$3.56
HOUGHTON	1982	11	7,512	74,566	11,720	167,444	6.4	$200,798	$71,069	$17.13	$1.20	$2.69
IONIA	1980	4	5,920	52,455	5,533	67,360	9.5	$126,171	$26,674	$22.80	$1.87	$2.41
LUDINGTON	1974	11	8,937	114,778	15,702	154,814	7.3	$326,650	$54,795	$20.80	$2.11	$2.85
MARSHALL	1974	4	7,201	58,567	6,018	81,015	9.7	$143,002	$19,114	$23.76	$1.77	$2.44
MIDLAND	1974	13	37,250	109,483	21,207	310,388	5.2	$591,310	$64,041	$27.88	$1.91	$5.40
12 SYSTEMS	TOTALS	90	154,421	973,951	137,418	1,791,851	7.1	$2,966,103	$511,850	$21.58	$1.66	$3.05
	AVERAGES	8	12,868	81,163	11,452	149,321	--	$247,175	$42,654	--	--	--

COUNTY SYSTEMS	YEAR SERVICE STARTED	FLEET SIZE	SERVICE AREA POPULATION	PASSENGERS	VEHICLE HOURS	VEHICLE MILES	PASS. PER HOUR	COST	REVENUE	COST PER VEHICLE HOUR	COST PER VEHICLE MILE	COST PER PASSENGER
ANTRIM	1977	13	16,194	84,541	20,788	444,916	4.1	$401,542	$86,927	$19.32	$0.90	$4.75
CHARLEVOIX	1980	9	19,907	70,765	9,988	232,595	7.1	$292,529	$52,319	$29.29	$1.26	$4.13
EATON	1980	16	88,337	147,038	27,436	588,776	5.4	$626,008	$128,628	$22.82	$1.06	$4.26
GLADWIN	1981	11	19,957	87,189	20,270	364,607	4.3	$271,168	$55,196	$13.38	$0.74	$3.11
HURON	1981	14	36,459	131,568	23,467	577,831	5.6	$491,508	$102,979	$20.94	$0.85	$3.74
IOSCO	1979	8	28,349	82,181	13,539	349,657	6.1	$268,122	$54,583	$19.80	$0.77	$3.26
MANISTEE	1975	21	23,019	140,187	30,910	576,528	4.5	$601,668	$148,719	$19.47	$1.04	$4.29
MECOSTA	1978	9	22,600	52,943	10,016	247,546	5.3	$211,951	$46,654	$21.16	$0.86	$4.00
OGEMAW	1980	5	16,436	40,764	5,435	107,123	7.5	$109,758	$36,045	$20.19	$1.02	$2.69
OTSEGO	1980	7	14,993	68,216	13,606	296,681	5.0	$233,551	$55,069	$17.17	$0.79	$3.42
ROSCOMMON	1980	10	16,374	92,965	18,893	504,434	4.9	$329,826	$70,875	$17.46	$0.65	$3.55
VAN BUREN	1979	6	66,814	46,028	8,346	163,532	5.5	$198,134	$67,628	$23.74	$1.21	$4.30
12 SYSTEMS	TOTALS	129	369,439	1,044,385	202,694	4,454,226	5.2	$4,035,765	$905,622	$19.91	$0.91	$3.86
	AVERAGES	11	30,787	87,032	16,891	371,186	--	$336,314	$75,469	--	--	--

Source: UPTRAN Reconciliation Reports

EXHIBIT 7
HARBOR TRANSIT
FINANCIAL REVIEW

	TOTAL ELIGIBLE COST	TOTAL FAREBOX REVENUES	TOTAL OTHER REVENUES	TOTAL REVENUES	FEDERAL SHARE	STATE SHARE	LOCAL SHARE
FY 80/81 (Actual Unaudited)	$366,510	$48,010	$0	$48,010	$127,400	$122,170	$68,930
FY 81/82 (Actual Unaudited)	$321,845	$49,870	$0	$49,870	$83,116	$107,282	$81,577
FY 82/83 (Actual Unaudited)	$304,835	$42,537	$9,352	$51,889	$98,624	$107,281	$47,041
FY 83/84 (Actual Unaudited)	$350,543	$54,154	$9,503	$63,657	$79,180	$139,155	$68,551
FY 84/85 (Actual Unaudited)	$403,730	$38,604	$40,247	$78,851	$84,469	$157,906	$82,504
FY 85/86 (Projected based on 1st & 2nd Quarters)	$469,200	$60,000	$56,000	$116,000	$85,932	$164,805	$102,463

Source: UPTRAN Reconciliation Reports

EXHIBIT 8

HARBOR TRANSIT
PERFORMANCE REVIEW

ECONOMIC AND PRODUCTIVITY CRITERIA

	FY 80/81	FY 81/82	FY 82/83	FY 83/84	FY 84/85	FY 85/86 *
PASSENGERS PER VEHICLE HOUR	7.1	6.8	7.1	7.2	7.2	7.2
PASSENGERS PER VEHICLE MILE	0.5	0.5	0.4	0.5	0.4	0.5
COST RECOVERY						
FAREBOX/COST	13.1%	15.5%	14.0%	15.4%	9.6%	12.8%
TOTAL REVENUE/COST	13.1%	15.5%	17.0%	18.2%	19.5%	24.7%
COST PER VEHICLE HOUR	$16.30	$17.59	$19.00	$19.94	$21.57	$25.62
COST PER VEHICLE MILE	$1.09	$1.16	$1.18	$1.25	$1.21	$1.61
COST PER PASSENGER	$2.29	$2.57	$2.67	$2.76	$3.01	$3.54
TOTAL PASSENGERS CARRIED	160,120	125,199	114,042	127,137	133,994	132,456
TOTAL VEHICLE HOURS	22,481	18,294	16,046	17,578	18,717	18,315
TOTAL VEHICLE MILES	335,762	276,326	258,768	279,842	332,800	291,403
CHARTER SERVICE HOURS	58	12	23	114	124	117
CHARTER SERVICE MILES	569	74	243	1,104	1,233	969
TOTAL SYSTEM VEHICLES	12	12	12	12	12	12
A. LIFT	6	6	6	6	6	6
B. NON-LIFT	6	6	6	6	6	6
GALLONS OF FUEL CONSUMED	41,177	40,454	38,441	42,011	43,805	42,000
TOTAL TRANSIT EMPLOYEES	16	16	16	14	16	16
TOTAL DRIVERS	12	12	12	13	12	12

* Estimated figures

Source: UPTRAN Reconciliation Reports

EXHIBIT 9

HARBOR TRANSIT
ROUTE MONTHLY OPERATING SUMMARY
FY 1984/85

	**********		FARES	**********									
	$0.50	$0.25	FREE	TRANSFERS	TOTAL	MILES	VEHICLE HOURS	OPERATING COST	PASS. PER VEH. HOUR	SENIOR HANDICAP.	SEN. CIT./ CITIZENS	HANDICAP.	GASOLINE (GALLONS)
OCTOBER	313	1,844	52	194	2,403	7,037	483	$10,418.31	5.0	144	1,129	70	964
NOVEMBER	261	1,635	42	127	2,065	6,174	420	$9,059.40	5.0	97	981	30	840
DECEMBER	314	1,655	49	130	2,148	6,125	409	$8,822.13	5.3	93	911	35	833
JANUARY	382	1,951	64	207	2,604	6,416	447	$9,641.79	5.8	72	1,027	24	991
FEBRUARY	363	1,782	55	203	2,403	5,774	402	$8,671.14	6.0	125	1,006	58	828
MARCH	492	1,912	93	154	2,651	6,253	423	$9,124.11	6.3	73	1,124	85	760
APRIL	372	1,856	93	193	2,514	6,636	439	$9,469.23	5.7	60	1,163	85	848
MAY	398	1,846	108	141	2,493	6,577	444	$9,577.08	5.6	72	1,251	89	814
JUNE	315	1,423	68	115	1,921	5,933	407	$8,778.99	4.8	31	989	84	678
JULY	304	1,598	76	128	2,106	6,363	442	$9,533.94	4.8	36	1,186	77	723
AUGUST	282	1,563	83	139	2,067	6,256	440	$9,490.80	4.7	57	1,252	87	674
SEPTEMBER	213	1,476	55	96	1,840	5,856	398	$8,584.86	4.6	22	1,087	98	744
TOTALS	4,009	20,541	838	1,827	27,215	75,400	5,154	$111,171.78	5.3	882	13,106	822	9,697
MONTHLY AVERAGE	334	1,712	70	152	2,268	6,283	430	$9,264.32	5.3	74	1,092	69	808

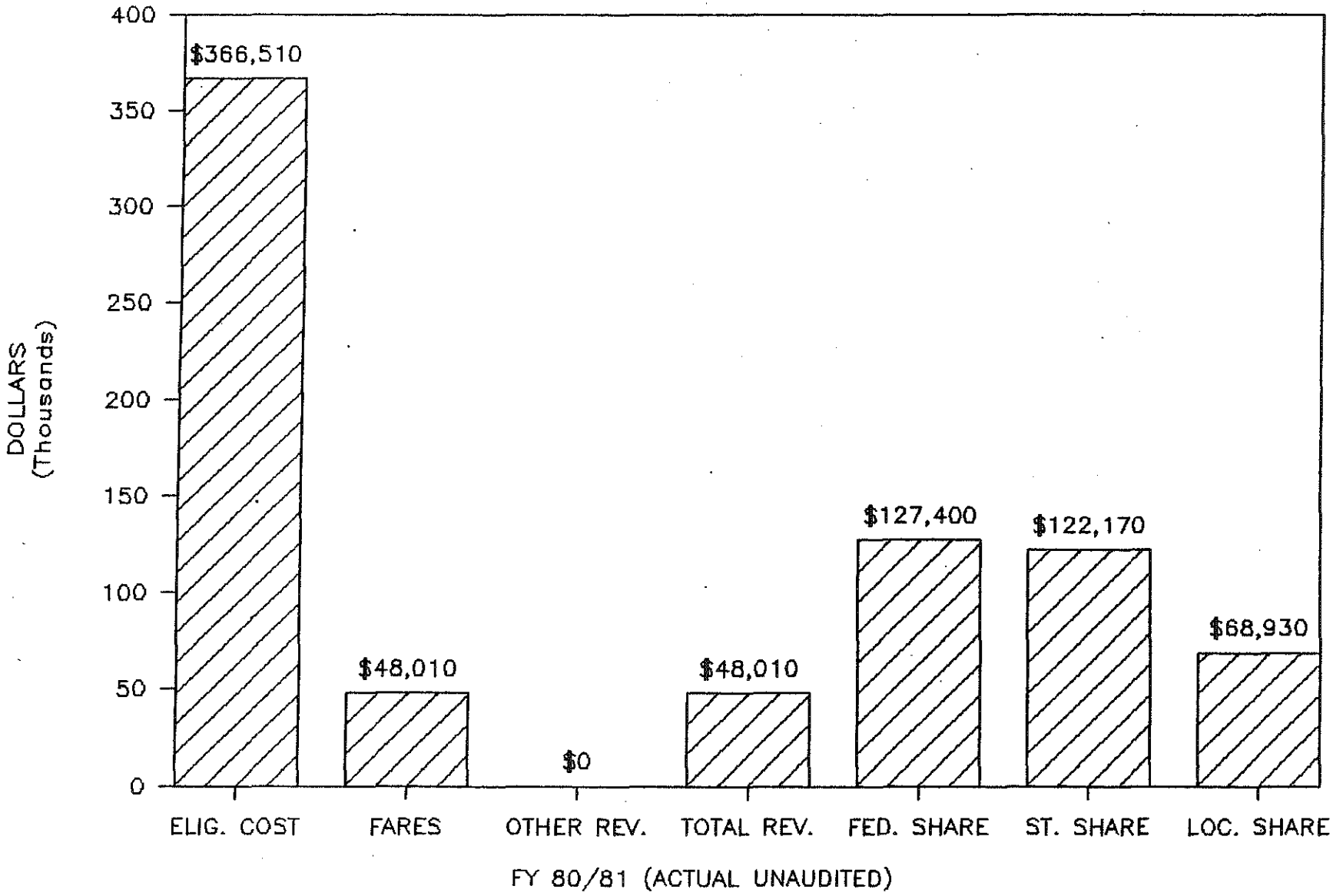
EXHIBIT 10

HARBOR TRANSIT RIDERSHIP MATRIX
RIDERSHIP BY ZONE (ONE WEEK)
DEMAND-RESPONSE

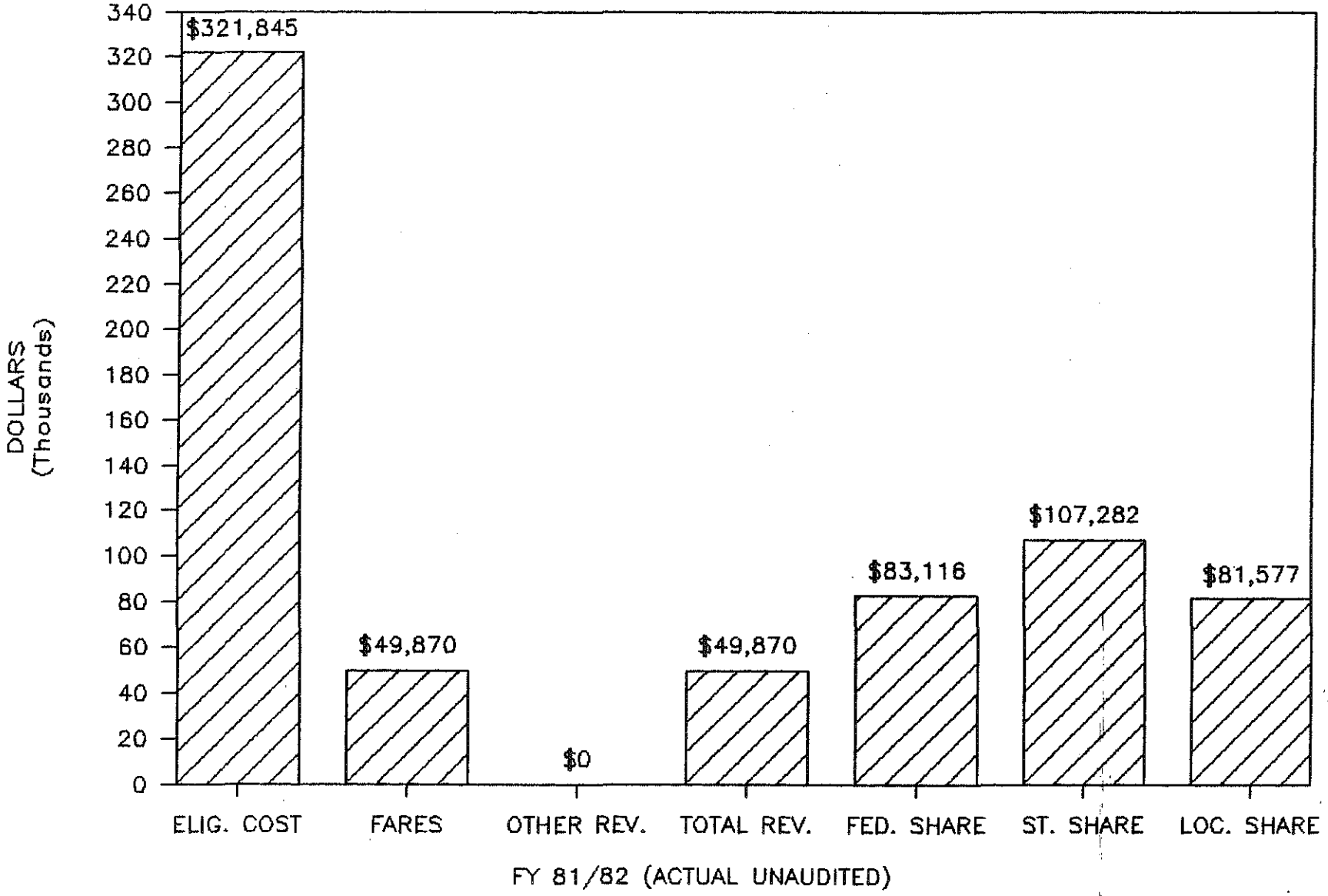
ORIGIN ZONE	DESTINATION ZONE 1	2	3	4	5	TOTALS
1	14	0	39	81	83	217
2	3	2	2	36	37	80
3	27	11	70	126	170	404
4	71	35	113	293	292	804
5	85	35	121	300	264	805
TOTALS	200	83	345	836	846	2310

EXHIBIT 11

HARBOR TRANSIT FINANCIAL REVIEW



HARBOR TRANSIT FINANCIAL REVIEW



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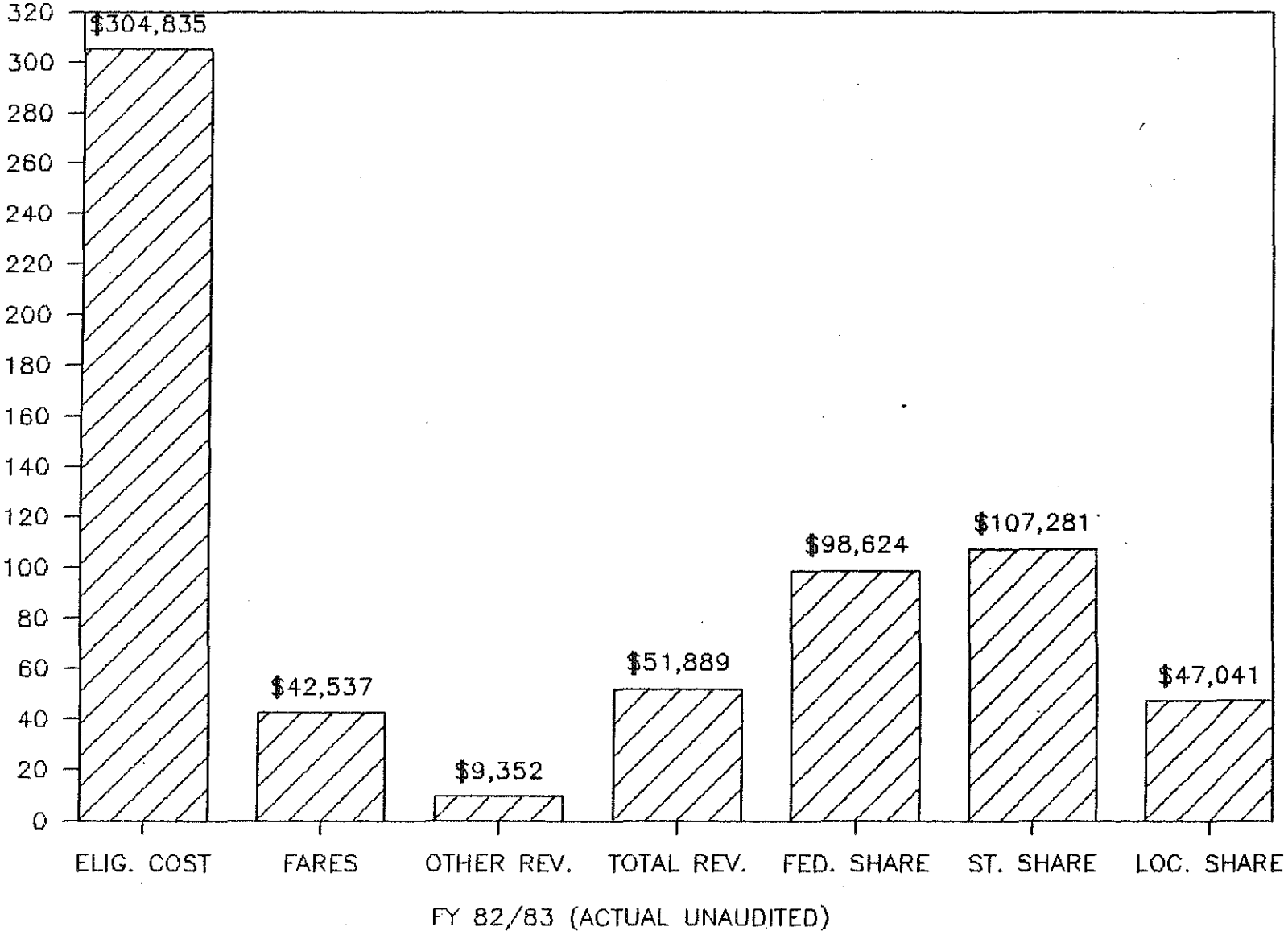

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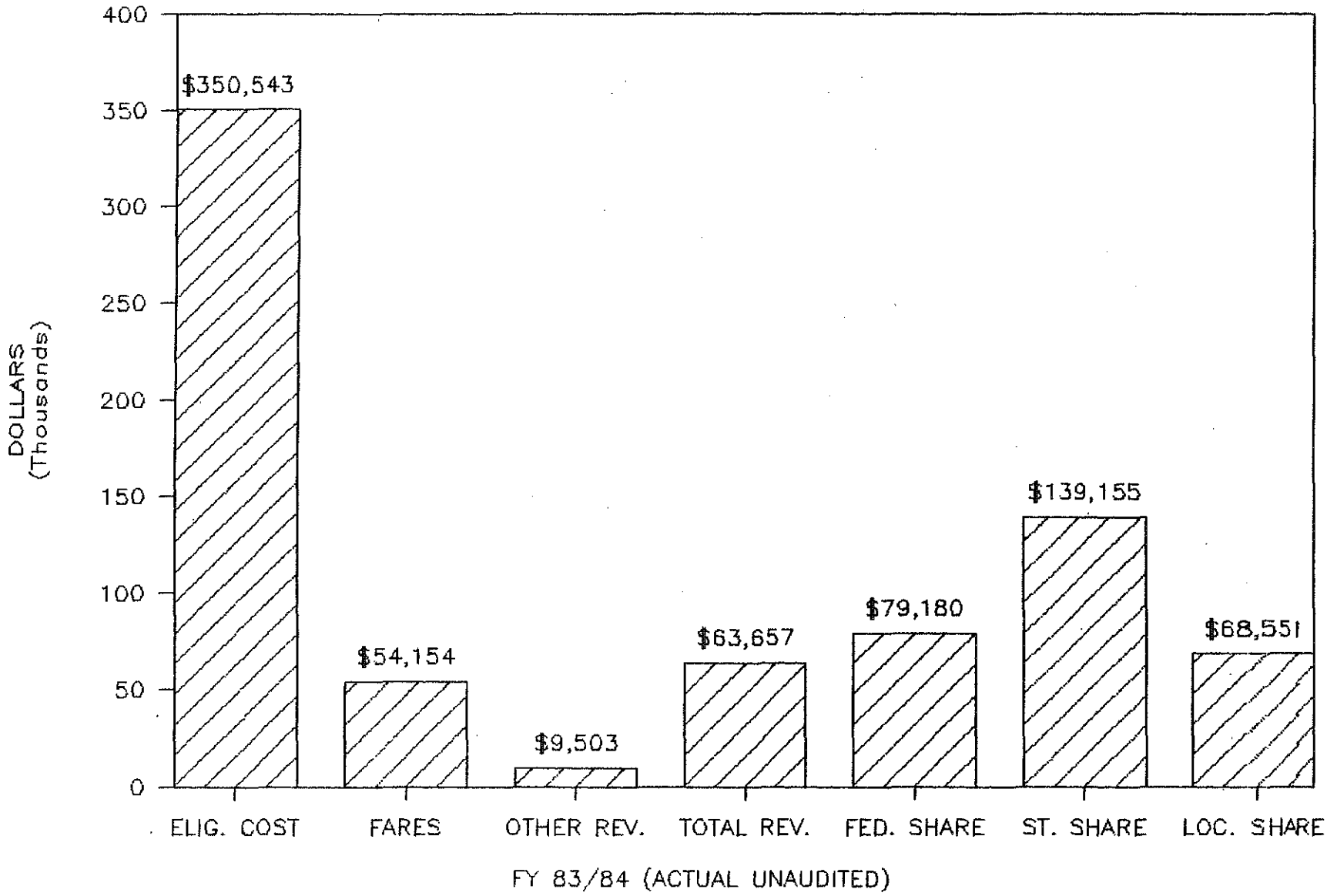

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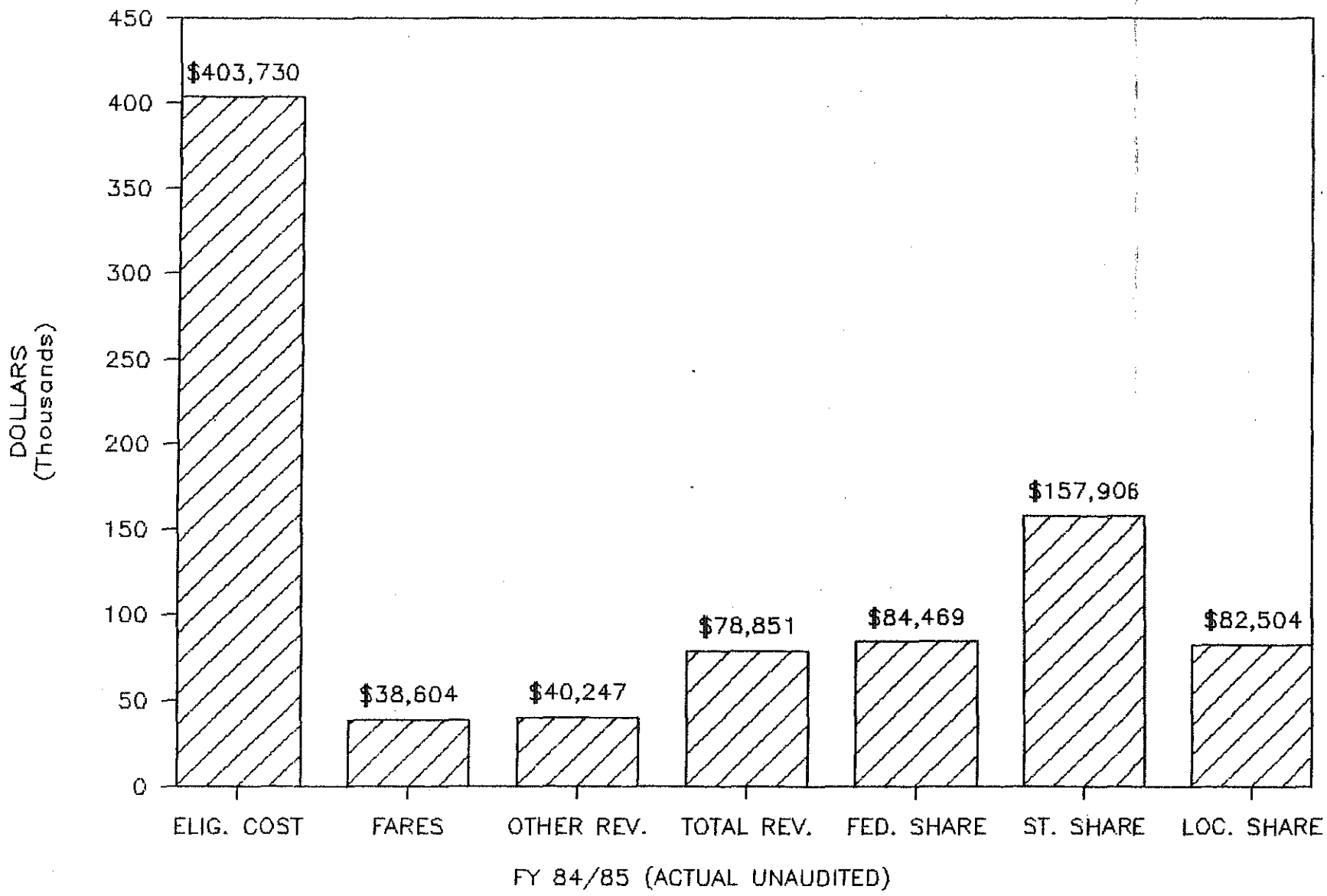

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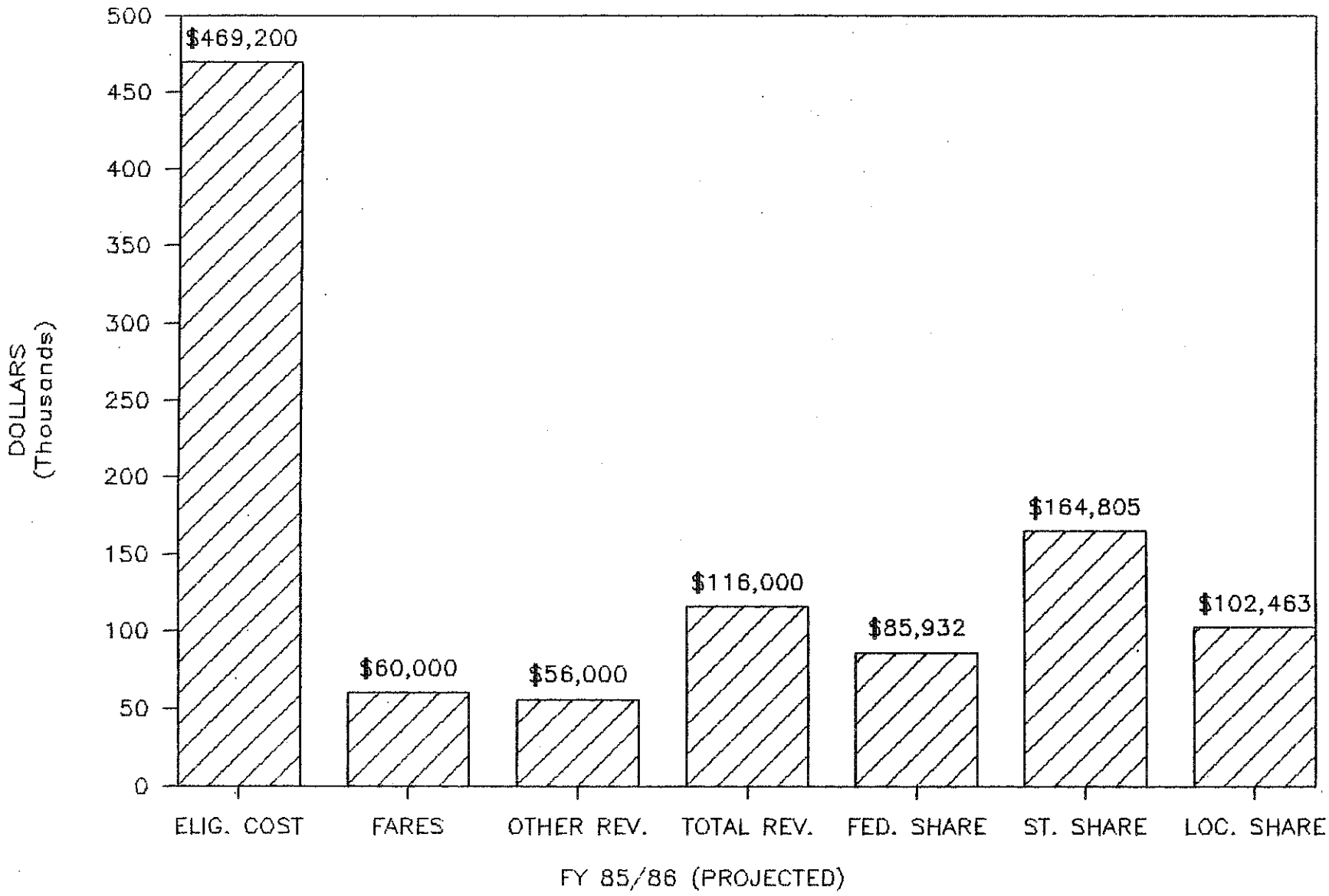
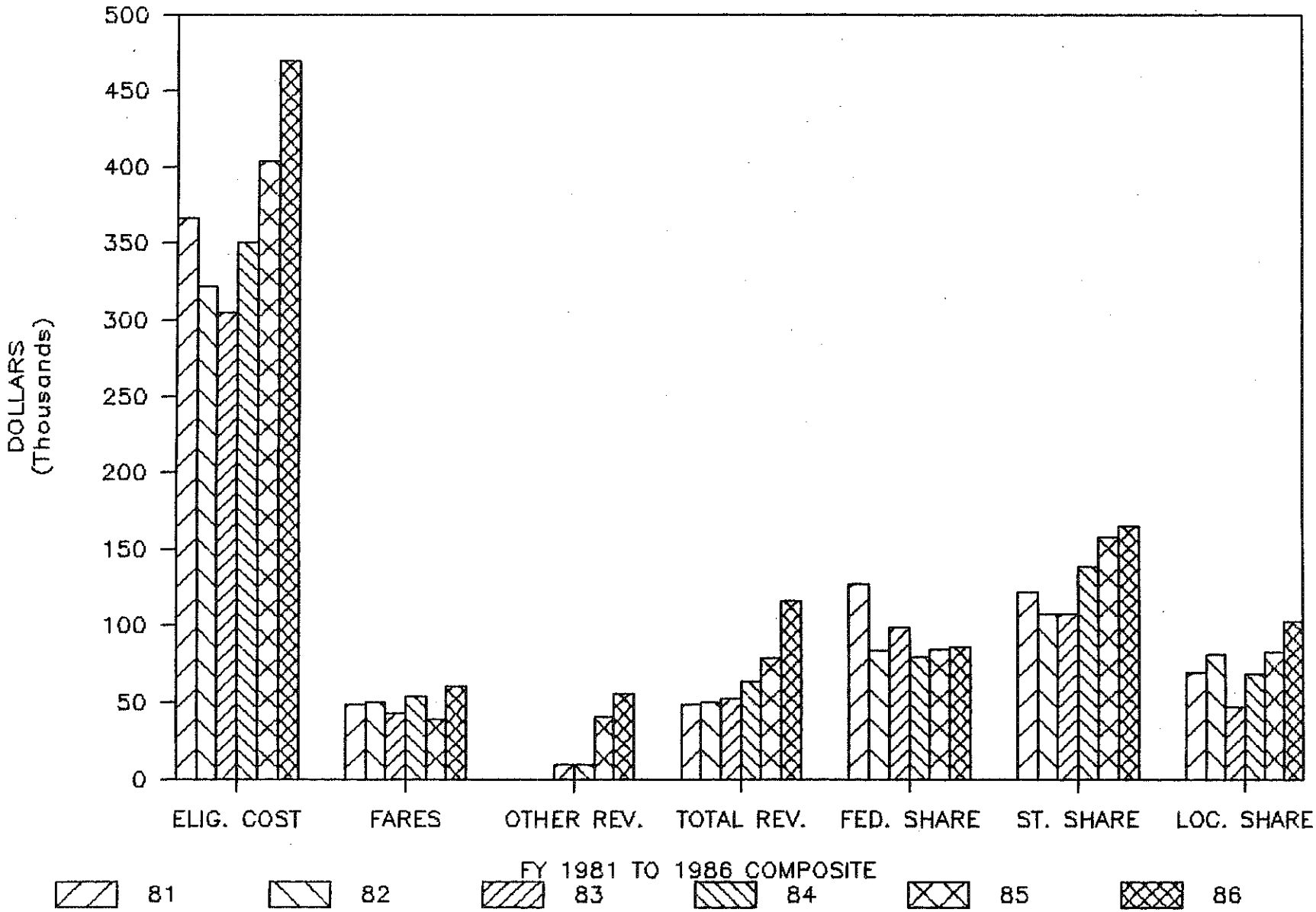


EXHIBIT 17

HARBOR TRANSIT FINANCIAL REVIEW



HARBOR TRANSIT

DEMAND VS. ROUTE COMPARISON

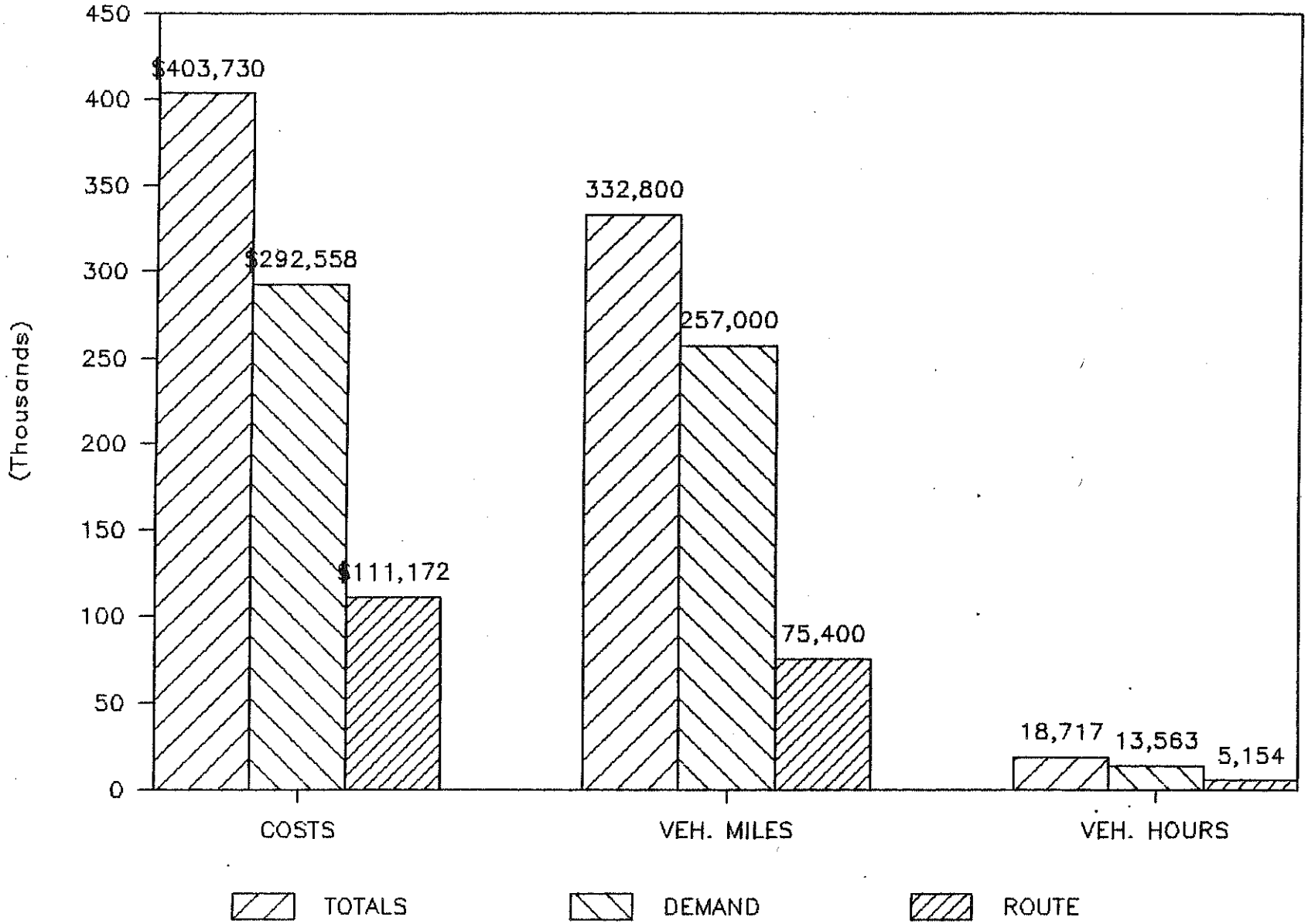


EXHIBIT 19

HARBOR TRANSIT RIDERSHIP

MAY 1985

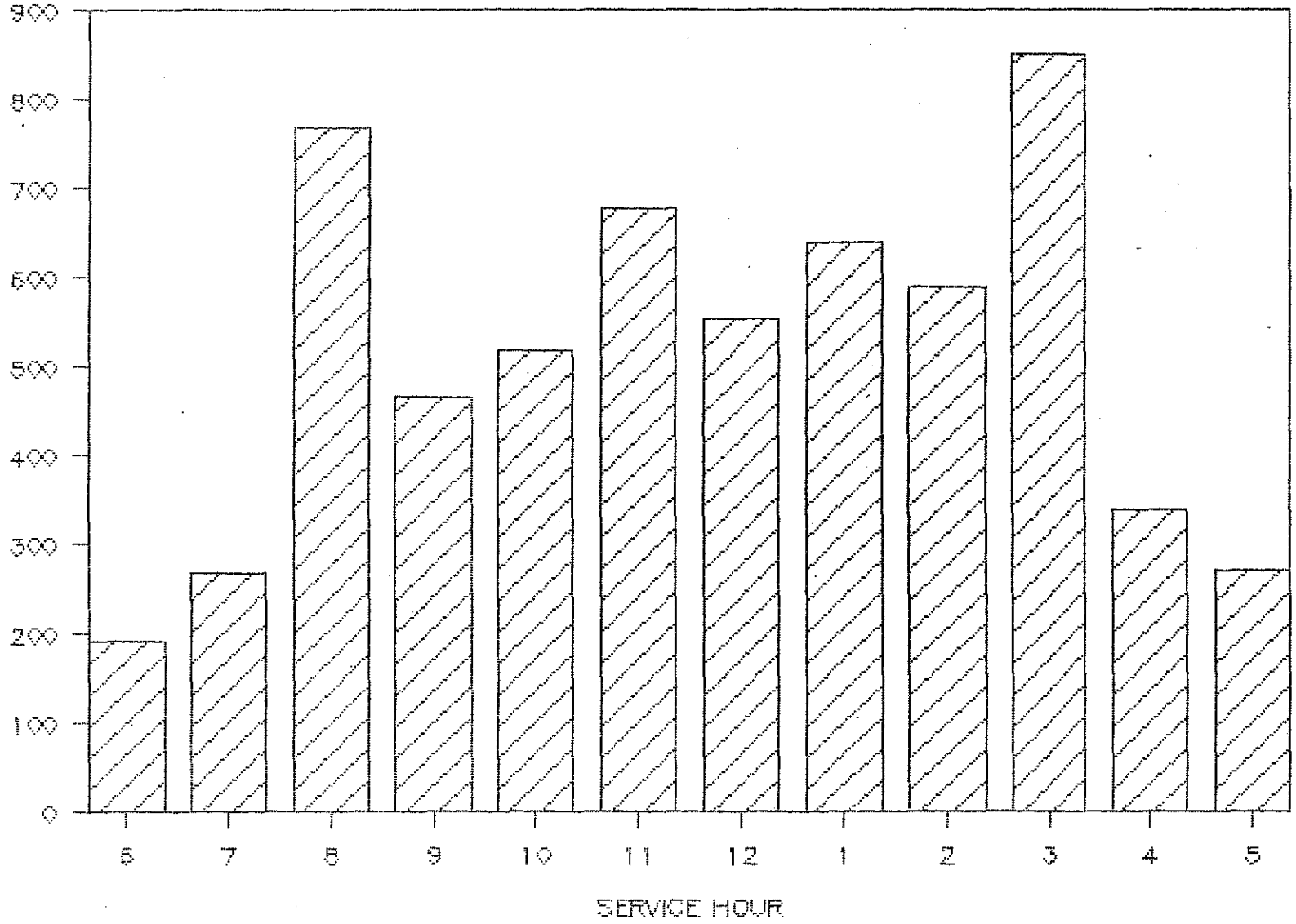


EXHIBIT 20

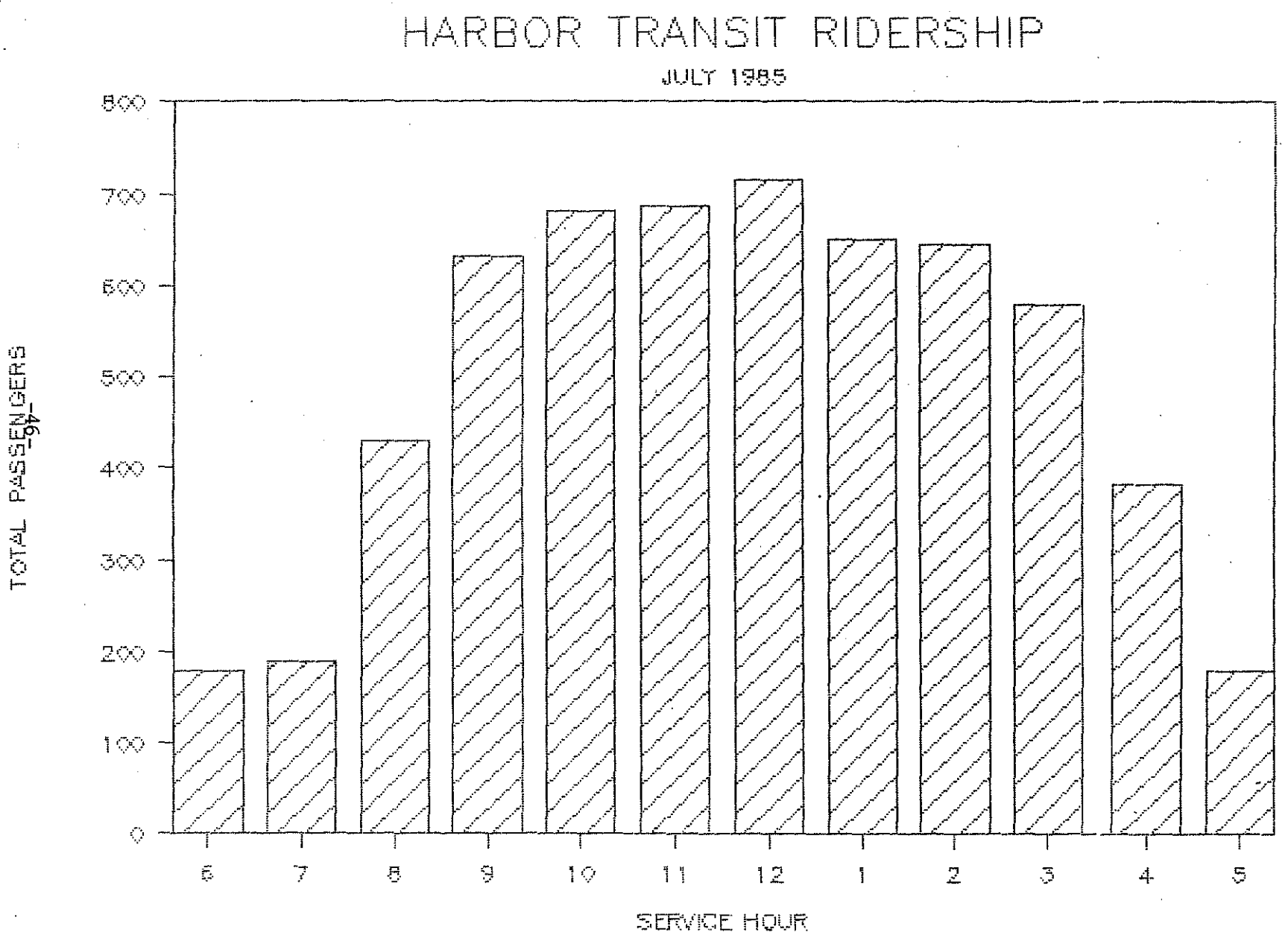

HARBOR TRANSIT RIDERSHIP
JULY 1985
TOTAL PASSENGERS
800
700
600
500
400
300
200
100
0
6
7
8
9
10
11
12
1
2
3
4
5
SERVICE HOUR

EXHIBIT 21

HARBOR TRANSIT RIDERSHIP

OCTOBER 1985

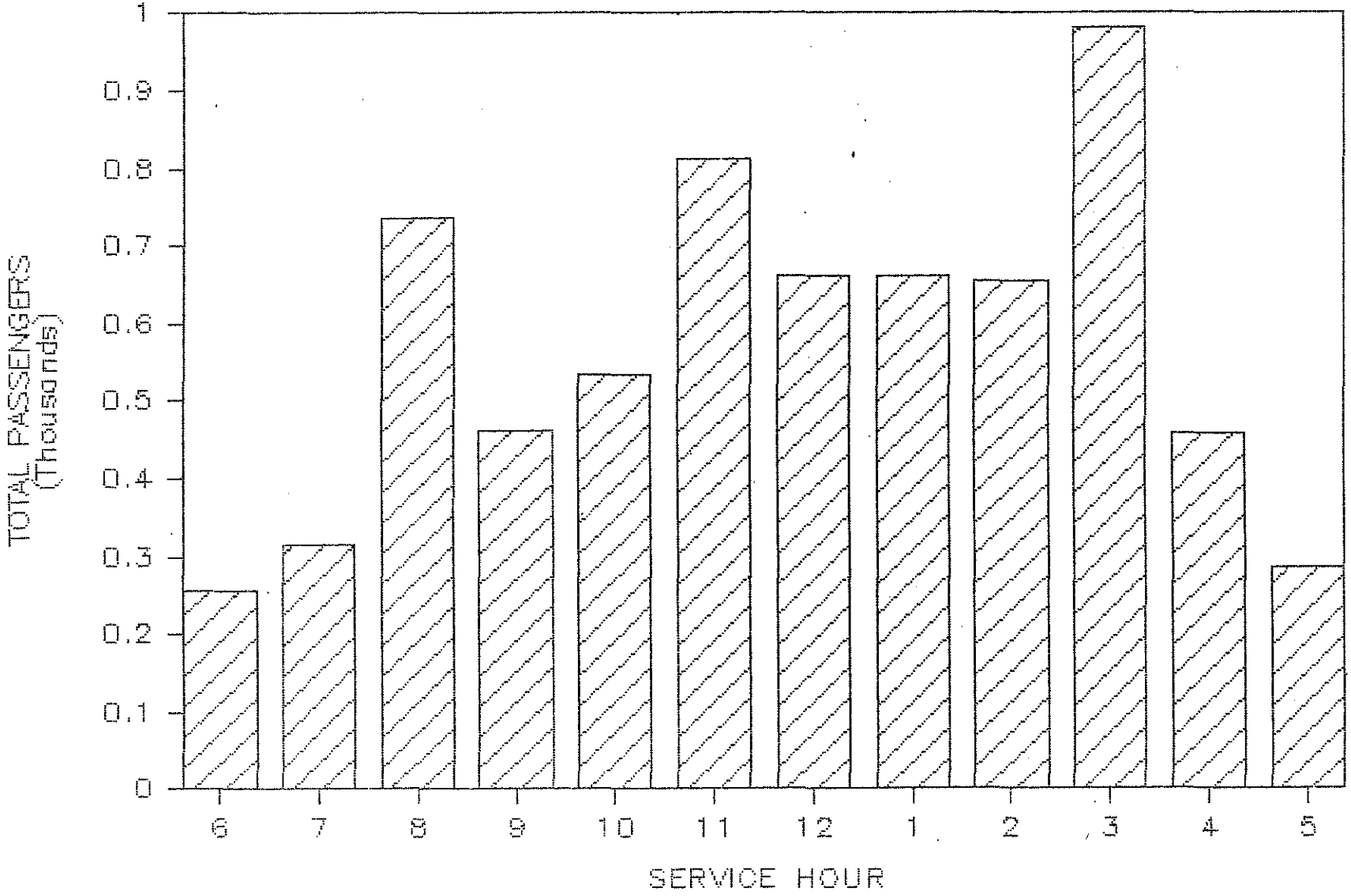
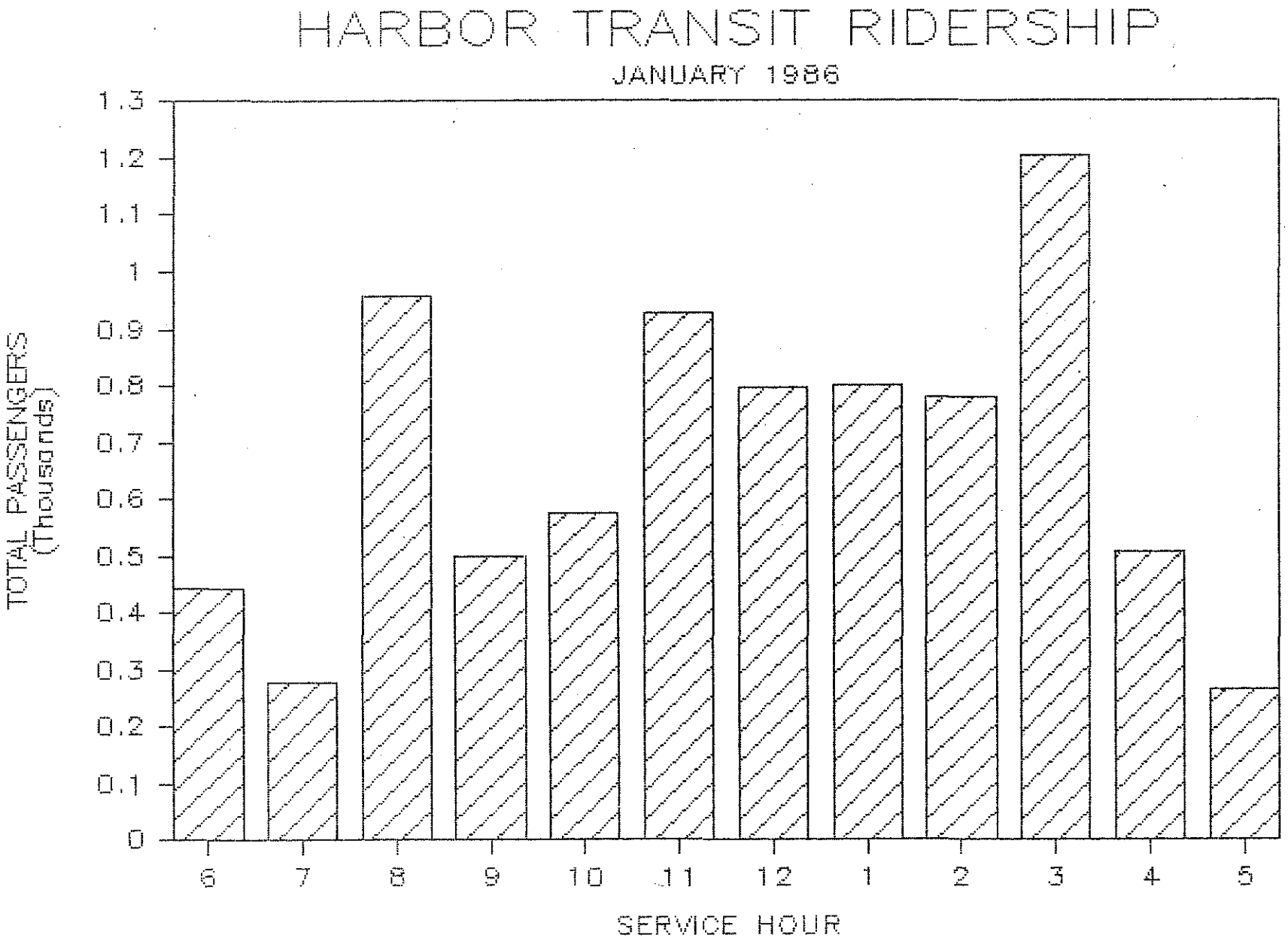


EXHIBIT 22


HARBOR TRANSIT RIDERSHIP
JANUARY 1986
TOTAL PASSENGERS (Thousands)
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
6
7
8
9
10
11
12
1
2
3
4
5
SERVICE HOUR

HARBOR TRANSIT RIDERSHIP

MAY 1985

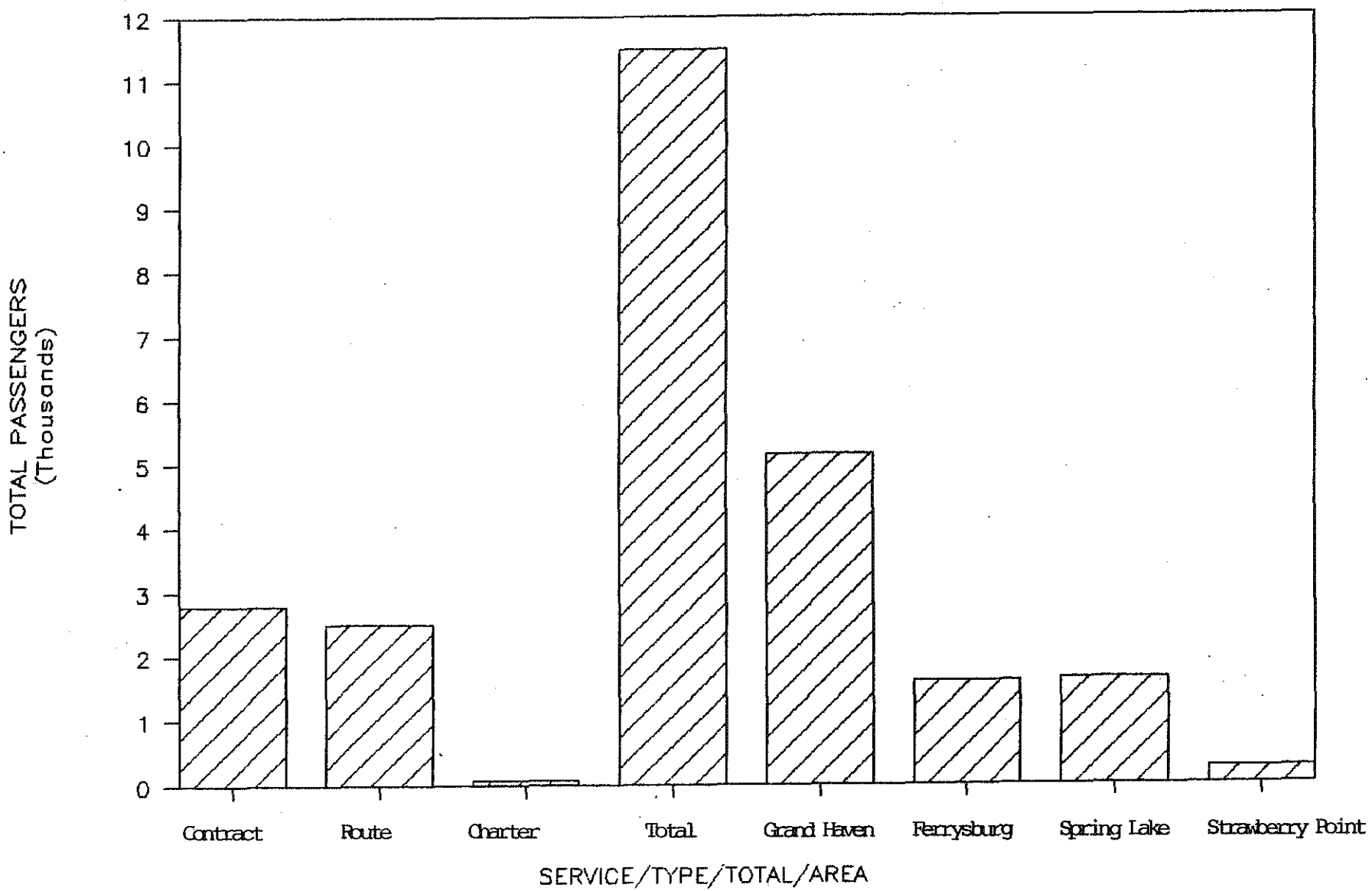


EXHIBIT 24

HARBOR TRANSIT RIDERSHIP

JULY 1985

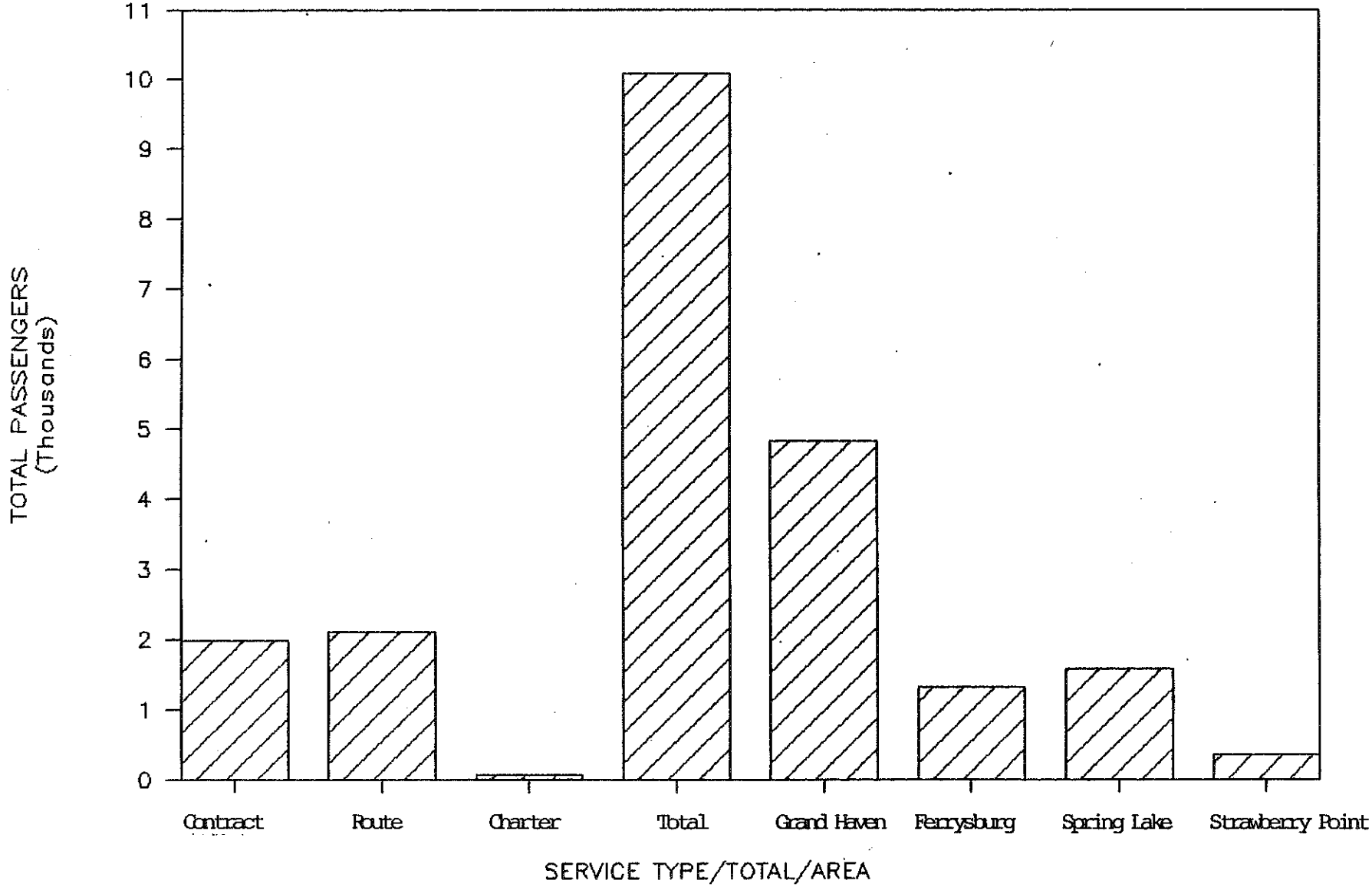


EXHIBIT 25

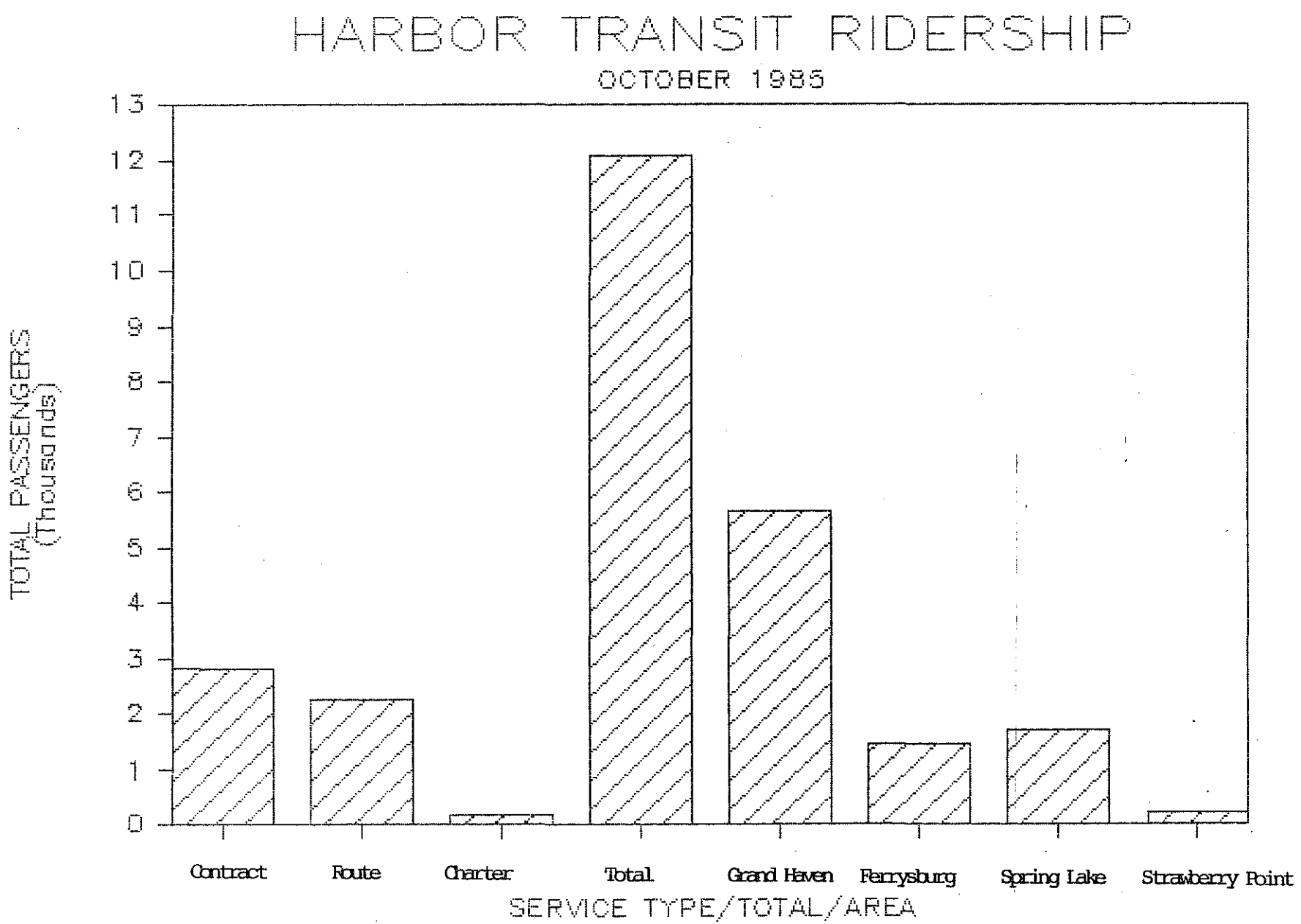
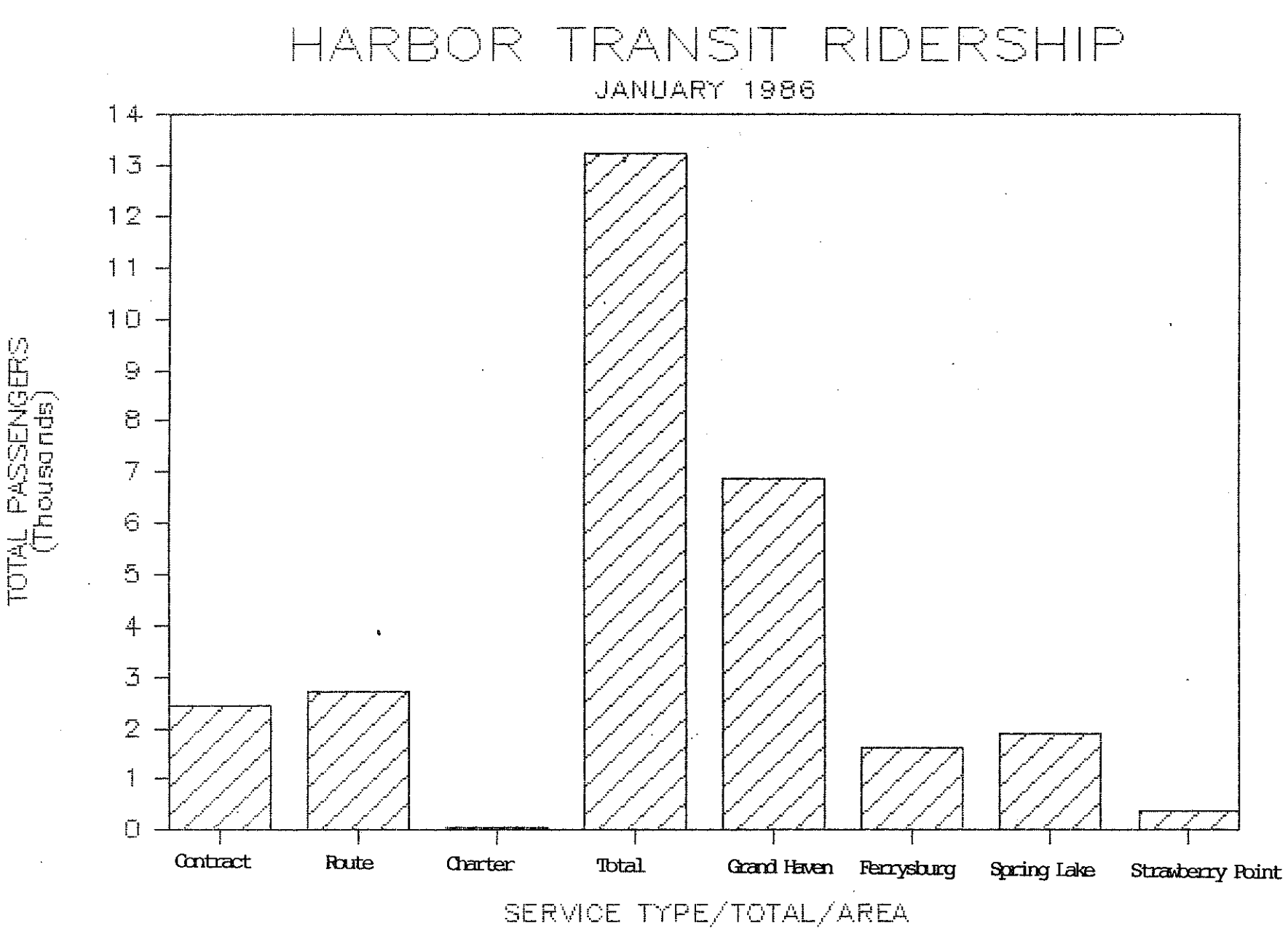

HARBOR TRANSIT RIDERSHIP
OCTOBER 1985
TOTAL PASSENGERS
(Thousands)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Contract
Route
Charter
Total
Grand Haven
Ferrysburg
Spring Lake
Strawberry Point
SERVICE TYPE/TOTAL/AREA

EXHIBIT 26


HARBOR TRANSIT RIDERSHIP
JANUARY 1986
TOTAL PASSENGERS
(Thousands)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Contract
Route
Charter
Total
Grand Haven
Ferrysburg
Spring Lake
Strawberry Point
SERVICE TYPE/TOTAL/AREA