EVALUATION OF COST SAVINGS OPPORTUNITIES IDENTIFIED IN MEMORANDUM OF UNDERSTANDING WITH THE LOS ANGELES COUNTY TRANSPORTATION COMMISSION

Prepared By:

The Southern California Rapid Transit District

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I. DISCUSSION OF SERVICE DEPLOYMENT STRATEGIES TO INCREASE PRODUCTIVITY

This report was prepared at the request of the Los Angeles County Transportation Commission in order to evaluate service redeployment strategies and various productivity measures that are appropriate for the Southern California Rapid Transit District. The report is organized in two parts. The first examines strategies presently employed at SCRTD. The second part discusses strategies that are either being tried now or might be tried in the future.

A. Current Efforts to Provide More Productive Service

1. Patronage Trends Since Proposition A

Figure 1 shows the growth in average daily boardings for the calendar months from July, 1982, the start of the Reduced Fare Program, through June, 1983. As can be seen in Figure 1, the weekday boardings have steadily increased each month except for some seasonal patronage loses which, nevertheless, represented ridership levels well over the previous year. Saturday and Sunday ridership levels, though more erratic month to month, have also experienced a substantial overall gain since July, 1982. Sunday patronage has experienced a larger relative increase than Saturdays. SCRTD's original predictions, drawn from past experiences with fare reductions, had stated that system patronage would probably level off around October or November, 1982. This pattern of continuing growth has been unexpected.

An indication of the relative growth among the components of SCRTD's ridership can be made by examining bus pass sales by category of pass. The graph in Figure 2 shows growth in sales by type of pass purchased. Although pass sales for all types are higher since the bus fares were reduced, the student and

FIGURE 1

PATRONAGE GROWTH SINCE THE REDUCED FARES

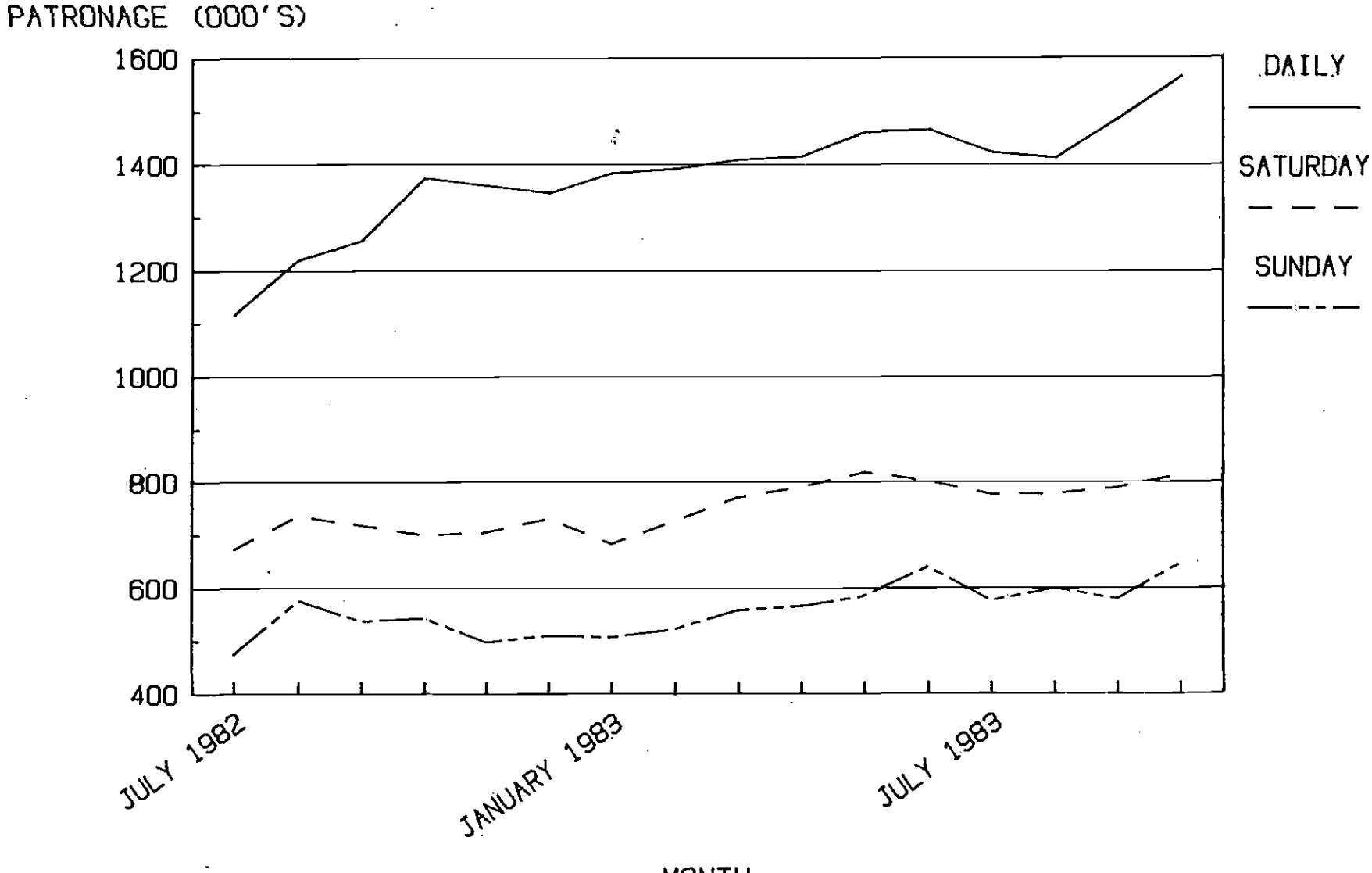
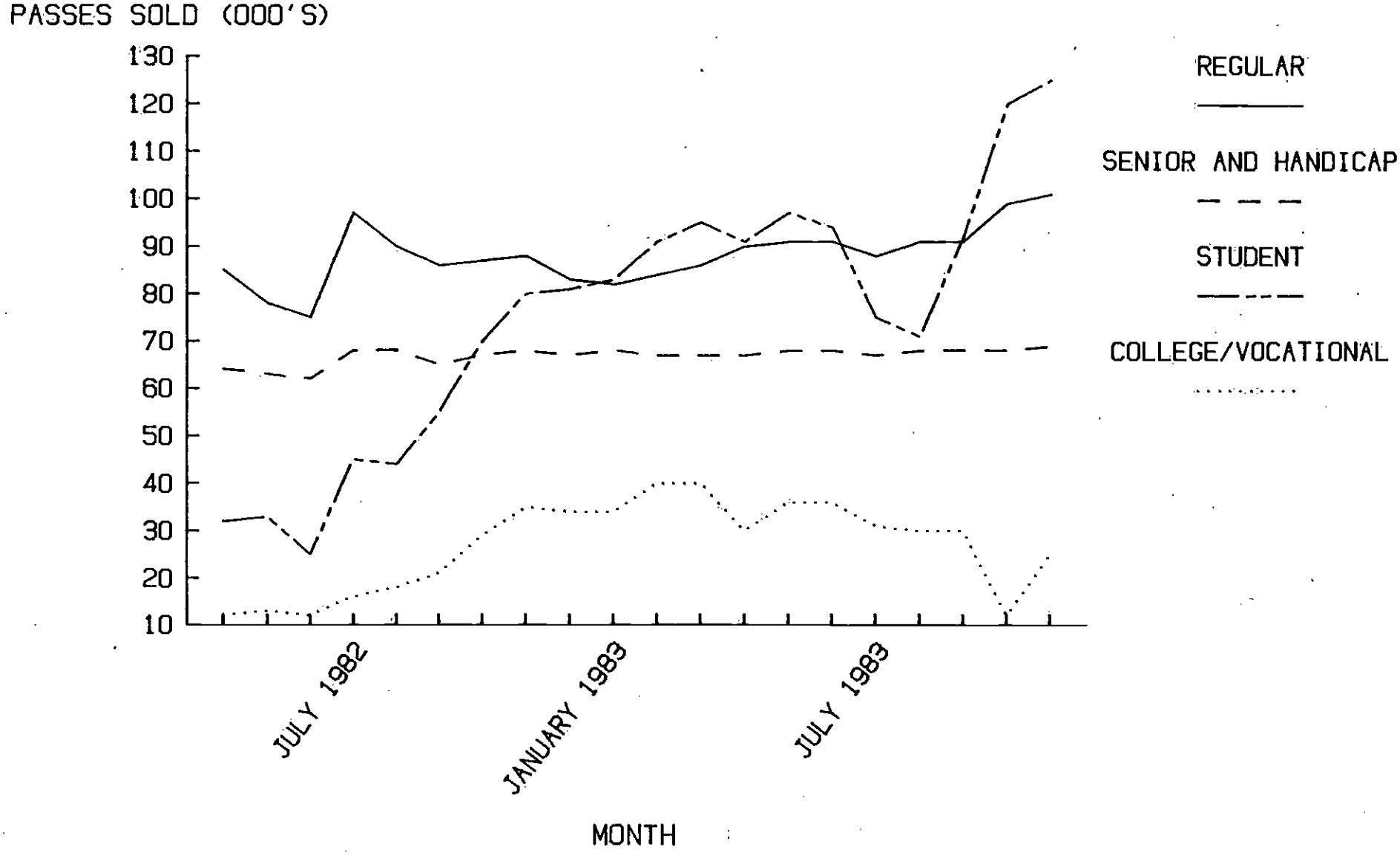


FIGURE 2

PASS SALES BY TYPE PER MONTH



college/vocational pass categories demonstrated the most dramatic rise, with student pass sales escalating to surpass both senior citizen and regular. The disproportionate growth in student pass sales is attributable to the 80% reduction in student pass price on July 1,1982 versus a 41% reduction in regular pass price. The Pasadena Unified School District has, in fact, cancelled its school bus contracts for the 1983-1984 school year, and is utilizing SCRTD instead. Even with staggered school hours and efficient scheduling, providing school bus service exerts a heavy impact on the District, because students travel in patterns requiring extra bus assignments and excessive non-revenue miles.

When pass use is viewed as a percent of average daily unlinked boardings, the effect of the reduced student fares can readily be seen. Table 1 compares pass use as a percent of average daily unlinked boardings for the months of February, 1982 and February, 1983. While actual sales of regular passes rose 2% from February, 1982 to February, 1983, the percentage of average daily boardings by regular pass fell 2.8%. Concurrently, the sale of student passes rose 162% and the percentage of average daily boardings by student pass gained 6.3%. Student pass sales surpassed the sale of regular passes for the first time in SCRTD history in January, 1983.

2. Accommodation Of Additional Patronage

a. Service Hours and Equipment

The patronage increase strained the capacity of many lines by October, 1982, and service had to be augmented. Table 2 reports the annualized system revenue vehicle hours in effect on ten representative months from April, 1982 to October, 1983. The drop in service hours that occurs between April and June, 1982 reflects the seasonal

TABLE 1: PASS BOARDINGS AS A PERCENTAGE OF AVERAGE DAILY BOARDINGS

PASS TYPE	FEBRUARY 1982	FEBRUARY 1983	CHANGE
Regular	25.6%	22.8%	-2.8%
Senior & Handicap	12.7%	12.1%	-0.6%
College/Vocational	3.6%	7.6%	+4.0%
Student	9.2%	15.5%	+6.3%
TOTAL	51.1%	58.0%	+6.9%

TABLE 2: CHANGE IN REVENUE VEHICLE HOURS[1]

		ANNUALIZED[2] REVENUE HOURS	PERCENTAGE CHANGE
1982	APRIL	6,650,353	-------
	JUNE	6,599,144	-.77%
	SEPT	6,673,098	+1.12%
	DEC	6,767,312	+1.41%
1983	JAN	6,860,569	+1.38%
	FEB	6,874,360	+.20%
	APR	6,928,705	+.79%
	JUNE	7,097,213	+2.43%
	AUG	7,085,909	-.16%
	OCT	7,086,883	+.01%

[1]-For months coinciding with significant changes in the bus system.

[2]-This includes only currently scheduled revenue hours.

service decrease caused by schools recessing. Revenue vehicle service hours then climbed in September, and continued growing through June, 1983. The District made an effort during this period to abide by the MOU when augmenting service. Previous reports have described the internal standards adopted by SCRTD to prevent unnecessary service additions. However, as FY 1983 entered its second half, the annualized revenue hours being operated by SCRTD surpassed, the 6,883,000 hour cap agreed upon in the FY 1983 MOU.

Another aspect of increasing service is the additional bus requirements. Figures 3, 4, and 5 exhibit the number of additional buses added for months from July, 1982 to October, 1983. Weekday equipment requirements increased in the AM and PM peak periods, while weekends required additional equipment during the mid-day and PM peak periods. As can be seen in Figure 3, weekday bus additions hovered around 30 buses in the peak periods for the first months of the reduced fare program and have since risen to almost 180 buses in October, 1983.

As shown in Table 2, the largest rise in service hours, 2.4%, occurred in June of 1983. This corresponds to the implementation of Phase VI of the Sector Improvement Program and augmented beach service for the summer season. At this time, neither of these service changes have been evaluated to determine their effects isolated from the effects of the ongoing trend of patronage growth. However, service hours have experienced a slight reduction since June, in spite of the addition of 56 buses to provide school related services, and the deployment of 32 buses to relieve overcrowding. This would indicate that some economies had been implemented.

FIGURE 3

PROPOSITION A BUS ADDITIONS
WEEKDAY

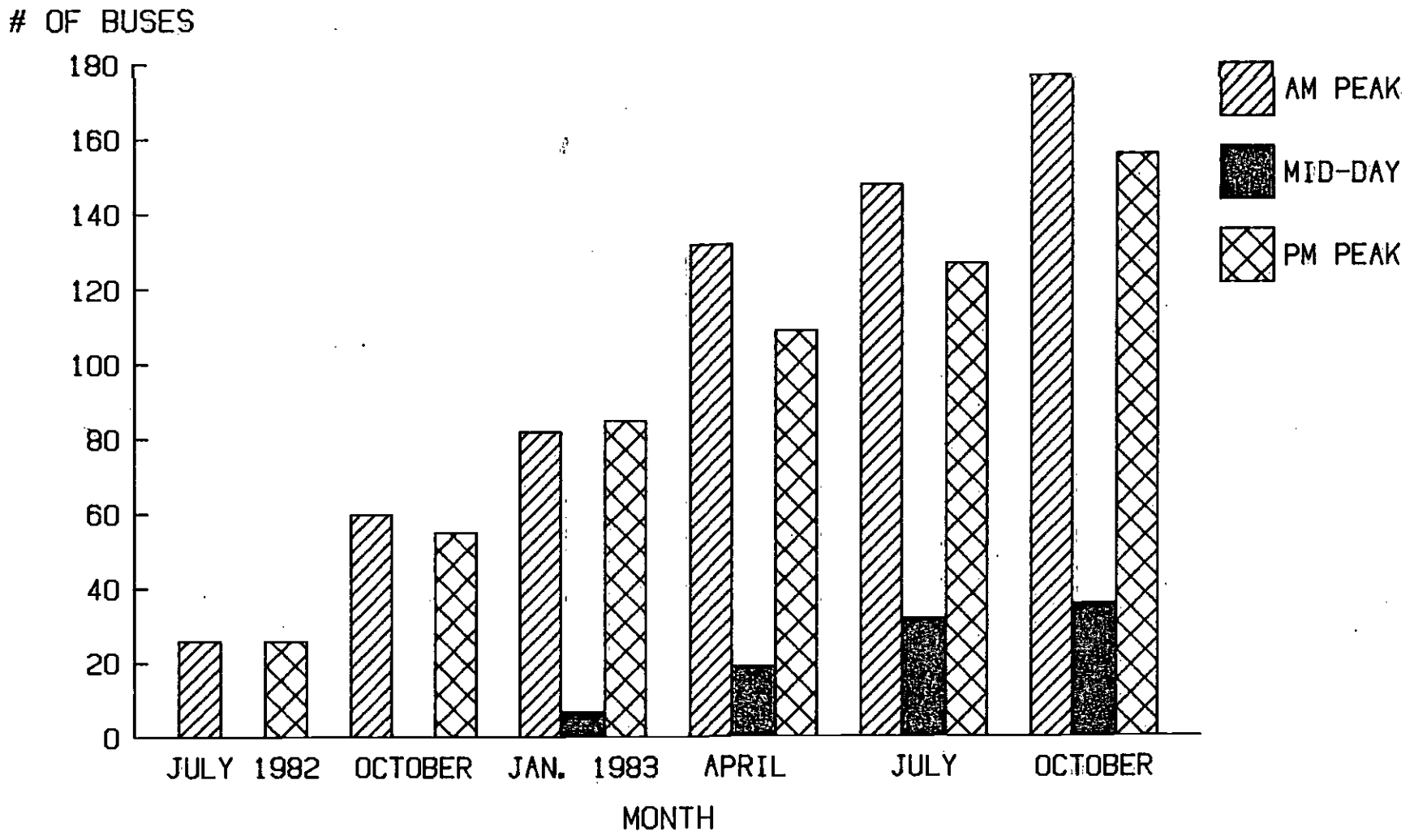


FIGURE 4

PROPOSITION A BUS ADDITIONS
SATURDAY

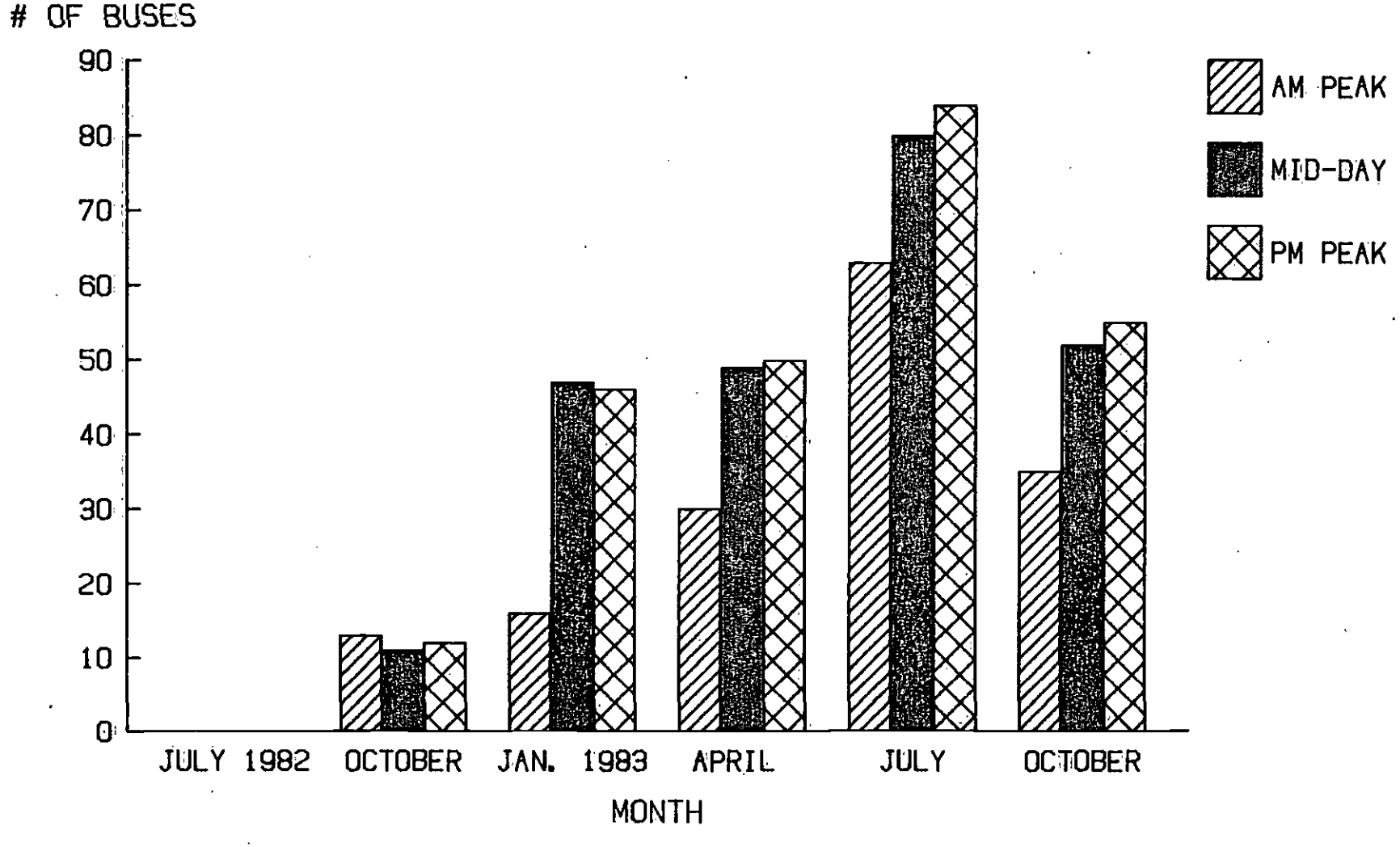
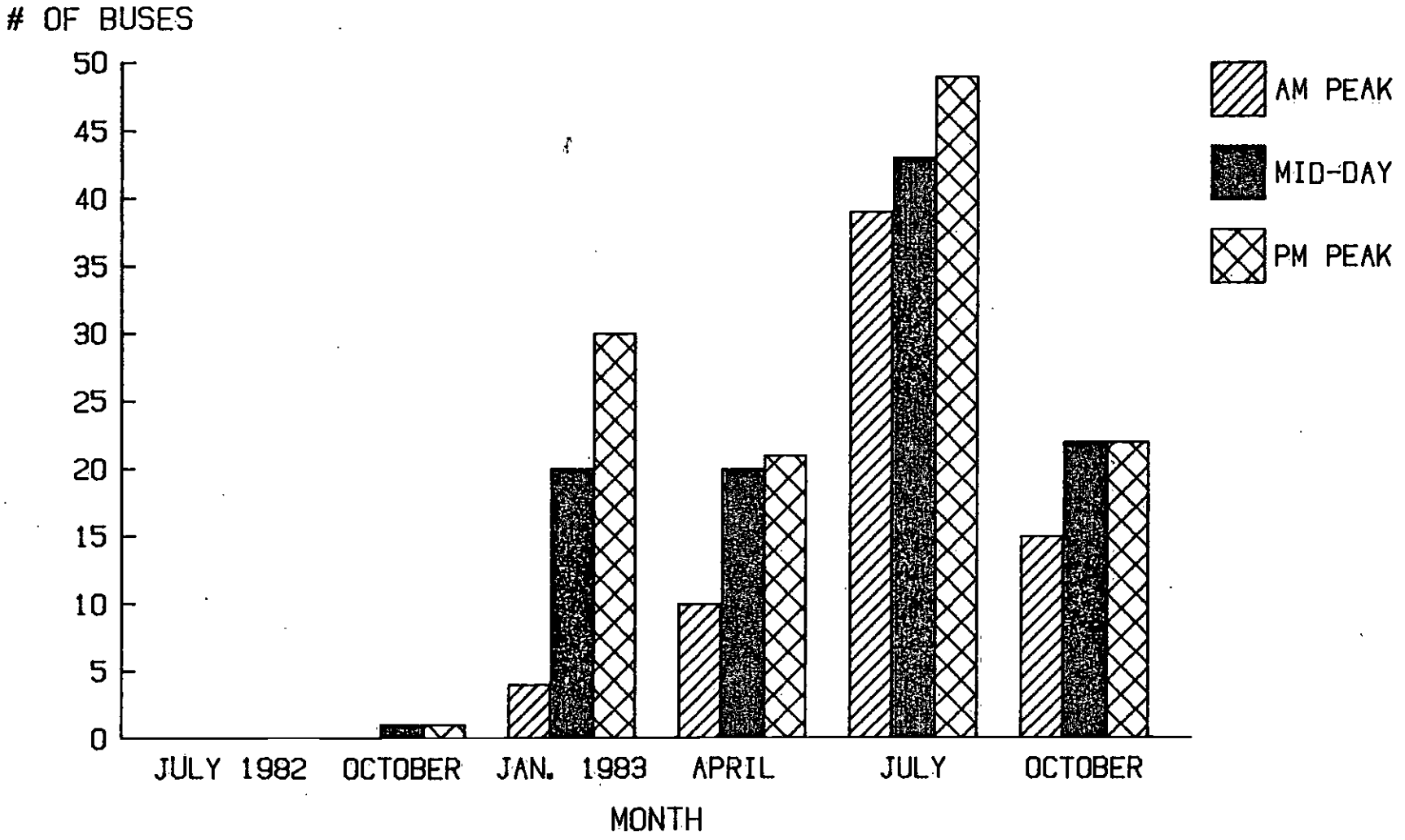


FIGURE 5

PROPOSITION A BUS ADDITIONS
SUNDAY



b. Shortlining

The District currently has shortline locatons assigned to 143 of 163 bus lines. Fifty-two percent of the lines having shortline locations utilize shortlining on at least 10% of their weekday trips. Table 3 gives the number of shortline or off-route locations that exist on each line in the system. Further documentation of these shortline locations is found in a supplement to this report which contains maps of all SCRTD lines with these locations identified.

Shortlining has been employed when adding service in reaction to the last year and one-half of ridership growth. Also, shortlining was utilized frequently in scheduling the phases of the 1980 Sector Improvement Program. However, there are several factors that constrain the applicaton of shortlines:

Load Factors: Passenger loads must drop off sufficiently to allow fewer buses to operate to the far terminal. Usually a 50% drop is desireable to avoide uneven scheduling at the far terminal. Uneven scheduling is less important when the headways are frequent.

Distance from Far Terminal: The short turn location must be at least one-half of the lines headway distant, in travel time, from the far terminal before any meaningful savings will result.

Availability of Facilities: The structural section and geometric configurations for streets, used as a turnaround at a shortline location, must be adequate for regular bus travel. Also restrooms and curb for layover are necessary if the bus is not deadheading.

Community Concurrence: The community must concur with the use of the streets and layover zones.

In addition to the above constraints, shortlining bus lines with infrequent headways could degrade service sufficiently to require a public hearing and SCRTD Board concurrence. Successful shortlining reduces service hours and operator requirements, but the most substantial savings occur on longer bus lines where loads peak on one segment of the line and base headways are frequent.

TABLE 3
NUMBER OF SHORTLINE OR OFF-ROUTE LOCATIONS BY LINE

LINE	LOCATIONS	LINE	LOCATIONS	LINE	LOCATIONS	LINE	LOCATIONS
1	6	104	2	206	5	438	1
2-3	9	105	7	207	6	439	2
4	6	107	5	209	1	443	1
10-11	9	108	7	210	8	444	2
14-37	8	110	5	212	5	445	1
16	6	111-112	9	215	4	446	5
18	8	115	11	217	5	456	1
20	12	120	2	220	2	457	2
26	3	124	4	225-226	4	460	4
27-28	6	125	3	228	4	464	1
30-31	11	126	1	230-239	4	466	2
33	9	128	1	232	2	470-471	5
38	5	130	1	234	1	480-481	3
40	1	146	1	236	3	482	2
42	1	147	1	243	4	483-485	2
45	9	149	1	245	3	484	5
48	1	150	7	250-253	2	486	1
51	7	152	4	251-252	6	487-489-491	4
53	7	154	2	254	2	488	2
55	5	158	4	255	1	490	5
56	2	163	5	256	3	492	1
60-61	7	164-165	4	258-259	1	493-494	1
65	1	166-168	5	260	6	495	2
66-67	8	169	12	262	3	496	3
68	7	175	3	264	1	497	2
70-71	5	176	1	265-275	1	498	1
76	1	177	4	266	4	560	5
78-79	4	178	1	267	1	576	5
81	5	180-181	4	268	1		
83	4	183	3	270	1		
84-85	7	185	3	274-276	2		
90-91	8	187	2	291-293	2		
92-93	5	188	1	420-421-422	7		
94	5	192-194	2	424-425	6		
96	4	200	1	426	1		
97	5	201	2	427	1		
102	2	204	10	429	3		
103	0	205	1	434	2		

c. Service Reallocation and Schedule Refinements

In addition to shortlining techniques, several other efficiency measures are regularly used in deploying SCRTD service. These measures include:

- o interlining,
- o reallocation of service to match demand,
- o deadheading peak direction services, and
- o limited stop services.

Over the last few years, SCRTD's effort to schedule service more efficiently, using these kinds of measures, has been successful at reducing equipment requirements and service hours. Table 4 shows the bus requirements, interlining, service hours, and patronage for September of 1981, 1982, and 1983. Total weekday service hours have increased by 600 from September, 1981 to September, 1983. However, revenue hours for 1983 represent a greater proportion of the total hours operated than in 1981. Compared to 1981, equipment requirements in the base and PM periods have actually been reduced; this is true despite a 24% increase in weekday ridership.

Attachment A documents the service reallocation and schedule refinements that have been accomplished since July, 1983. The majority of the changes were rescheduling of service from low productivity lines to the more overcrowded lines. Many of the lines rescheduled were in response to the United Transportation Unions memorandum regarding overcrowding, shortage of running time and recovery time.

A total of 26 lines were rescheduled with over $2 million worth of service changed. The bottom line was an increase of $214,000 in service added.

TABLE 4

COMPARISON OF EQUIPMENT, SERVICE HOURS AND PATRONAGE

	EQUIPMENT			INTERLINING		VEHICLE HOURS		PATRONAGE
September, 1981	AM	BASE	PM	AM	PM	TOTAL	REVENUE	(000's)
Weekday	2044	1201	2106	111	124	23,400	21,366	1195
Saturday	901	932	945	0	2	14,592	13,888	679
Sunday	682	726	744	1	5	11,236	10,679	460
September, 1982								
Weekday	1918	1150	1928	80	66	22,549	20,850	1244
Saturday	880	909	915	2	1	14,181	13,562	721
Sunday	686	721	730	2	4	11,040	10,562	559
September, 1983								
Weekday	2090	1195	2098	86	86	24,032	22,325	1479
Saturday	910	961	968	0	0	14,866	14,258	778
Sunday	705	767	775	2	2	11,688	11,250	582

d. Productivity

Table 5 exhibits the statistics for passengers per hour, passengers per mile and non-revenue hours as a percentage of total operating hours for months from April, 1982 to September, 1983. The first two of these productivity measures experienced considerable improvement during this time period. The third percentage of non-revenue hours operated, has made some overall improvement but tended to fluctuate more.

Some of the added efficiency demonstrated in Table 5 occurred due to the growth in patronage. The rise in patronage, caused by lower fares, has favorably affected productivity by increasing bus utilization in the off-peak periods when excess capacity is generally available. Productive scheduling measures, which contained peak vehicle requirements in spite of the significant patronage increase, have contributed to these improvements also.

However, the unanticipated substantial increases in operating hours and vehicles operated had a negative impact on SCRTD's cost of operation. In order to meet vehicle requirements quickly, the District had to rely heavily on its reserve fleet for regular service. This in turn increased maintenance costs and had a negative effect on service reliability. In order to operate the additional service hours, operators had to be paid at overtime rates while new operators were hired and trained. Training costs for new operators also increased during this last year.

In spite of the above mentioned temporary increases in operating costs, SCRTD's cost per passenger has fallen since FY 1982. The cost per passenger was $1.03 in FY 1982. Since then, the statistic has steadily fallen to

TABLE 5: OPERATING PRODUCTIVITY MEASURES[1]

	PSGRS. PER REVENUE HRS.	PSGRS. PER REVENUE MILES	NON-REVENUE HRS. PER TOTAL HRS.
1982			
APRIL	53.0	4.0	7.39%
[2]JUNE	52.1	3.9	6.75%
FARE REDUCTION			
SEPT	59.9	4.5	6.92%
DEC	63.4	4.7	6.91%
1983			
JAN	65.1	4.8	6.60%
FEB	66.0	4.9	6.67%
APR	66.1	4.9	6.45%
[2]JULY	63.9	4.8	6.88%
[2]AUG	63.6	4.8	6.81%
SEPT	66.6	5.0	7.10%

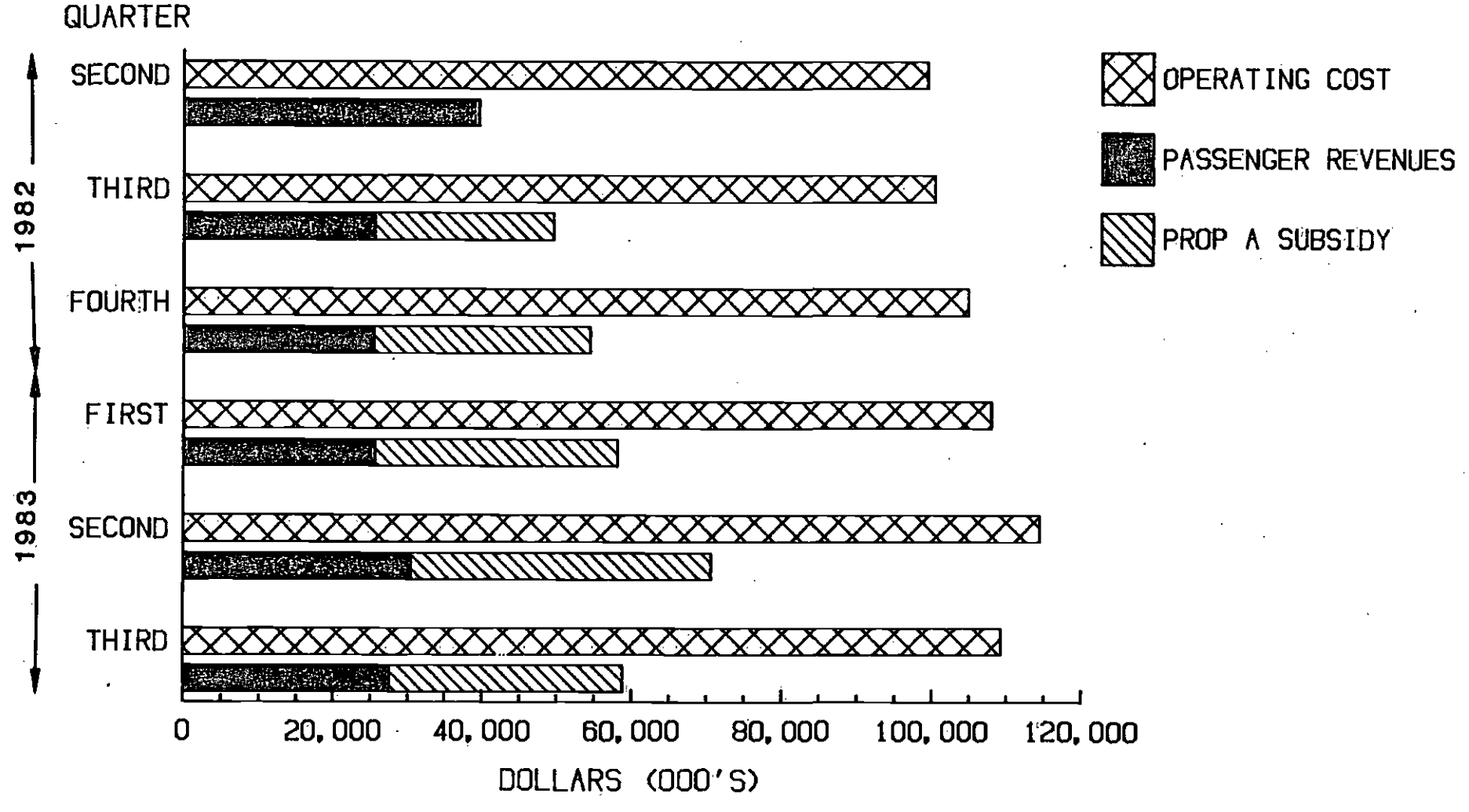
[1]-For month coinciding with significant changes in the bus system.

[2]-School Recess

its present level, which is less than 92 cents. A comparison of operating costs, fare revenues and Prop. A subsidies by quarter are shown in Figure 6. Comparing the third quarter of 1982 to third quarter of 1983 operating costs have risen about 10% and fare revenues have increased about 8%. During this same time period patronage rose over 20%.

FIGURE 6

COMPARISON OF PASSENGER REVENUE AND OPERATING COSTS



B. FUTURE EFFORTS TO ESTABLISH SERVICE ECONOMIES

1. Near Term

Several projects are currently underway at RTD that are expected to provide economies either through some service redeployment or service regulation technique. Most of these techniques are further applications of the service reallocation measures discussed above. A brief description of each project follows:

a. Service Refinements

A program of service refinements and line rescheduling has been prepared, which would affect 65 lines. The lines included in this program and the planned changes are displayed in Attachment B. The program is divided into three parts:

- Changes that are insignificant in their effect on patrons (although the saving may be substantial). These could take place at the earliest opportunity. (Noted as A in Attachment B.)

- Changes that will require a public hearing. (Noted as B in Attachment B.)

- Changes requiring further study. (Noted as C in Attachment B.)

Normally, service refinements could be described as making small changes in schedules such that the perceived loss of service would be insignificant. A somewhat broader definition prevails here. In this case, the system is being fine-tuned to reflect more efficient use of resources. This entails some perceivable loss of service

at the line level in some cases, which would necessitate a public hearing. Nevertheless, by considering each case on its merits, the overall negative rider impacts should be minor.

The table in Attachment B includes supplemental data which indicates both service and patronage for the period of the day and on the segment of the route for which the change is being considered. The last column indicates the probable average maximum passenger loads, assuming the passenger volumes remain as they were in the cited ride check.

This program is evolving still and it is likely that some lines will be added and dropped. In its present form, if all the changes were effected, over 168 thousand service hours could be saved annually.

b. Corridor Studies

RTD has hired a consultant, Multisystems, to study and recommend new bus schedules for several transit corridors in Los Angeles. The new schedules are expected to, at least, save equipment over the current schedules. This would be acomplished, primarily, with the use of more shortlining and limited services. Corridors being examined include Vermont Avenue, West Third Street, Santa Monica Boulevard, Ventura Boulevard and the corridor from Downtown Los Angeles to Inglewood.

The resultant schedule designs will be implemented and then evaluated to determine if they are satisfactory. This study should provide a guide to the amount of further economies that can reasonably be expected in the system, as it currently operates. If a savings results, RTD will be able to acquire the computer software used to generate the schedules.

c. Line Regulation

RTD has recently begun an experimental program of line regulation. Line regulation entails a person, stationed upstream from the peak stop of a line, who can hold buses (for periods of a few minutes) in order to even out the bus loads. This technique can be used during the AM and PM peak periods to maintain even loads on the more heavily travelled lines. If a more even loading can be maintained, capacity can be added to a line during the heaviest travel period. In effect, some buses may be saved.

A recent test of the line regulation effort has demonstrated positive results. Two lines were checked at the peak stop on days when the line was being regulated and on days when it wasn't. Using line regulation the Vermont Avenue line saved two peak buses and the West Third Street line saved one. The marginal peak hour buses are the costliest buses for RTD to provide. Since these buses cost more, the savings of one bus for the cost of one person to regulate the line could be worthwhile. The main question to be answered now is just how worthwhile the program of line regulation can be.

As a point of interest, the personnel being used for line regulation are disabled RTD bus operators. This program provides them with work when they would otherwise be on disability. In addition, these same personnel are used to collect data on RTD's weekend service. Weekend data collection has been a major weakeness for RTD and this is expected to help.

ATTACHMENTS

A. FINE TUNING OF SCHEDULES
JULY THROUGH NOVEMBER, 1983

B. PLANNED SERVICE REALLOCATION AND
SCHEDULE REFINEMENTS

C. QUESTIONAIRE USED IN THE
ON BOARD SURVEY

A. FINE TUNING OF SCHEDULES JULY THROUGH NOVEMBER , 1983

A

LINE	EFFECTIVE DATE	DESCRIPTION of Schedule Changes	NUMBER OF BUS Pull-out Changes per day	VEHICLE HOURS Changes per day	VEHICLE MILES Changes per day	COST/ SAVINGS per day	ANNUAL COST/ SAVINGS
483	July 24	DA - Retied PM service.	-1	- 2.0	- 32	-$ 204.00	-$ 48,977.
60	Aug. 21	SA - Headways changed from 7½/15/30 to 8/16/32 minutes providing 16 minutes through service to Long Beach.	0	+12.8	+219	+$ 420.00	+$ 19,740.
154	Aug. 21	DA - Headways on low productivity line changed from 30 to 35 minutes.	-1	-10.2	-173	-$ 473.00	-$104,084.
250	Aug. 21	DA - Headways changed from 22 to 25 minutes because of low productivity. Minor change in route.	-1	-12.1	- 68	-$ 535.00	-$117,79[illegible].
256	Aug. 21	DA - Headways changed from 30 to 35 minutes because of low productivity.	-1	-15.3	-209	-$ 641.00	-$140,8[illegible]7.
111-112	Sept. 18	DA - Base headways changed from 15/30/60 minutes to 16/32/64 minutes. Minor peak hour adjustments. Retied to save buses.	-1	-13.33	- 78	-$ 581.00	-$116.860
		SA - Shortline terminal changed from Kelso & Market to Florence & Crenshaw. Schedule adjusted and retied.	-1	-23.8	-215	-$ 919.00	-$ 39,531.
		SU - Same as Saturday.	-1	-15.4	-114	-$ 644.00	-$ 29,611.
1	Oct. 16	SU - Headways changed from every 6-12/36 mins. to every 11/33.	-4	- 9.5	- 81	-$ 866.00	-$ 36,372.
10-11	Oct. 16	SU - Headways changed from 10-20 to 17 minutes.	0	+ 6.3	- 33	+$ 207.00	+$ 8,682.
55	Oct. 16	DA - Peak hour service rescheduled because of overloads. Base headways changed from 20/60 to 16/64. Line scheduled to new Terminal 32 at Vignes & Macy.	+4	+43.0	+523	+$ 1994.00	+$360,943.

FINE-TUNING OF SCHEDULES JULY THROUGH NOVEMBER, 1983

LINE	EFFECTIVE DATE	DESCRIPTION of Schedule Changes	NUMBER OF BUS Pull-out Changes per day	VEHICLE HOURS Changes per day	VEHICLE MILES Changes per day	COST/ SAVINGS per day	ANNUAL COST/ SAVINGS
56	Oct. 16	DA - Peak hour service adjusted, base headways changed from 20 to 25 minutes, schedule retied.	+2	- 6.7	-112	+$ 58.00	+$ 10,498.
		SA - Headways changed from 20 to 25 minutes.	-1	- 7.9	-111	-$ 398.00	-$ 14,315.
		SU - Headways changed from 20/60 to 25/50.	-1	-15.7	-151	-$ 654.00	-$ 27,450.
94	Oct. 16	DA - New running time, headways and retied.	+2	+18.3	+195	+$ 877.00	+$158.795.
		SA - Headways changed from 20/40 to 15/45.	+3	+24.6	+320	+$ 1222.00	+$ 44,005.
124	Oct. 16	DA - Running time and headways adjusted. Schedule retied.	+1	- 5.6	- 31	-$ 45.00	-$ 8,145.
146	Oct. 16	DA - Headways changed from every 35 minutes to every 40 minutes.	0	+ 1.0	- 63	+$ 33.00	+$ 5,940
		SA - Headways changed from 40 to 50 minutes.	-1	-11.7	-100	-$ 522.00	-$ 18,804.
		SU - Same as Saturday.	-1	-11.7	-120	-$ 522.00	-$ 21,924
163	Oct. 16	DA - Headways and running time adjusted.	0	- 1	- 45	-$ 33.00	-$ 5,940.
560	Oct. 16	DA - Peak headways and running time adjusted. Schedule retied.	+3	+ 9.7	+161	+$ 318.00	+$ 82,664.
103	Oct. 30	DA - Headways changed from every 30 to 35/40 minutes. New running time.	0	-12.8	- 90	-$ 420.00	-$ 71.815.
152	Oct. 30	DA - Running time and peak headways adjusted.	+1	- 1	+ 58	+$ 105.00	+$ 18,065.
243	Oct. 30	DA - Headways changed from every 35-40 minutes to every 45 minutes. New running time.	-1	+ .6	- 75	-$ 119.00	-$ 20.308.

FINE-TUNING OF SCHEDULES JULY THROUGH NOVEMBER, 1983

LINE	EFFECTIVE DATE	DESCRIPTION of Schedule Changes	NUMBER OF BUS Pull-out Changes per day	VEHICLE HOURS Changes per day	VEHICLE MILES Changes per day	COST/ SAVINGS per day	ANNUAL COST/ SAVINGS
245	Oct. 30	DA - Shortlined. Headways changed from 30 minutes to 30/60 minutes.	-1	-12.6	-233	-$ 552.00	-$ 94,392.
320	Oct. 30	DA - New running time. Added peak hour and night service. Base headways changed from 15 to 12 mins.	0	+54.2	+734.1	+$ 1778.00	+$304,090.
		SA - Add night service.		+11.2	-313	+$ 367.00	+$ 12,494
		SU - Add night service.		+11.6	+290	+$ 381.00	+$ 15,224.
427	Oct. 30	DA - Reduced peak hour service due to low patronage.	-2	- 3.3	- 95	-$ 385.00	-$ 65,864.
443	Oct. 30	DA - Headways coordinated with Line 444.	0	+ .1	- 19	-	-
444	Oct. 30	DA - Headways coordinated with Line 443; running time and peak headways adjusted. Schedule retied.	-1	-14.2	-291	-$ 466.00	-$ 79,669.
446	Oct. 30	DA - New running time, peak headways adjusted, schedule retied.	+3	+21.7	+105	+$ 1127.00	+$192,773.
14	Nov. 13	SU - Headways changed from 10/20 minutes to 14/28 mins.	-1	- 8.0	-150	-$ 401.00	-$ 15,235.
51	Nov. 13	DA - New running time, peak headways adjusted and retied.	0	+11.0	+ 1	+$ 361.00	+$ 58,107.
				DA +50.4 SA + 5.2 SU -32.9	DA SA SU	+$ 1,836 +$ 170 -$ 2,499	
						TOTAL	+$214,028.

B. PLANNED SERVICE REALLOCATION AND SCHEDULE REFINEMENTS

B

Revised 12/5/83

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
1	7	4	DX	Reschedule morning and afternoon peak hour service and retie.			7	E-AM	669	9/12/83	12	56.0	11	61.0
								E-PM	154	9/12/83	5	31.0	4	39.0
								W-AM	149	9/12/83	6	25.0	5	30.0
								W-PM	658	9/12/83	14	47.0	13	50.6
2	7	4	DX	Reschedule peak hour service and retie.	3			E	977	2/2/83	19	51.4	18	54.3
								W	1,093	2/2/83	22	49.7	21	52.0
4	6&7	4	DX	Adjust peak hour service and retie schedule. (Checks pending)			10	E	1,424	9/20/83	28	50.9	24	59.3
								W	1,737	9/20/83	28	62.3	26	66.8
								E	2,016	9/20/83	31	65.0	31	65.0
								W	1,617	9/20/83	26	62.2	23	70.3
10-11	7	4	DX	Consider eliminating Route 11 service after 7:00 pm.*		4		E	322	9/28/83	21	15.3	11	29.3
								W	298	9/28/83	14	21.3	7	42.6
			SA	Same as daily.*		4		CHECK PENDING						
16	1	1	DX	Reschedule peak hour service.		3		E	2,174	10/20/83	39	55.7	37	58.8
			DX	Change mid-day headways from 7½ to 8 minutes.		4		E	1,542	10/28/83	40	38.5	38	40.6
								W	1,459	10/28/83	41	35.6	40	36.5
			DX	Eliminate Owl service.*		4		E	7	10/28/83	2	3.5	-	-
			SA	Eliminate Owl service.*		4		W	21	10/28/83	2	10.5	-	-
			SU	Eliminate Owl service.*		4								
			DX	Eliminate night service between		2		E	10	10/28/83	12	0.8	-	-
			SA	6th and Central & 4th & Main.*		2		W	18	10/28/83	11	1.6	-	-
			SU			2								
18	1	1	DX	Reschedule AM peak service and eliminate non-productive trips east of downtown. Reschedule AM peak service and eliminate non-productive trips westbound.			12	E	1,976	3/24/83	39	50.7		N/C
								W	1,618	3/24/83	36	44.9	31	52.2

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PASSENGER LOADS PSGR VOL	CHK DATE	CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
18	Cont'd			Same as above for PM peak east.				E	1,874	3/24/83	33	56.8		N/C
				Same as above for PM peak west.				W	2,044	3/24/83	43	47.5	39	52.4
20	2, 6, 7	4	DX	Consider scheduling mid-day local service every 5 mins. instead of 4 mins. & limited service every 15 mins. instead of 20 mins.			40	E	3,510	5/10/83	95	37.0	85	41.3
								W	3,655	5/10/83	95	38.5	85	43.0
26	1	1	DX	Change mid-day headways between Virgil & Sunset and downtown Los Angeles from 12 minutes to 13 minutes. Headways from Hollywood would be 39 minutes instead of 36 minutes and headways to Boyle & Olympic on the east portion of the line would be 26 minutes instead of 24 minutes.	4			E	1,072	1/18/83	29	36.9	26	41.2
								W	674	1/18/83	29	23.2	26	25.9
28	3&7	4	DX	Reschedule peak hour service and retie. (Point check at Oly. & Western - Tues.)			9	W	2,441	9/13/83	53	46	50	48.8
				(Point check at Oly. & Figueroa)				W	2,545	11/14/83	43	59.2	43	No Change
				(Point check at Oly. & Figueroa)				E	2,154	11/14/83	42	51.3	40	53.9
				(Point check at Oly. & Vermont)				E	1,616	10/26/83	38	42.5	35	46.1
				New check pending for further study.										
38	2	1	DX	Reschedule AM peaks both directions and eliminate non-essential trips.	8			E	1,217	3/3/83	25	48.7	24	50.7
								W	1,345	3/3/83	28	48.0	26	51.7

* - Public hearing required.

Revised 12/5/83

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
38 Cont'd				Change mid-day headways from 12 mins. to 13 mins. between Jefferson &				E	1,265	3/3/83	28	45	26	48.6
								W						
				10th Ave. and Maple Avenue Lot. Headways to and from the West Los Angeles terminal and to and from Vignes & Macy would change from 24 minutes to 26 minutes.					956	3/3/83	26	36.7	23	41.6
				Reschedule PM peaks both directions and eliminate low productivity trips.				E	1,438	3/3/83	30	47.9	29	49.6
								W	864	3/3/83	24	36.0	22	39.3
40	5	3	DX	Reschedule peak hour service and eliminate low productivity trips.			6	E	1,563	10/24/83	39	40.1	34	46.0
42	5	3	DX	Consider changing mid-day headways from 30 to 35 minutes, reschedule PM service. Consider shortlining peak hour service at 98th & Vicksburg.	12			E	247	4/8/83 (9am-3pm)	12	20.6	10	24.7
								W	239	4/8/83 (9am-3pm)	12	19.9	10	23.9
45	2	1	DX	Consider Changing mid-day headways from 7½ to 9 minutes between Manchester and downtown Los Angeles. Change from 15-30 mins. to 18-36 south of Manchester and from 15 to 18 mins between downtown Los Angeles and Rose Hills.	15			N	1,143	3/11/83	40	28.6	35	32.7
								S	1,271	3/11/83	39	32.6	34	37.4
	2	1	DX	Adjust northbound peak headways between 3-6 pm, eliminate 2 trips.				N	1,248	3/11/83	27	46.2	25	49.9
	2	1	DX	Adjust southbound peak hour service between 3-6:20 pm eliminate 4 trips.				S	1,797	3/11/83	42	42.8	38	47.3

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
48	2	1	DX	Consider base service up to 25 min. headways (using Line 49 check).			6	N	525	11/10/82	21	25.0	17	30.9
								S	326	11/10/82	17	19.2	13	25.1
			SA	Consider headways up to 25 min.			10	CHECK PENDING						
68	1	1	DX	Reschedule AM peak service both directions and eliminate one bus.	6			N	889	9/1/83	21	42.3	20	44.5
								S	991	9/1/83	25	39.6	24	41.3
				Reschedule PM peak service north-bound and eliminate one bus.				N	1,281	9/1/83	26	49.3	25	51.2
70	9	5	DX	Consider shortlining peak hour trips at Garvey & San Gabriel.	6			W	516	4/27/83	26	19.8	22	23.5
								E	732	4/27/83	21	34.9	19	38.5
				Consider reducing service from Sybil Brand Institute.				E	55	4/27/83	42	1.3	36	1.5
								W	47	4/27/83	48	1.0	41	1.1
			SA	Consider changing headways from 10 to 15 minutes.	15			E	1,230	6/4/83	44	28.0	28	43.9
								W	1,298		43	30.2	28	46.4
			SU	Consider changing headways from 10 to 15 minutes.	15			E	933	6/19/83	44	21.2	29	32.2
								W	914		43	21.3	26	35.2
76	9	5	DX	Consider shortlining peak hour hour buses at Del Mar.	7			E(AM)	295	3/14/83 4/25/83	18	16.4	13	22.7
								W(PM)	380	7/10/83	13	29.2	10	38.0
78	9	5	DX	Reschedule peak hour service.	6			E	658	2/8/83	19	34.6	17	38.7
								W	1,717	2/8/83	40	42.9	37	46.4
83	3	2	DX	Change mid-day headways from 20 to 30 mins. on York & Figueroa to York & Eagle Rock service.	6			N	524	10/4/83	19	27.6	12	43.7
								S	606	10/4/83	19	31.9	13	46.6

* - Public hearing required.

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
90	15	2	DX	Consider shortlining peak hour service at Glendale College.			4	N	238	11/16/83	10	23.8	5	47.6
								N	502	11/16/83	17	29.5	8.5	59.1
92-93	15	2	DX	Consider changing mid-day headways from 30 to 45 minutes between Brand & Fairview and Brand & Mountain.	6			N	110	5/31/83	16	6.9	10	11.0
								S	115	5/31/83	13	8.8	9	12.8
			DX	Consider changing mid-day headways from 30 to 45 minutes between Burbank and San Fernando.				N	277	5/31/83	15	18.5	10	27.7
								S	209	5/31/83	12	17.4	9	23.2
97	15	2	DX	Consider changing headways from 30 to 55/60 minutes.*		12		E	332	6/22/83	28	11.9	14	23.7
								W	342	6/22/83	28	12.2	14	24.4
			SU	Consider eliminating shuttle and instead reschedule line to 60 minutes from end-to-end. (Service to zoo can be augmented by temp. letter.)*		10		E	427	10/16/83	22	19.4	13	32.8
								W	361	10/16/83	22	16.4	14	25.7
107	5	3	DX	Consider changing headways from 15/20/15 to 20/22/20 minutes.	15			E	851	4/29/83	47	18.1	39	21.8
								W	784	4/29/83	46	17.1	39	20.1
			SA	Consider changing headways from 30 to 40 minutes.	10			E	528	9/10/83	26	20.3	20	26.4
								W	491	9/10/83	26	18.9	20	24.6
			SU	Consider changing headways from 30 to 40 minutes.	10			E	329	7/31/83	26	12.7	20	16.5
								W	294	7/31/83	26	11.3	20	14.7
110	23	3	SU	Consider reducing service west of Pacific Ave. from 30 to 60 mins.*		10		W	113	5/30/82	20	5.7	10	11.3
								E	103	5/30/82	20	5.2	10	10.3
125	18	3	DX	Establish short-line at Lakewood Blvd. and consider up to 30/60 mins. base and demand peak headways.	12			E	175	9/8/83	10	17.5	5	35.0
								W	123	9/8/83	10	12.3	5	24.6

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
119	18	3	DX	Consider combining with Line 126 and reduce base headways from 45 to 50 minutes.	12			E	457	10/18/83	21	21.7	17	26.8
								W	430	10/18/83	21	20.4	17	25.2
126	18	3	DX	Same as above				N	171	4/4/83	17	10.0	16	10.0
								S	203	4/4/83	17	11.9	16	12.6
146	12	3	DX	Shortline after 6:00 pm at Avalon & Anaheim. This will eliminate duplication of Line 232 to Long Beach.*		6		N	35	2/25/83	16	2.2	None	None
								S	37	2/25/83	13	2.8	None	None
	12	3	SA	Shortline after 6:00 pm at Avalon & Anaheim. This will eliminate duplication of Line 232 to Long Beach. Pending more recent check.*		4		N	55	5/2/81	10	5.5	None	None
								S	31	5/2/81	10	3.1	None	None
	12	3	SU	Same as Saturday.*		4		N	49	4/5/81	10	4.9	None	None
								S	29	4/5/81	10	2.9	None	None
154	15	2	SA	Consider eliminating shuttle between Rinaldi & Tampa and Reseda & Ventura. Schedule 60 minutes end-to-end. Pending more recent check.	12			S	231	4/18/81	27	8.6	14	16.5
								N	212	4/18/81	27	7.9	14	15.1
			SU	Consider eliminating shuttle between Rinaldi & Tampa and Reseda & Ventura schedule 60 minutes end-to-end.	10			CHECK PENDING						

* - Public hearing required.

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
158	15	2	DX	Consider changing mid-day service from 30 to 35 minutes.	8			E	255	6/21/83	14	18.2	12	21.3
								W	248	6/21/83	14	17.7	12	20.7
168	15	2	DX	Consider changing Nordhoff St. mid-day service from 22 to 30 minutes & Lassen St. mid-day service from 45 to 60 minutes.	12			E	288	9/29/83	23	12.5	17	16.9
								W	334	9/29/83	25	13.4	19	17.6
			SA	Consider changing Nordhoff St. service from 35-40 to 45 minutes & Lassen St. service from 75 to 90 minutes.	12			E	236	1/22/83	34	6.9	27	8.7
								W	222	1/22/83	34	6.5	27	8.2
			SU	Consider changing Nordhoff St. service from 35-40 to 45 minutes & Lassen St. service from 75 to 90 minutes.	10			E	167	1/2/83	29	5.8	24	7.0
								W	207	1/2/83	31	6.7	24	8.7
170	9	5	DX	Consider changing headways from 45 to 55 minutes.	13			E	407	3/8/83	21	19.4	17	23.9
								W	446	3/8/83	21	21.2	16	27.9
176	9	5	DX	Consider changing headways from 35 to 50 minutes.	11			E	392	3/8/83	24	16.3	19	20.6
								W	380	3/8/83	24	15.8	18	21.1
177	3	2	DX	Consider changing headways from 45 to 50 minutes. (Maintaining adequate service for school travel.)	12			E	164	2/7/83	8	20.5	6	27.3
								W	112		7	16.0	6	18.7
180-181	3	2	DX	Eliminate night service west of Vermont & Prospect and east of Lake & Colorado. (Passengers to use Lines 1 and 485.)*		4		E	266	3/25/83	20	13.3	-	-
								W	123	3/25/83	20	6.2	-	-
			SA	Same as above.*		4		E	256	11/28/81	18	14.2	-	-
								W	133	11/28/81	18	7.4	-	-

[redacted] - Public Hearing Required [redacted]

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
180-181 Cont'd			SU	Same as above.*		4		E	245	4/11/83	18	13.6	-	-
								W	124	4/11/83	18	6.9	-	-
183	15	2	DX	Consider changing mid-day headways from 30 to 40 minutes.	6			E	681	11/7/83	27	25.2	21	32.4
								W	744	11/7/83	26	28.6	22	33.8
			SA	Consider changing headways from 40 to 50 minutes.	12			E	105	6/20/81	22	4.8	17	6.2
								W	62	6/20/81	20	3.1	17	3.6
			SU	Consider changing headways from 60 to 75 minutes.	10			E	88	5/31/81	12	7.3	10	8.8
								W	109	5/31/81	12	9.1	10	10.9
187	9&16	5	DX	Consider shortlining in Glendora midday with 60 minute service to Pomona.	6			E	365	5/6/83	28	13.0	16	22.8
								W	336	5/6/83	27	12.4	15	22.4
188	3	2	DX	Consider changing headways from 30 to 60 minutes from Santa Anita Fashion Park or Foothill & Rosemead to Duarte.	12			E	380	4/6/83	27	14.1	14	27.1
								W	319	4/6/83	27	11.8	13	24.5
			SA	Same as above.	10			E	181	8/22/81	12	15.1	6	30.2
								W	179	8/22/81	13	13.8	6	29.8
201	3	2	DX	Consider changing service from 35 to 50 minutes.	6			N	141	6/15/83	11	12.8	7	20.1
								S	197	6/15/83	11	17.9	7	28.1
			SA	Consider changing service from 40 to 60 minutes. Pending new check.	12			N	95	8/18/81	21	4.5	13	7.3
								S	95	8/18/81	21	4.5	13	7.3
204	2	1	DX	Consider eliminating Observatory service.*		8		N	24	3/10/83	8	3.0	0	0
								S	12	3/10/83	8	1.5	-	-
								N	11	11/22/83	8	1.4	-	-
								S	12	11/22/83	8	1.5	-	-

* - Public hearing required.

Revised 12/5/83

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
204	Cont'd		SA	Same as above.*		8		N	35	11/26/83	9	3.8	-	-
								S	58	11/26/83	9	6.4	-	-
			SU	Same as above.*		8		N	15	11/20/83	9	2.1	-	-
								S	19	11/20/83	9	2.7	-	-
212	5-15	3	DX	Consider changing headways from 30 to 45 minutes between Hollywood and Burbank.	12			N	978	4/8/83	43	22.7	32	30.6
								S	887	4/8/83	43	20.6	32	27.7
			SA	Consider changing headways from 30 to 45 minutes between Hollywood and Burbank.	10			CHECK PENDING						
			SU	Consider changing headways from 30 to 45 minutes between Hollywood and Burbank.	10			CHECK PENDING						
217	7	4	SA	Consider shortline at Fairfax and Sunset reducing duplication of service into Hollywood.	12			CHECK PENDING						
	7	4	SU	Consider shortline at Fairfax and Sunset reducing duplication of service into Hollywood.	10			N	662	9/4/83	54	12.3	27	24.6
								S	877	9/4/83	54	16.2	27	32.5
220	7	4	SA	Eliminate Robertson Blvd. shuttle and schedule 60 minutes end-to-end. Pending new check.*		12		N	312	8/15/81	28	11.0	15	21.0
								S	299	8/15/81	28	11.0	15	20.0
225-226	18	3	DX	Shuttle route 226 service midday and consider up to 60 mins. service north of Redondo Beach (PCH & Palos Verdes Bl.).*		3		N	77	2/24/83	11	7	6	12.8
								S	110	2/24/83	12	9.2	6	18.3

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS			DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT		PROPOSED	
					A	B	C				TRIPS	AVG PASS PER TRIP	TRIPS	AVG PASS PER TRIP
225-226 Cont'd			SA	Shuttle route 226 service from Redondo Beach to Marineland. Pending new check.*		12		N	193	6/6/81	27	7.1	14	13.8
								S	224	6/6/81	29	7.7	15	14.9
230	15	2	DX	Consider changing headways from 30 to 60 minutes from San Fernando to Encino.	18			E	439	5/23/83	31	14.2	16	27.4
								W	412	5/23/83	33	12.5	17	24.2
			SA	Same as above. (Pending more recent check.)	24			E	298	3/28/81	31	9.6	16	18.6
								W	219	3/28/81	33	6.6	17	12.9
236-239	8	4	DX	Consider changing service from 40 minutes up to 70-75 minutes on Woodley leg.*		12			528	5/5/83	47	11.2	23	23.0
250-253	3	2	DX	Consider changing headways from 25 to 40 minutes.*		12		N	314	6/24/83	35	9.0	22	14.3
								S	291	6/24/83	34	8.6	21	13.9
			SA	Consider changing headways from 25 to 40 minutes.*		12		N	192	4/30/83	34	5.6	22	8.7
								S	190	4/30/83	33	5.8	21	9.0
256	3	2	DX	Consider changing midday headway from 35 to 40 minutes.	12			N	308	9/19/83	11	28.0	8	38.5
								S	348	9/19/83	11	31.6	8	43.5
260	9-12	5	DX	Shortline at Atlantic & Fernwood instead of Atlantic & Artesia Blvds. (Pending check.)	6			N	424	2/8/82	40	10.6	15	28.3
								S	504	2/8/82	38	13.3	13	38.8
	9-12	5	SA	Shortline at Atlantic & Slauson instead of Atlantic & Artesia Blvds. (Pending check.)	7			N	456	8/29/81	25	18.2	14	32.6
								S	489	8/29/81	26	18.8	12	40.8
	9-12	5	SU	Shortline at Atlantic & Washington instead of Atlantic & Artesia Blvds. (Pending check.)	14			N	265	4/11/82	21	12.6	11	24.1
								S	261	4/11/82	20	13.1	11	23.7

* - Public hearing required.

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LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
262	9	5	DX	Consider Changing headways as follows: AM 15/30 to 17/34, mid-day 20/40 to 25/50, PM 15/30 to 18/36.	6			N	827	10/17/83	42	19.7	35	23.6
								S	851	10/17/83	39	21.8	35	24.3
266	9&12	5	DX	Consider changing night headways from 60 mins. to 90 mins.	3			N	122	4/29/83	9	13.6	7	17.4
								S	72	4/29/83	7	10.3	4	18.0
			SA	Same as above.	3			N	140	4/16/83	7	20.0	5	28.0
								S	155	4/16/83	9	17.2	6	25.8
			SU	Same as above.	5			N	86	4/17/83	4	21.5	3	28.7
								S	89	4/17/83	3	29.7	2	44.5
270	9&12	5	DX	Consider changing headways from 45 to 55 minutes.	13			N	329	6/13/83	20	16.5	16	20.6
								S	354	6/13/83	20	17.7	16	22.1
274-276	9	5	DX	Consider changing headways from 60 to 70-75 minutes.*		12		N	133	3/28/83	15	8.9	13	10.2
								S	152	3/28/83	15	10.1	13	11.7
420	8	4	DX	Adjust PM peak service (pt. check at Santa Monica & Western Thursday, 11/17/83, 2-6 pm).	2			S	670	11/17/83	25	26.8	23	29.1
								N	1,059	11/17/83	27	39.2	25	42.4
				(pt. check at Hollywood & Highland Thursday, 11/17/83, 2-6 pm)				S	921	11/17/83	22	41.9	20	46.1
								N	964	11/17/83	26	37.1	24	40.2
423	8	4	DX	Reschedule peak hour service.*		5		E	72	8/9/83	3	24	2	36
								W	70	8/9/83	3	24	2	35
424	8	4	DX	Adjust peak hour service & retie (Point: Ventura & Lankershim)	10									
				AM peak 6:00 - 9:00				N	2,523	11/15/83	53	48	52	49
				PM peak 2:00 - 6:00				S	1,996	11/15/83	41	49	40	50
427	8	4	DX	Consider reducing peak service	6									
				AM peak				S	157	8/9/83	6	27	5	31
				PM peak				N	167	8/9/83	6	28	5	34

* [illegible] required.

Revised 1[illegible]/83

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
439	5	3	DX	Consider shortlining mid-day service at Sepulveda & Manhattan Beach Blvd. to eliminate duplication of Line 232 service.*		5		E	30	3/22/83	8	3.7	None	None
								W	31	3/22/83	8	3.7	None	None
470	9	5	SA	Consider changing headways from 20 to 25 minutes.	20			E	1,128	10/22/83	35	32.2	28	40.3
								W	1,157	10/22/83	35	33.1	29	39.9
	9	5	SU	Consider changing headways from 20 to 30 minutes.	30			E	866	10/9/83	35	24.7	23	37.7
								W	886	10/9/83	37	23.9	23	38.5
480	9	5	DX	Consider changing base headways from 20 to 30 mins.	14			E	543	8/24/83	36	15.1	22	24.7
								W	551	8/24/83	38	14.5	25	22.0
			SA	Consider changing headways from 30 to 40 minutes.	30			E	656	2/6/82	26	25.2	19	34.5
								W	672	2/6/82	26	25.8	19	35.4
			SU	Consider changing headways from 30 to 40 minutes.	30			E	522	5/21/82	28	18.6	21	24.9
								W	573	5/21/82	28	20.5	21	27.3
487	9	5	DX	Adjust morning peak hour headways and retie schedule.	3			S	215	9/15/83	6	35.8	5	43.0
608	6	4	DX	Cancel service (Use Lot "C" Shuttle).*		37		RT	712	9/3/82	152	4.7	0	0
			SA	Same as above.*		37								
			SU	Same as above.*		37								
609	1	1	DX	Reduce by 1 bus.*		7				Average of 9 days 10/24/83 thru 11/2/83	2	20.6	1	41.1
			SA	Same as above.*		7								

* - Public hearing required.

Revised 12/5/83

LINE	DIV	G	DAY	SUGGESTED CONSIDERATIONS FOR CHANGES	VEH HRS PER DAY SAVINGS A	B	C	DIR	PSGR VOL	CHK DATE	PASSENGER LOADS CURRENT TRIPS	CURRENT AVG PASS PER TRIP	PROPOSED TRIPS	PROPOSED AVG PASS PER TRIP
				Total Vehicle Hours Savings DX	309	143	94							
				SA	189	106	10							
				SU	154	79	0							

"A" Savings From Feb. 19, 1984

	Hours		Days		Hours
DX	309	X	94	=	29,046
SA	189	X	19	=	3,591
SU	154	X	20	=	3,080
		Total			35,717

"B" Savings From March 4, 1984

	Hours		Days		Hours
DX	143	X	84	=	12,012
SA	106	X	17	=	1,802
SU	79	X	18	=	1,422
		Total			15,236

"C" Savings From March 18, 1984

	Hours		Days		Hours
DX	94	X	74	=	6,956
SA	10	X	15	=	150
SU	-	X	-	=	-
		Total			7,106

Grand Total 62,965

Estimated Annualized Savings:

	Hours		Days		Hours
DX	546	X	255	=	139,230
SA	305	X	52	=	15,860
SU	233	X	58	=	13,514
		Total			168,604

* [illegible] [illegible] [illegible]ed.

C: QUESTIONAIRE USED IN THE ON BOARD SURVEY

1. If you just TRANSFERRED FROM ANOTHER BUS TO THIS BUS, please write in the NUMBER OF THAT BUS LINE here _____

2. Where did you COME FROM before you got on this bus? *(Check one only)*
1 ☐ Home 3 ☐ School 5 ☐ Visiting/Recreation 7 ☐ Doctor/Dentist
2 ☐ Work 4 ☐ Shopping/Errands 6 ☐ Religious Institution 8 ☐ Other

3. What is the ADDRESS of that place?
Number Street *(If address is not known, intersection or place name)* City Zip Code

4. At what time did you leave that place? _____ *(Time)* 1 ☐ A.M. 2 ☐ P.M. *(Check one)*

5. WHERE did you get ON THIS BUS?
Corner of _____ *(First Street Name)* AND _____ *(Second Street Name)* WHICH IS IN: _____ City

6. I got TO THIS BUS by: *(Check one only)*
1 ☐ Walking—I walked _____ blocks.
2 ☐ Automobile—I drove and paid $_____ for parking.
3 ☐ Automobile—I was dropped off.
4 ☐ Bus—I transferred from Bus Line _____ *(Number)*
5 ☐ Other

7. What type of FARE did you use to get on this bus? *(Check all that apply)*
1 ☐ Cash fare of $_____
2 ☐ Ticket fare of $_____
3 ☐ Used a transfer
4 ☐ $20 Regular Monthly Pass
5 ☐ $4 Handicapped Pass
6 ☐ $4 Senior Citizen Pass
7 ☐ $4 Student Pass
8 ☐ $4 College/Vocational Pass
9 ☐ $_____ Express Pass
10 ☐ $_____ Tourist Pass
11 ☐ Other _____

8. Where will you get OFF THIS BUS?
Corner of _____ *(First Street Name)* and _____ *(Second Street Name)* WHICH IS IN: _____ City

9. Where are you GOING TO now? *(Check one only)*
1 ☐ Home 3 ☐ School 5 ☐ Visiting/Recreation 7 ☐ Doctor/Dentist
2 ☐ Work 4 ☐ Shopping/Errands 6 ☐ Religious Institution 8 ☐ Other

10. What is the ADDRESS of that place?
Number Street *(If address is not known, intersection or place name)* City Zip Code

11. How will you get TO THAT PLACE after you get OFF THE LAST BUS you ride to get there? *(Check one only)*
1 ☐ Walking—I will have to walk _____ blocks.
2 ☐ Automobile—I will drive. My parking costs were $_____
3 ☐ Automobile—I will be picked up.
4 ☐ Other _____

12. How MANY BUSES will you ride to get from where you started (Question 2) to where you are going to now (Question 9)?
1 ☐ 1, only this bus 2 ☐ 2, including this bus 3 ☐ 3, including this bus 4 ☐ 4 or more, including this bus

13. I USUALLY RIDE RTD buses:
1 ☐ Almost every day 2 ☐ Not every day, but at least once a week 3 ☐ Less than once a week

14. The following number of MOTOR VEHICLES (cars, trucks, vans) are in running condition at my home: *(Check one only)*
1 ☐ 0 (none) 2 ☐ one 3 ☐ two 4 ☐ three or more

15. Was a VEHICLE AVAILABLE today for you to use to make this trip?
1 ☐ Yes, as a driver 2 ☐ Yes, as a passenger 3 ☐ No

16. The combined TOTAL ANNUAL INCOME of all members of my household is:
1 ☐ Less than $2,000
2 ☐ $2,000-$4,999
3 ☐ $5,000-$9,999
4 ☐ $10,000-$14,999
5 ☐ $15,000-$19,999
6 ☐ $20,000-$24,999
7 ☐ $25,000-$34,999
8 ☐ $35,000-$49,999
9 ☐ $50,000 & Over

17. Write in the following for the persons living in YOUR HOUSEHOLD:
____Number of Persons ____Number of Licensed Drivers
____Number of Employed Persons Living There

18. My age is _____ *(Years)* I am 1 ☐ Male, 2 ☐ Female.

19. I consider myself to be: 1 ☐ White/Caucasian 2 ☐ Oriental/Asian/Pacific Islander 3 ☐ Hispanic/Latino 4 ☐ American Indian 5 ☐ Black 6 ☐ Other

20. I: ☐ Work full time 2 ☐ Work part time 3 ☐ Am not working outside home (retired, student, homemaker, disabled)

21. I am 1 ☐ a Resident, or 2 ☐ a Visitor to the Los Angeles area. *(Check one)*

22. I STARTED RIDING RTD buses:
1 ☐ After January 1983
2 ☐ Between July 1982 and January 1983
3 ☐ Between January 1979 and July 1982
4 ☐ Before January 1979

23. I obtained the PRINTED SCHEDULE for this bus line from:
1 ☐ On-Board this bus
2 ☐ I don't have one.
3 ☐ By Mail
4 ☐ RTD Customer Service Center
5 ☐ RTD Pass Outlet
6 ☐ Library
7 ☐ Thrifty Drug Store
8 ☐ Other _____

24. As you understand it, Metro Rail will be which of the following:
1 ☐ A train between Los Angeles and Las Vegas.
2 ☐ A train between Los Angeles and San Diego.
3 ☐ A light rail line between Los Angeles and Long Beach.
4 ☐ A subway line between downtown Los Angeles and the San Fernando Valley.
5 ☐ I don't know.

PLEASE PLACE IN RETURN BOXES ON BUS

II. FEASIBILITY OF SUBSTITUTING PRIVATELY-PROVIDED TRANSIT SERVICES

A. Introduction

The financial and operating structure of transit provision in the United States has changed substantially in recent years. Prior to 1960, the majority of all transit companies were privately owned and operated competitively at a profit. As the profitability of providing services decreased, however, many communities adopted public ownership of their transit systems in order to maintain and improve service. This trend became particularly strong in the 1960's when the opportunity for Federal government financial assistance became available. The profit maximizing philosophy of private carriers was thus largely replaced by these public agencies whose functions were to run urban transit systems as public services. These public agencies assumed the role of providing service at minimum resource cost, subject to providing service at some minimum overall quality and given fare. They were not, however, constrained to cover all costs from farebox revenues as their predecessors were. In the years since this restructuring has taken place, the need for subsidies to operate these public transit agencies has increased substantially.

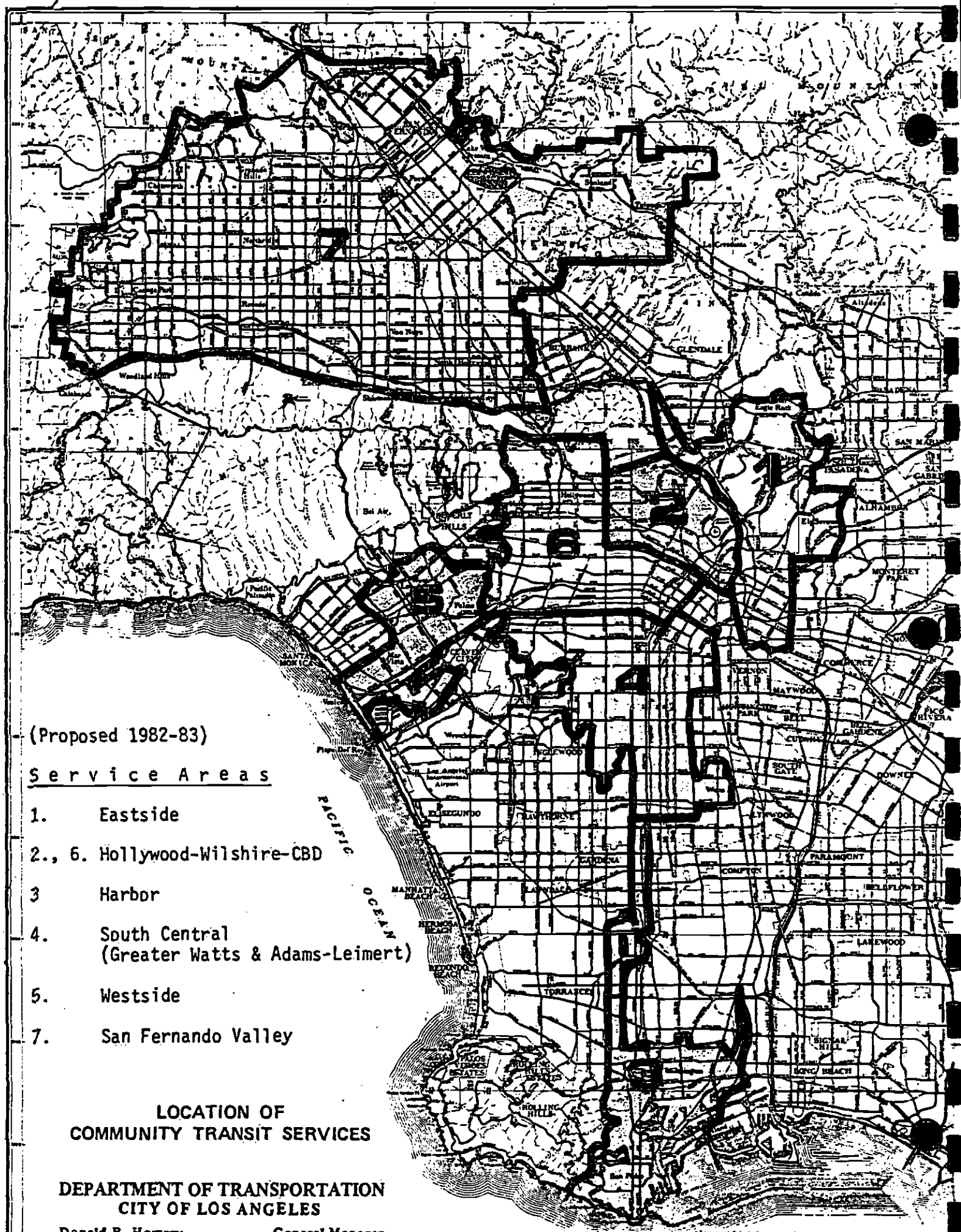
With the prospects of continually rising operating costs and possible reductions in operating subsidies, however, public transit agencies now face the problem of how to improve service while attaining greater cost economies. The changing nature of demand in certain markets, such as longer trips, warrants an evaluation of existing lines where service alternatives may be substituted. In light of the possible expiration of the Proposition A Fare Program in July of 1985, SCRTD is also faced with additional financial uncertainties. The District, therefore, is currently evaluating opportunities for achieving cost economies by improving the productivity and efficiency of its system. One such opportunity being studied is that of providing transit service by private firms as a means of relieving the District of unprofitable parts of its operation.

This chapter examines the feasibility and desireabiliy of such an option within the constraints of meeting the District's goal of providing, to the greatest extent possible, an efficient and equitable transit system for the entire area. There are basically two broad categories of alternatives in which private carrier service can be substituted: 1) suspending existing service for private carrier substitution and 2) the subcontracting of service to private carriers. The cost and institutional feasibility of these alternatives and the various options available for their implementation are examined in this chapter. The experience of other transit agencies which provide paratransit services and an examination of the SCRTD Pomona Valley Study, which exemplifies the nature and scope of undertaking an endeavor to improve the quality and efficiency of service in the District, is also presented.

B. COST FEASIBILITY OF SUBSTITUTION OF SCRTD SERVICE WITH PARATRANSIT SERVICE

1. Existing Los Angeles City Dial-A-Ride Services

The City of Los Angeles, as of 1982, provides Dial-A-Ride services to six separate service areas of the City through service agreements (see attachment). The last remaining unserved portion of the City, the San Fernando Valley, is scheduled to be served with a similar demand-responsive service. The method of operation consists of service contracts with local taxi cab companies. Only one area, the East-Northeast area, is served by a company which uses five dedicated vans for this service. In addition, the City contracts with a service broker who acts in an intermediary capacity between the City Department of Transportation (DOT) staff and the carrier under contract to the City. The broker/coordinator's responsibilities include administration of the transportation coupon fare program.


(Proposed 1982-83)
Service Areas
1. Eastside
2., 6. Hollywood-Wilshire-CBD
3 Harbor
4. South Central
(Greater Watts & Adams-Leimert)
5. Westside
7. San Fernando Valley
PACIFIC OCEAN
LOCATION OF
COMMUNITY TRANSIT SERVICES
DEPARTMENT OF TRANSPORTATION
CITY OF LOS ANGELES
Donald R. Howery General Manager
CARTOGRAPHIC SECT. BUREAU OF ENGINEERING 10-1981

These services are available only to persons 60 years and older and to the handicapped. An exception is the service provided in the greater Watts area in which all persons within specified service areas are eligible for the service. Except for the Watts district (which has a 25 cents fare) and for the East-Northeast district (in which donations are the only passenger revenue) a transportation coupon program is in effect. A maximum of $20.00 per month in $10.00 amounts are available per person with the user paying only $2.00 per $10.00 value of the coupons. Coupons can be used for a maximum of $7.00 per trip with the balance being paid by the user at full cab fare.

For reference purposes, 1982 cab fares within the City result in about a $7.00 charge for a three mile trip. As shown on the attachment, the average cost per passenger, including approximately 20% in administrative costs was $6.20. This indicates that the average trip length was less than 3 miles. City DOT staff estimated the trip length to be between 2.0 and 2.5 miles for these Dial-A-Ride services.

Patronage is constrained by the funding available for the transportation coupons (limit of $20.00 per month per person). In the case of the East-Northeast service which has no fare, patronage is constrained by the funding limitation of five vans in service, which are in maximum use, given the restricted population which is eligible to use the service and given the population density and distribution of rider demand within the service area.

Operating costs expressed in terms of miles and hours operated are not very relevant when the demand-responsive service uses undedicated vehicles, i.e., regular taxicab service. In this case, the most comparable statistic is cost per passenger. The City's experience for FY 1981-82 shows an average by service area cost range of $5.70 to $9.00 per boarding. City

DOT staff explain that the higher range number comes from the West Los Angeles service area which to date has experienced lower ridership, causing the relatively fixed broker/ coordinator costs as a percentage of fares to be disproportionately high.

Operating costs for dedicated service can be expressed in unit service costs similar to conventional fixed-route services. The one service area, East-Northeast area, using five dedicated vans has the following cost experience for FY 1981-82:

EAST-NORTHEAST AREA

	Total Cost to Carrier	Approximate Admin. Cost	Total Cost
Total Hours	$20.00/hr.	+20%	$24.00
Total Miles	$1.50/mi.	+20%	$1.80
Boardings/ Total Mile	.20/mi.		

Los Angeles City - 6 Dial-A-Ride Operators

Average Cost Per Boarding	$5.89
Cost Range: Cost/Boarding	$5.70-$9.00

The LACTC has developed service and financial statistics on a wide range of paratransit operators within the Los Angeles County. The District Planning staff has attempted to identify the operating costs of a representative sample of demand-responsive services which are operated with dedicated vehicles and also services using taxicab operators. Most of the services use regular taxicabs, in which cases the operation is referred to as a user-side subsidy.

There is a wide range in the costs reported for these services. This is particularly true for the taxicab operations. As a generality, LACTC staff reports that currently demand-responsive services cost in the $15.00 to $20.00 range per total hour of operation. This cost includes administrative costs in the range of 12% to 15%. Riders or boardings per vehicle hour and per vehicle mile are very low by fixed-route productivity standards; they equate to approximately two boardings per hour and .30 boardings per mile, respectively. This low productivity is due to the inherent nature of demand-responsive service and to the fact that the ridership is, in almost all cases, restricted to seniors and the handicapped. The fare box recovery for this service generally ranges between 10% and 20% of reported operating costs.

2. Orange County Transit District Experience with Dial-A-Ride Services

The Orange County Transit District (OCTD) has had experience in operating dial-a-ride service in several variations for ten years. After several years of experience in portions of their service area, the OCTD after consideration of several alternatives, implemented a comprehensive District wide demand-responsive service to the general public. The services are operated under contract by private operators, one operator for each of five contract areas. A total of 100 vehicles are used, all carrying the OCTD logo. In general, the private operators handle all supervision and administrative matters, including service complaints and community liaison requirements. In some cases OCTD provides major maintenance service, and in other cases the private carrier handles it all. The present manual dispatching performed by each private operator is being phased out in favor of an automated dispatching and control system operated by OCTD. Presently OCTD already has converted two of the five private operators to the new system.

The system is an adaption and refinement of the dispatching system first developed for the Haddonfield demand-responsive system and later used by the Rochester system.

The five contract areas encompass a total of 39 fare zones with each fare zone about ten to twelve square miles in size. The regular fare is $1.00 per zone or $.50 per zone for seniors and handicapped riders. Riders have to transfer to travel outside each zone. The response time goal is an average wait time of 20 minutes, with 75% of the service requests being met in 30 minutes and 90% of the service requests being met in 40 minutes. The OCTD Dial-A-Ride Manager believes that these response time goals are being met. The service is operated 7:00 a.m. until 6:00 p.m., Monday through Friday and 9:00 a.m. until 5:00 p.m., Saturday. No Sunday service is operated.

During FY 1981-82, it is estimated that the OCTD Dial-A-Ride system cost about $5,915,000, excluding OCTD overhead costs of about 25%. The cost per vehicle hour is about $23.00, which includes about a 25% additive for administrative costs. The average driver pay per hour is between $4.00 and $5.00 per hour. Farebox revenues are estimated to be $541,000, which amounts to about an 8% recovery when administrative costs are included. About 810,000 boardings are projected and ridership productivity is projected to equate to 3.2 boardings per hour and .20 boardings per vehicle mile. In future years, productivity is projected to gradually increase to a maximum of six boardings per vehicle hour.

3. Projected Operating Costs of SCRTD Paratransit Substitution

It can be assumed that the private carrier's cost of providing substitute service on the District's existing lines would be considerably lower, since such service is highly labor intensive and private carrier non-union wages are generally

much lower than the District's. It can also be assumed that in order to induce private carriers to operate service on the District's unprofitable lines, that they would have to be allowed to set the level and quality of service they would provide relatively freely. Thus, a reasonable cost analysis and comparison of this type of service cannot be made.

Projected operating costs of subcontracted demand-responsive service as a substitute for existing SCRTD service involve a number of unknown factors. As noted in the previous section, existing paratransit services generally have a total operating cost in the range of $15.00 to $20.00 per hour of operation (FY 1981-82 dollars). In theory, the larger and expanded paratransit operations which would be required as a substitute for SCRTD services, could result in some economies of scale, in terms of spreading the overhead costs over a larger number of vehicles with their attendant staffing requirements. On the other hand, there may be significant increases in cost as a result of an expanded scale of operation. The impetus behind this cost increase would be the need to upgrade service in terms of more coordination and more support services. Paratransit service that is a substitute for existing SCRTD fixed-route service is likely to generate public demands and expectations for service far beyond present experience with paratransit services in Los Angeles County. Therefore, it appears that a more reasonable minimum cost estimate, for FY 1981-82, would be $20.00 to $25.00 per hour instead of $15.00 to 20.00 per hour.

The reasonableness of a $25.00 per hour of operation estimate for demand-responsive service is further confirmed by review of the operating cost per bus hour for the well established Dial-A-Ride service in La Mirada and for that provided by Orange County Transit District (OCTD). The cost per hour for FY 1981-82 for these two services is approximately $33.00 and $23.00 respectively, including administrative costs. Both of

these services are open to the general public as opposed to being restricted to seniors and handicapped riders.

4. Theoretical Cost Comparison of Fixed-Route to Demand-Responsive Service

The example of Pomona Valley, as shown in Table A, has been used to develop a theoretical comparison between fixed-route service and demand-responsive service. Column A of Table A shows in summary form the primary financial service and ridership data items for the District's 1982 fixed-route local circulation routes, consisting of Lines 451-453 and 452-454. (These line numbers have since been changed to 291-293 and 192-194 respectively on October 2, 1983.) Columns B through G show variations of demand-responsive services.

A key input to this comparison is the assumption that the paratransit alternatives shown in Alternatives B through G could be operated in FY 1982-83 for only $25.00 per bus hour compared to $55.00 per total bus hour for District operated bus service. This assumption is based on applicable current paratransit operating experience in the region and was discussed in the previous sections of this report.

Given the assumption that demand-responsive service could be operated in FY 1982-83 for only $25.00 per bus hour, it can be seen that slightly more than twice the number of bus hours could be operated for the same total operating cost of $6,050.00 per day. Yet, as shown in Column C, no more than the same number of riders could be carried due to the inherent lower productivity of paratransit services. In fact, seven boardings per hour is considerably higher than most many-to-many paratransit services, even including the more productive services that are open to the general public. A less optimistic figure of five boardings per hour, as shown in Column B, produced only 1,200 boardings per day, 500 fewer

TABLE A

Pomona Valley
Theoretical Comparison: Fixed Route
Compared to Demand Responsive Service
Average Weekday Statistics
(FY 1982-83)

Alternatives	A	B	C	D	E	F	G
		Demand Responsive				Modified Demand Responsive	
Service Description	Fixed Route 451-453 & 452-454	Present Fare		Higher Fare		Additional Fare	
Buses	8	16	16	16	8	8	8
Hours	110	242	242	242	120	120	120
Financial Description							
Fare Revenue	850	600	850	1200	840	1800	3000
Net Cost	5200	5450	5200	4850	2160	1200	0
Total Cost	6050	6050	6050	6050	3000	3000	3000
Fare Recovery	14%	10%	14%	20%	28%	60%	100%
Fare Level	.85	.85	.85	Higher	Higher	Higher	Higher
Ridership							
Boardings	1700	1200	1700	1200	840	1200	1200
Bd/Hr	15	5	7	5	7	10	10
Service Stat.							
Cost/Hr.	55.00	25.00	25.00	25.00	25.00	25.00	25.00
Rev./Bd.	.50	.50	.50	1.00	1.00	1.50	2.50
Net Cost/Bd.	2.30	2.30	2.30	1.80	1.80	1.00	00
Total Cost/Bd.	2.80	2.80	2.80	2.80	2.80	2.50	2.50
Headway (Min.)							
Response Time (Min.)	40	20-30	20-30	20-30	20-30	20-40	20-40

boardings compared to the present fixed-route service. Columns F and G show ten boardings per bus hour. These two paratransit alternatives are listed as "modified demand-responsive" services because normally this productivity level exceeds the capability of the many-to-many mode of demand-responsive service. Modifications such as the following can make a productivity of ten boardings an hour more feasible: many-to-few, many-to-one, group riding, and connections to scheduled service through scheduled demand-responsive service. (The latter is somewhat of a contradiction in terms.)

In fare recovery, the present fixed-route service recovers an estimated 14%. This compares with a paratransit range of between 10% to 100%. The 10% recovery is achieved from five boardings an hour at the present average fare of $.50 per boarding. A recovery of 28% is obtained in alternative E, assuming an average fare of $1.00 which is double the present average fare. A recovery of 60% and 100% is obtained from average fares of $1.50 and $2.50, respectively. These fare levels are three and five times the present average fares, respectively.

The level of service provided to the user is another comparison. In theory, in low density areas, demand-responsive service can provide more convenient service where the alternative is widely spaced, infrequent fixed-route service. This service when operated in a door-to-door, many-to-many mode may be more attractive if the wait time can be held to reasonable lengths, such as 20 to 30 minutes after placing a call. On the other hand, the productivity of such service may not be able to exceed five boardings per hour. Even under modified paratransit operating conditions, productivity is not likely to rise above ten boardings per hour, a figure which is less than one fifth of the District's system average.

One clear conclusion to be drawn from this theoretical comparison is that for the same total operating cost and for the same cost per passenger (boarding), only under the most favorable assumptions and circumstances will the same number of passengers be served with paratransit compared to the present fixed-route services. Moreover, the boardings per hour assumed for the demand-responsive service shown in Table A are maximum productivity levels based on general experience from dial-a-ride systems. This contrasts with the fixed-route service (Lines 451-453 and 452-454) which has a large unused capacity. The maximum for the dial-a-ride service, operating in a many-to-many mode is about seven boardings per hour, compared to the fixed-route lines which could easily handle 40 to 50 boardings per hour operating over their present routes in the Pomona Valley.

C. INSTITUTIONAL FEASIBILITY

1. Suspending Existing Service for Private Carrier Substitution

One method of using private carriers in the provision of District service would be to suspend service on certain lines, in accordance with District Service Standards, and offer them to private carriers. An initial task in evaluating this option is to determine the situations in which private transit providers would, or could be induced to, provide service. One must assume the private operator's sole motivation is profitability. To be profitable it must also be assumed that service conditions and fares could be set relatively freely by the carrier. Assuming that no competition of subsidized transit exists and a real demand for services, it appears likely that a private carrier would be able to operate at a profit.

As the only motivation of substituting private carriers for existing service is to become more cost-effective, candidate lines for substitution would be those which are the least profitable. To generate a profit on these lines, the private operator would set service conditions and fares at levels in which a profit could be generated. In this instance, a private operator could enhance the overall quality of service with much higher fares or reduce the quality of service with only slightly higher fares.

In practice, it appears that quite often when private carriers have been allowed to operate substitute service on a line with relatively little restrictions on their fares or service conditions, that they have done so by offering both higher fares and quality of service than the existing service. Fares, although usually regulated to some extent, have often been three or more times higher than that of existing public agency fares. It also appears that new patrons have been attracted by improving service quality.

In February of 1968, the Transit Authority of New York implemented an experiment in which a private operator was allowed to attempt profitable service on one of their existing express bus lines. While the fare was regulated by the New York Board of Estimate, other characteristics of the service such as frequency, coverage of the area and the cleanliness of the vehicles were left to the discretion of the operator. To date, this service is still in operation. It has been extended to additional lines, and is considered by the Transit Authority to be a success. Noteable aspects of this service are that the express bus service is operated at a high level of service and efforts are taken by the carriers to ensure that all passengers have a seat. Fares are approximately three times the normal Transit Authority fare. The privately provided services in the off-peak, however, are infrequent and only provided on some of these lines.

In light of the District's public responsibility to provide equitable transportation service to the area, it is possible that if the District allowed private carriers to operate existing service with substantially increased fares, a minimum level of service at a reduced lower fare would have to be maintained resulting in much higher subsidies. It could thus be alleged that allowing the private carrier to provide high quality service is in effect like allowing them to "skim the cream" from the public carrier, to the detriment of the general community.

The District's LAX service could possibly be considered an example of this. A private carrier has been allowed to operate an express service to the airport. The private carrier provides a relatively high quality of service to LAX from various hotels in the Los Angeles area and does so at fares that are substantially higher than the SCRTD fares. However, since this service could not be considered as a substitute for the service previously operated by the District, service to LAX is still provided by SCRTD at the regular fare to serve the general public equitably.

Allowing private carriers to set service levels and fares relatively freely does not, however, necessarily mean that a higher quality of service will result. In order to generate a profit on the District's unprofitable lines, carriers may in fact provide service which is well below present District service levels. The District would have no means of monitoring the private carrier's frequency of service, reliability, area of coverage, and cleanliness of buses.

2. Subcontracting Service to Private Carriers

Should the District seek to substitute private carriers on unprofitable lines and no profit maximization incentive exists, an alternative is to subcontract the service to

private carriers and provide incentives through subsidies at levels which would make it profitable for carriers to provide services. Under this option, the District could regulate the fare, and the level and quality of service to be consistent with the rest of the District's service goals and standards. This alternative lends itself particularly well to the provision of dial-a-ride services in lieu of fixed-route service in areas where transit demand is low as in low density suburban areas, in periods of low service demand, and selected express lines that provide point-to-point service.

Under regulated service and fare conditions, there is little or no reason for private operators to compete for service contracts without at least a limited amount of subsidy. The premise to subcontracting and providing subsidies is that subsidies can be provided to private carriers and the service can still be less expensive since private carriers generally have labor costs which are substantially lower than agency unionized labor. As dial-a-ride services are highly labor-intensive, the cost feasibility of subcontracting will therefore generally depend on the private carrier's labor rates as well as operational overhead.

Assembly Bill 216, enacted into law as Chapter 43 will become effective January 1, 1984. This new law will allow the District to contract with public utilities for the provision of transit services within the District. This law amends Section 30634 of the Public Utilities Code which allowed the District to contract for service only with cities or the county. While the subcontracting of services to private operators will soon be permitted by State law, there are still a number of issues which must be considered regarding the United Transportation Union, the labor union which represents the District's bus drivers.

Under the District's current contract with the United Transportation Union, the subcontracting of services to private carriers is not allowed. Article 7, Section 2 of the contract reads as follows:

Subcontracting and Paratransit

a. Nothing in this contract shall be deemed to preclude the District from contracting for service with common carriers of persons operating under a franchise or license for services, providing that no contracting shall take place unless there is insufficient equipment, or there are insufficient operators to perform said service, and provided further that said contracting shall not adversely affect the existing employees of the District.

b. Nothing in this contract shall prohibit the District from becoming an "umbrella" agency with responsibility for administering, regulating, and contracting with respect to Paratransit Programs.

c. At no time during the term of this contract or any extension thereof between the District and Union will the District reduce its hiring of new employees covered by said contract as a result of the inclusion of subcontracting of Paratransit Programs.

d. The District's participation in subcontracting or Paratransit Programs shall not adversely affect any of the District's employees covered by this Agreement.

e. No Paratransit equipment shall, during the term of this contract, be stored, serviced, repaired or maintained on any District property where District revenue equipment is stored.

Thus, unless the District could prove it was out of either buses or operators, subcontracting would not be permitted nor could equipment be stored or maintained by the District, until this section of the United Transportation Agreement is changed.

Another labor issue concerns Section 13(c) of the Urban Mass Transportation Act of 1964. Section 13(c), as amended, requires protective arrangements for employees who might be adversely affected by a project assisted with federal funds. This requirement may severely limit the feasibility of paratransit options which would require financial assistance from the U.S. Department of Transportation.

The primary consideration is that District Union representatives may view the substitution of existing District service with paratransit services with private contractors as a threat to union jobs and job security. Union representatives could seek protection under Section 13(c) and federal funding subsidies for service subcontracted to private carriers requiring such subsidies would not be practical.

In practice, it appears that this constraint has made it extremely difficult for UMTA to provide assistance to public agencies for paratransit alternatives which might result in reduced employment for conventional transit services, even though some of these alternatives may have great cost effective potential. Should SCRTD Union representatives object to subcontracting to private carriers who would use their own vehicles and drivers, the District would instead have to consider using its own buses and drivers and it is possible that the provision of paratransit services may lose much of its cost-effectiveness. The District may, however, be able to negotiate with Union representatives, particularly if it can be shown that any of the subcontracted services would not mean a loss of existing jobs to the Union and would in

fact result in avoiding certain lay-offs if present conditions were allowed to remain unchanged.

3. Analysis of Orange County Transit District Experience

The OCTD Dial-A-Ride system, as described previously, has been designed to avoid competing with the fixed-route system. The requirement to transfer between zones ensures that the primary purpose of the system will be to serve short distance trips of two to three miles in length throughout the OCTD service area. An alternative approach for OCTD would be to deploy dial-a-ride service as a substitute for fixed-route services in the outlying low density areas. OCTD has not taken this approach for two reasons. First, from the political standpoint, there has been a strong demand for dial-a-ride service throughout the OCTD service area. Every city wants to be served. Second, OCTD does not believe that dial-a-ride service is an adequate substitute for fixed-route service. Productivity limitations and the requirement for longer distance trips dictate a fixed-route solution. Scheduling dial-a-ride for transfer connections can help integrate the service with the regional fixed-route network. But in doing so, the dial-a-ride service is basically becoming a regular fixed-route service.

Related to the integration of dial-a-ride services is the question of labor protection measures. As long as the service remains purely a dial-a-ride service, the OCTD union (UTU) has not raised any objections to the use of non-union private operators under contract to the OCTD. It is believed that efforts to integrate the dial-a-ride service into the OCTD system, through such measures as scheduled meets at transfer points, may give rise to union demands for unionization of the dial-a-ride services.

4. National Experience

Research and review of existing documentation of service subcontracting by transit agencies in the United States that have either directly or indirectly replaced traditional fixed-route service are discussed specifically in two case studies that follow: Examples 1 and 3, applying respectively to San Diego, California, and Norfolk, Virginia. Example 2 is a review of a subcontracted paratransit project in Ann Arbor, Michigan, that is a late night service expansion of the transit district. Examples 1, 2, and 3, point out innovative techniques as to how an integration of paratransit services and fixed-route services have been attained. The Urban Mass Transportation Administration considers Examples 1, 2 and 3, illustrations of some fairly successful experiences. In contrast, Example 4 is a review of a paratransit project in Deerfield, Illinois, that was discontinued because the constraints of increasing project cost could not be overcome.

In summary, general conditions for subcontracting paratransit service has been where fixed-route service previously operated by a transit district had to be discontinued because of low ridership and decreasing available funds. At that time residents of the affected community brought local pressure demands for transit service from their geographically isolated community to feed into express routes to downtown areas and nearby employment centers.

Another type of paratransit project subcontracted to a private taxi operator is a late night, demand-responsive, door-to-door service, expanding the services of a transit district. This

has been initiated in response to requests by local citizenry for safer transit in neighborhoods with attractions that generate late night activities, such as universities.

Historically, transit districts have applied for an UMTA Demonstration Grant to subcontract for a taxicab feeder service on low demand lines. The 13(c) Labor Protection Agreement is necessary in order to obtain UMTA funding for the demonstration of the paratransit project. Negotiation with labor representatives could cause a project time delay of at least one year. This one year delay could negatively affect the projected cost and timing of any proposed paratransit projects.

Generally, paratransit services have lower vehicle productivities than conventional fixed-route systems. There are two exceptions to this rule. The first exception is that those subscription bus services servicing the work trip commute can have high productivities. The second exception occurs in low density areas that are sometimes geographically isolated where a fixed-route transit system usually operates with very low productivity. Other conclusions are that dial-a-ride systems need a shorter trip length to operate efficiently. Furthermore, dial-a-ride systems have worked in areas that are geographically isolated, with a scattered ridership, not located near major fixed-route corridors.

Operating costs of unionized transit systems are higher and unless these costs are made up for in a higher productivity on a fixed-route system, subcontracting a low productivity line to a private provider of transit may become more cost effective. A thorough analysis would be required on a case-by-case basis before a firm conclusion can be reached.

EXAMPLE 1

In San Diego, California, a taxi feeder service was started as a replacement to a previously discontinued fixed-route service in Paradise Hills. This six square mile residential community, with a population of 25,000, is located in the southeast quadrant of the City of San Diego. The demonstration site has a hilly terrain and a discontinuous street pattern. Furthermore, the Paradise Hills Community is geographically isolated from the rest of the City of San Diego but borders National City on the east. About 42% of Paradise Hills residents' travel demand is to nearby employment centers, National City and Chula Vista.

Prior to July, 1979, SDT operated fixed-route service from Paradise Hills to National City on Route 12. Since the SDT is a corporation and not a transit district, it can only operate within another city's borders, such as National City, if the other city is willing to pay for the service. In July, 1979, during post-Proposition 13 days, National City decided that SDT's service costs were too high and decided to operate the portion of Fixed-Route 12 within National City themselves, but would not serve Paradise Hills which was outside their jurisdiction.

Subsequently, Paradise Hills residents brought local pressure demands for transit service to feed into express routes to downtown San Diego and into National City. During the next three years, the SDT tried three different, east-west, fixed-route alignments within Paradise Hills in order to serve that community. Cost became a problem in that the subsidy per passenger was more than $5.00 and demand remained low due to the incomplete coverage of the service areas. San Diego Transit (SDT) discontinued fixed-route service in Paradise Hills in July, 1981.

SDT received an UMTA grant to subcontract a taxicab feeder service to Paradise Hills and DART (Direct Access to Regional Transit) was initiated on July 15, 1982. After the UMTA grant funds for the demonstration are finished in Spring of 1984, San Diego Transit has indicated that they will provide operating funds to continue DART.

SDT is responsible for system design, service modifications, project administration, and marketing. The subcontractor, who is Co-op Cab, provides personnel, equipment, a radio dispatch center, and daily supervision. Co-op Cab is a non-profit organization formed in 1977, after the San Diego Taxi industry underwent deregulaton. Co-op Cab's principal business is providing radio dispatching service for independently owned taxicabs. In order to provide incentive, Co-op Cab pays the taxi feeder service drivers the same hourly rate they could average operating an exclusive ride taxi service.

Originally, DART offered service during the peak-period hours, 5:30 a.m. to 9:00 a.m. and 3:30 p.m. to 7:00 p.m., on two-fixed routes (DART-1 and DART-2). These two fixed-routes replaced about half of the fixed-route service that had been discontinued the year before. The cab company also was required to provide demand-responsive service between the off-peak hours, 9:30 a.m. to 3:30 p.m.

A further service change was instituted on November 1, 1982 to increase ridership in East Paradise Hills during the peak-period. One of the peak-period fixed-routes, DART-1 was changed to demand-responsive service both during peak and non-peak hours. DART-2 continued to provide peak-period, fixed-route service for the higher density West Paradise Hills, with a half hour frequency of service.

DART service operates Monday through Friday, from 5:30 a.m. to 7:00 p.m. DART-2 is a feeder service that provides timed transfer connections, with a maximum wait time of ten minutes, to three San Diego Transit routes, two National City Transit routes, and one Chula Vista Transit route. The taxi feeder fare is the same as express route bus service, one dollar, and includes a free transfer to any connecting bus. Seniors and handicapped passengers' fare during non-rush hour service is $0.40. Return trips can be arranged at the same time if the passenger knows his return trip arrival time within two minutes. DART-1 drivers will honk their horn but are not allowed to wait for more than two minutes. Passengers can also make DART-1 reservations one day in advance. Outbound demand-responsive service is provided from a passenger's home to several transfer points. Inbound demand-responsive service is provided from several transfer points to a person's home.

SDT's reimbursement plan with the taxicab company that provided service to Paradise Hills is as follows: Co-op Cab retains all the money its drivers collect, which is subtracted from the amount SDT owes Co-op Cab for providing the service. SDT's reimbursement for the peak-period, demand-responsive service is based on vehicle service hours and mileage, resulting in less cost than the fixed-route service. The fixed-route service payment is based on the number of vehicle service hours Co-op Cab operates. Reimbursement for non-peak service is provided to the taxi company on a per passenger basis. The taxicab company does not dedicate a special fleet of taxis for the demand-responsive service; instead any driver assigned by the dispatcher can pick up a DART passenger, reducing the taxicab company's costs.

According to staff at SDT, before National City removed itself from Route 12 in July, 1979, the subsidy per passenger on the fixed-route service to National City was approximately $2.00. During the interim phase when SDT tried out three different

fixed-route alignments in Paradise Hills, the subsidy per passenger had risen to an amount between $5.00 and $6.00. As of August, 1983, the average passenger subsidy for the taxi-feeder service both for the peak and non-peak periods was $2.18. Another effect of the service change has been that weekly ridership of Paradise Hills residents has increased to over 400 passengers from about 200 Paradise Hills passengers who rode the fixed-route SDT service prior to July, 1979.

EXAMPLE 2

A second example of an ongoing paratransit project is located in Ann Arbor, Michigan. The Ann Arbor Transportation Authority (AATA) operates public transportation service in the Ann Arbor urbanized area and also in the surrounding area. The service area of the AATA has a population of 208,782. The City of Ann Arbor has a population of 108,000, of which 28,000 are students at the University of Michigan. Ann Arbor has a large transit demand for late night service because the University of Michigan generates late night activities.

It was determined that the cost would be too high for the AATA to operate a late night dial-a-ride service. As a result in March, 1982, the Ann Arbor Transportation Authority (AATA) subcontracted to a private taxi operator a late night, demand-responsive, door-to-door, shared-ride service for the general public called Night Ride; this service did not replace any previous service of AATA. AATA started the Night Ride service because of local pressure requesting a dial-a-ride transit service during late night hours to increase public safety. Funding for Night Ride has been provided by an Urban Mass Transportation Administration (UMTA) Demonstration Grant.

Ann Arbor taxi companies are required to operate all night; also, it was well known they had excess capacity during late night hours, a low demand period. The AATA opened discussion

about the possibility of subcontracting Night Ride with the two local taxicab companies.

AATA subcontracted Night Ride to a private operator because the taxi company could provide the service at a lower cost. In order to insure quality of service the AATA specified in their contract with the taxicab company that Night Ride be operated by licensed taxicab drivers using licensed taxicabs.

In order for a private taxi company to be able to provide the Night Ride service, the AATA had to negotiate a waiver from the Ann Arbor Taxicab Ordinance, which prohibited shared rides and required that fares be based on the taximeter. The Taxicab Board agreed to exempt the taxis used for Night Ride from the ordinance because those taxis were reclassified as "mass transit vehicles." The "mass transit vehicles" were exempted as far as fares but not licensing inspection portions of the ordinance.

Night Ride's patronage dips during summer months when a large portion of students leave the city, but during the regular school year patronage counts rose up to 1300 passengers in November, 1982. The subcontracted taxicab company dedicates one to four taxis for the Night Ride under their agreement with AATA. With the City of Ann Arbor, Night Ride operates between the hours of 11:00 p.m. and 6:00 A.M., seven days a week.

The AATA pays Veterans Cab a $7.50 subsidy per vehicle hour and the taxicab company retains all fares. In addition, the AATA pays for a Night Ride telephone line and is repsonsible for marketing. Equipment, personnel, and dispatch service are provided by the taxicab company. The fare is a flat rate of $1.50 per trip, regardless of trip distance. Advance reservations are not necessary, but calls must be made on the day of the trip. The average wait time is between 15 and 20

minutes, but individual wait times are more variable, occasionally as long as 40 minutes. This occurs because at certain times more trips are requested than can be handled by the number of vehicles available. Veteran's Cab usually routes their vehicles so that a series of pickups are made first, followed by a series of drop offs.

EXAMPLE 3

A third example of an ongoing paratransit operation is located in Norfolk, Virginia. The Tidewater Transportation District Commission (TTDC) operates public transportation over a 1,092 square mile area; about one third is urbanized. Five cities, Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach, are members of the Commission. The TTDC serves a population of approximately 800,000. Even though TTDC provides transportation service for five cities, each city must pay for its own service. TTDC was awarded a National Ridesharing Demonstration Program project, sponsored by FHWA and UMTA. State aid funds were also granted to the TTDC.

TTDC had previously discontinued several fixed-route services; this service was substituted with a demand-responsive, door-to-door, dial-a-ride service. The shared-ride taxi service was contracted out to a taxicab company using vans. Originally, the fixed-route system that was replaced were low demand portions of several routes operating from downtown Norfolk to the suburbs. The outer portions of the fixed-route service became very costly to operate because of the low ridership and decreasing available funds. One option was to terminate service altogether. A second option, which TTDC decided to act upon, was to shorten the fixed routes to a major transfer point at the regional shopping mall. Therefore, passengers traveling to the Community of Deep Creek and several other suburban areas could avail themselves of the door-to-door, dial-a-ride service within their community.

The Deep Creek area of Chesapeake is a low density, rural area, with several fast growth suburban developments, bordering the City of Portsmouth. Deep Creek has a population of 19,222 within an area of 19.06 square miles. Fixed-route service to Deep Creek had a history of declining ridership and two hour headways. Finally, bus service was discontinued to Deep Creek in early 1979. After a six month interval of no service, residents of Deep Creek brought demands for transit service to the City Council. As a result, the TTDC decided to initiate a shared-ride taxi service for the Deep Creek service area.

The service concept for Deep Creek transit service was to replace low patronage, two hour headway bus service with dial-a-ride feeder service to the major shopping center with bus connections. The service operates from 6:00 a.m. to 7:00 p.m., Monday through Saturday with at least a 60 minute response time. The fare is $1.50 with a free transfer to connecting buses.

A second service change was made in the City of Norfolk on the Coronado Route. The City of Norfolk has a populaton of 30,520 within an area of six square miles. The Coronado bus route was a low demand route at night. Traditional fixed-route service was replaced with fixed-route jitney service from 9:00 p.m. to midnight daily. This jitney service also operates on weekends all the way into downtown Norfolk, Virginia.

On the Hampton Boulevard Corridor, two parallel routes performed poorly at night. These low demand fixed-routes were replaced with door-to-door, dial-a-ride services from 7:00 p.m. to midnight, daily. As of March, 1981, only one van serves this area and ridership is 885 per month.

The TTDC also subcontracted dial-a-ride services in the urban Community of Ocean View, located in the City of Norfolk. The

fixed-route that was replaced here was a highly circuitous bus route with a history of low ridership. Instead the TTDC has initiated door-to-door, dial-a-ride service. This service was expanded in September, 1981. A fixed-route jitney service was provided during the AM and PM peak periods with demand-responsive service in the off-peak period.

All dial-a-ride, shared taxi services are provided by Yellow Cab of Chesapeake, at $14.00 per vehicle hour. TTDC has estimated that the new service has reduced costs along the outer portions of this route by half. Operational problems have included supervision of the privately operated services, acceptance by Union officials, and control of fare revenues.

The Tidewater Transit District Commission has also subcontracted fixed-route service in the downtown area. In fact, on one fixed-route, two of the runs during low demand periods are subcontracted to a private minibus operator and two of the runs are operated by TTDC. The 13(c) labor contract was revised to include a new classification of minibus driver with a lower wage rate, competitive to the wages of non-union drivers working for transit subcontractors.

Basically, even though the TTDC had trouble renegotiating their 13(c) labor agreement with the local labor union, they basically went ahead with their plans anyway. It seems initially that TTDC's drivers were not interested in the subcontracted routes because the new routes only paid the lower minibus wage rates. Still TTDC's drivers felt that the new service would be a threat to their jobs. Interesting to note, the cab drivers felt the same; they perceived demand-responsive shared-ride taxi service would reduce the number of persons using exclusive-ride taxi service. At this time, the TTDC is in the process of renegotiating the 13(c) labor agreement.

EXAMPLE 4

The Northeastern Illinois Regional Transportation Authority's (RTA) Paratransit Brokerage Demonstration Program was created in 1974 by a region-wide referendum, which imposed local taxes to pay for improved public transportation. The RTA is responsible for providing public transportation in the six county Chicago metropolitan area. The goal of the RTA program is to have municipalities operate and partially fund innovative transit services in areas that cannot support fixed-route, fixed-schedule service. Therefore, the RTA acts as a transit broker, in that they arrange funding of programs by obtaining agreements between federal, state, regional, local agencies, and the provider.

With RTA's decentralized approach to transit brokerage, the RTA does not directly match providers and consumers. Instead the RTA lets local municipalities ascertain their own transit needs and plan for a service that the municipality feels best addresses those needs. The RTA provides technical expertise, brokers money, acts as a technical facilitator, and also coordinates paratransit with conventional service. Under this demonstration project the local governments received grants to operate paratransit service using small buses and taxis.

In order to obtain UMTA funding for the demonstration of the paratransit project a 13(c) Labor Protection Agreement was necessary. Negotiation with labor representatives caused the project a time delay of one year. This one year delay negatively affected the projected cost and timing of the projects. As a direct result, the relationship between the RTA and local officials became strained at the start. Also at a later date in 1980, increased funding was required from UMTA to compensate for inflation. Therefore part of the 13(c) process had to be renegotiated.

RTA staff had worked out an innovative 13(c) agreement, which focused on part-time operators/mechanics, and a wage differential between the regular operators' and the paratransit operators' wage rate. However, the Union agreement that was finally worked out was fairly standard in that union operators were protected. Furthermore, the union was not willing to adjust wage rates so that service costs could be reduced.

When the paratransit project was first initiated, two persons performed this function in the Operations Planning section. Further into the project, paratransit became one of the eight departments reporting directly to the general manager. Also a RTA Board Paratransit Committee was created. The Board had a stated desire to expand the paratransit program. By September, 1982, RTA had almost 30 operating paratransit projects and applications for 98 additional projects.

Deerfield Dial-A-Ride was one of RTA's paratransit brokerage programs. This dial-a-ride service operated for the general public in Deerfield, a low density suburb 24 miles north of Chicago. The community was composed mainly of upper middle income residents. NORTRAN (Northern Suburban Mass Transit District), a public carrier that provides fixed-route, fixed-scheduled service to Deerfield and 20 other suburban communities. NORTRAN fulfilled the 13(c) Labor Protection Agreement requirement of the paratransit project because they were an existing local union operator. NORTRAN already provided peak-hour feeder service to the commuter railroad station, which was RTA funded. Since the dial-a-ride was a non-peak hour service only, drivers could work both routes, thereby cutting the costs of each service.

Problems arose when the RTA cut the Deerfield peak-hour commuter service and operator expenses would no longer be shared between the two projects. As a result, costs rose

dramatically after the first year of service. UMTA funding ended, which was 90% of the project's cost. The RTA was to pick up half of the costs, the other half of the costs would be picked up by the local community. In order to reduce costs the RTA recommended that the community of Deerfield choose another provider to cut costs or reduce service. Since Deerfield was pleased with NORTRAN service, they chose the reduction in service. Total project costs dropped but so did ridership, resulting in reduced RTA reimbursement. Three months later, Deerfield officials decided local costs were too great and the dial-a-ride service was discontinued.

D. IMPLEMENTATION OF PARATRANSIT SERVICE

1. Identification of Lines as Candidates for Paratransit Substitution

The District is currently in the process of developing new Service Standards which will provide a means of evaluating routes for remedial action or deletion, consistent with the District's overall goals and objectives. A procedure contained within the Action Plan (which is the Addendum to the FY 1984-88 Short Range Transit Plan for the District) will be presented to discuss how candidate lines for paratransit substitution may be identified. This procedure was developed in that document to identify lines as candidates for service elimination for the purpose of doing a required analysis of scenarios which required service cuts.

The Action Plan procedure was developed to rank each route on the basis of three performance measures: Revenue-to-cost operating ratio, the number of boardings per revenue bus hour, and passenger miles per seat-mile of revenue service. The revenue-to-cost operating ratio is indicative of the relative recovery of operating costs from farebox revenues on a route.

Routes with low values for this variable require relatively higher subsidies from non-farebox sources and generate the largest savings from service reductions. The number of boardings per revenue bus hour indicates the relative demand for service. Routes with the lowest number of boardings per revenue service hour are utilized by the least number of patrons. The number of passenger miles per seat mile of revenue service measures the average load ratio on each transit route. Low values for this measure indicate that buses are running with excess capacity relative to routes that have high values for this measure. While boardings per bus hour measures productivity in the number of patrons generated by a line, passenger miles per seat-mile measures efficiency in the level of service provided on a route.

The ranking of routes is obtained by developing an index based upon the three selected performance measures. For each performance measure, the highest value observed for all transit routes is selected as the reference point for that performance measure. The index for each Route (I) is then calculated using the following formula:

INDEX (I) = .40 * (OR(I)/OR(REF))
+.35 * (BHB(I)/BHB(REF))
+.25 * (PMPS(I)/PMPS(REF))

WHERE:

INDEX(I) is the Index for Route I;
Operating Ratio weight is .40.
Boardings per bus hour weight is .35.
Passenger miles per seat-mile weight is .25.
OR(I) is the operating ratio for Route I;
BHB(I) is the number of boardings per bus hour for Route I;

PMPS(I) is the number of passenger miles per seat-mile for Route I;

OR(REF) is the highest operating ratio for all routes; BHB(REF) is the highest number of boardings per bus hour for all routes; PMPS(REF) is the highest number of passenger miles per seat-mile for all routes.

These weights were selected to emphasize the importance of cost-effectiveness as measured by the operating ratio, and productivity of routes in generating patronage as measured by boardings per bus hour. The efficiency of service allocation as measured by passenger miles per seat-mile of service is oriented toward express services whereas the boardings per bus hour is oriented towards local services with high patron turnover. Altogether, the ranking methodology identifies the services which provide the least benefit for the greatest cost as candidates for service elimination. It must be emphasized, however, that this procedure was developed only to meet LACTC requirements and has not been adopted as a procedure to be used by the District.

2. Transfer of Service Scenarios

A range of scenarios have been identified from minimum District involvement to service contracting with major District involvement in the provision of support service. These scenarios involve, in ascending order, an increasing amount of District and LACTC involvement in the support and management of private operation of service formerly operated by the District. Scenarios IV through VI involve at least minimal amounts of public funding of the private operators. It is assumed that service subcontracting requires at least a limited amount of subsidy funding to work. Without this funding it appears there is little or no reason for private operators to compete for service contracts compared to the normal Public Utilities Commission (PUC) application process in which public transit Districts are excluded from any involvement other than to submit testimony if the District

opposes the application. A brief discussion of each follows:

Scenario I: Minimum District Involvement

The principal action of the District would be to inform the public and the riders affected of the lines to be suspended. The District would disseminate this information on board the lines to be suspended and other channels immediately following a final decision by the Board of Directors.

Commuter Computer information could be distributed on board to help displaced riders form carpools, vanpools and bus pools. Also the District could develop special brochures to show riders of the suspended lines and the nearest alternative District routes.

The most pertinent operating and ridership statistics could be made available by the District directly to interested private operators. Or preferably, under this minimum involvement scenario, this information would be disseminated by LACTC staff.

Once private bus operators are ready to start operations on specific routes and trips, the District could disseminate information through appropriate channels. Again, under this minimum District involvement scenario, development of this marketing information about the private operators is probably best left to a combination of Commuter Computer and LACTC staff efforts. District assistance in this effort would simply be to disseminate routinely what has been developed and prepared by the other two agencies.

Under this scenario, the District would not support the private operators in any other way. It would be reasonable for the District not to object to joint use of District bus stops, provided no layover is taken in these bus zones. The

District would not provide route information on the private carriers at the stops, but would not object if the carriers affixed route information to the bus stops, with approval in advance from the District Stops and Zones Section.

Scenario II: Assist LACTC and PUC in Application Process; No Other RTD or LACTC Involvement

The primary difference in this scenario with Scenario I is that the District staff would be actively involved in assisting private bus operators to form bus pools and to obtain PUC approval for the operation of these bus pools.

The District staff would also advise and assist the private operators as to various possible modifications to their present mode of operation, which generally can be characterized as subscription service. Modifications for consideration include making the privately operated service more like regularly operated District service which is open to the general public on a daily cash fare basis.

Scenario III: Same as Scenario II with Limited Support Service by LACTC and Possibly Commuter Computer and with District Public Information Support

The primary difference in this scenario compared to Scenario II is a follows: 1) LACTC and possibly Commuter Computer would provide ongoing support service in the areas of route planning, bus scheduling, marketing and public information; 2) District would accept responsibility for dissemination of public information about privately operated services in a more active way compared to Scenarios I and II. Specifically, the District would regularly seek to directly update service information and to make this information available on a timely basis to the public. In addition to brochures, the information might also be made available through the District's telephone information system.

Given the inherent unorganized and unsystematic method of operation of the private commuter operators, acceptance of responsibility for this expanded scope of public information services on behalf of the private operators could become a major and time consuming District effort.

Scenario IV: LACTC Subcontracting with Limited Support Service and with District Public Information Support

This scenario differs from Scenario III in that the LACTC would subcontract the service to private operators. Private operators would, on a competitive basis, bid on the service and would be reimbursed for their net costs on a cost less revenue basis. Specific routes and schedules and standards of service would be set in the service specifications contained in the request for proposal (RFP).

It is assumed that service subcontracting requires at least a limited amount of subsidy funding to work. Without this funding it appears there is little or no reason for private operators to compete for service contracts compared to the normal PUC application process in which public transit districts are excluded from any involvement other than to submit testimony if the District opposes the application. Based on review of current reported operating costs for private operators it is suggested that a mininum subsidy in the range of 10% to 25% of their total operating costs may be necessary to make subcontracting work. If a significant level of support services are included and made a condition of service subcontracting, it is possible that some private operators would be interested in subcontracting without any other form of public funding support.

One important issue that needs to be fully investigated is the legal ramifications of using public funds to support private bus carriers. What rules and regulations and policy

constraints, applicable to District operations, will also apply to private carriers as a result of their receiving public funds? This issue was addressed previously in this report to some extent in regards to Section 13(c) of the Urban Mass Transportation Act of 1964 and the District's Union contract.

Scenario V: District Subcontracting with Limited Support Service, to Include Public Information Support

This scenario differs from Scenario IV in that the District rather than the LACTC would subcontract the service to private operators.

As discussed previously, the District's contracts with the United Transportation Union restricts the subcontracting of services to private carriers. This scenario assumes that the District would obtain approval from the Union. Up to now, the UTU, on behalf of the District's drivers, has been strongly opposed to any form of subcontracting work presently performed by the District's drivers. In this regard, it must also be assumed in this scenario that issues relating to Section 13(c) of the Urban Mass Transportation Act have been resolved.

District subcontracting would include all contract administration and performance monitoring requirements.

Scenario VI: District Subcontracting with Major Support Services

This scenario differs from Scenario V in that additional support services would be provided for the private bus operators.

Under this scenario, full route planning, bus scheduling, public information and marketing services would be provided in the same manner in which District supports its own services. The identification of the service would conform to the District's new route numbering system. Bus stop information would also be provided, similar to the present formats in use.

In the planning and scheduling area, the usual ridership checks and the usual tabulation of operating statistics would be performed. Ongoing schedule and route adjustments would also be carried as indicated by field checks, passengers and general community feedback and other sources of input. Full community relations and customer relations support would be provided, including the handling of complaint calls and letters.

Depending upon pertinent provisions in in the District's union contracts, other support services involving a greater degree of integration into the District compared to the above support services could also be provided. These could include monitoring of service by road supervisors with authority to provide limited directives to private company bus drivers under clearly defined circumstances. Also there could be provision of emergency back-up bus service in the event of a bus breakdown. Under this circumstance, the service contract would probably provide for assessment of charges against the private bus operator, each time District back-up service had to be used.

Lastly, the service operated by private bus operators, whether subscription or regular scheduled service, could use the District's fare structure. Due to the probability of lower subsidy levels (or even no direct subsidy at all) a surcharge could be applied to private bus operators. The surcharge might have to vary between private bus operators and/or between the different routes.

One of the advantages of integration of the private bus operators fare structure with the general District fare structure would be to make it more feasible to disseminate private carrier fare information to the public by the District and for the District to sell passes and tickets, etc., that would be used by the private carrier riders.

Scenario VII: Lease of District Buses to Private Bus Operators

This last item is an option that could be employed in any of the six scenarios outlined above.

District has leased its buses to other transit agencies in other metropolitan areas. The District's union agreements, discussed previously, may prohibit the lease of the District's surplus buses to private bus carriers for use in service formerly operated by the District. Union restrictions as well as the legal ramifications of this option would have to be fully explored.

Lease of District buses for this purpose would provide an immediate supply of buses to private operators. The District would benefit from obtaining some revenue from this source compared to the buses otherwise being stored as part of the District's contingency fleet.

3. Procedural Arrangements

The procedures outlined for the subcontracting of services are broken down into two phases. The first phase establishes basic District policy and procedures. The second phase involves the routine series of steps required every time service is proposed for subcontracting or every time existing service contracts need to be rebid.

Special union approval would be needed if service subcontracting was desired immediately under the present union-management agreements in effect for the United Transportation Union and possibly the other two District unions. The service subcontracting procedures outlined herein are predicated on modification of the present work rules in the three labor agreements to permit service subcontracting.

PHASE I

Establish Basic District Policy and Procedures

Tasks/Steps

Planning Department Proposal*

- Basic Procedures
- Proposed Lines and/or
- Service Packages
- Develop list of potential bidders

NSRB Review and Approval

Board of Directors Review and Approval

*Note: Includes informal discussions and liaison with LACTC staff and with potential bidders on studied service candidates for subcontracting.

PHASE II

Service Subcontracting Steps Following Approval of Policy and Procedures

Tasks/Steps

Planning Department Proposal*

- Cost/Revenue/Net Cost Analysis
- Service Specifications
- Development of RFP packages

NSRB Approval of RFP

Purchasing Committee Approval of RFP
Includes requisition for estimated net cost of service to be paid to subcontractor.

Executive Staff Approval of RFP

Board Approval of RFP

*Note: Includes informal discussions and liaison with LACTC staff and with potential bidders on studied service candidates for subcontracting.

Issue RFP
Minimum 30 days is required but 60 days is a more reasonable response time for this type of RFP.

Close Bidding Period

NSRB Recommend Approval of Contract Award

Executive Staff approve award of contract

Start service under award of contracts

If PUC certification process is required, companies awarded service contracts can proceed to get necessary PUC approval during this period of time.

E. POMONA VALLEY STUDY

1. Background

On May 5, 1982, the SCRTD Board of Directors approved a resolution to study the transportation needs of the Pomona Valley. This action was originally prompted by a request from the cities of Pomona, La Verne, Claremont, and San Dimas who in April of that year asked that the District help develop this study with their cooperation. The overall objective of the study was to improve transportation services in the Pomona Valley.

Subsequent to that time, a special management committee was formed to administer the development of the study. Known as the Project Management Committee (PMC), it is comprised of a

representative from each of the cities mentioned above along with a representative from the San Bernardino Association of Governments (SANBAG), Southern California Association of Governments (SCAG) and the Los Angeles County Transportation Commission (LACTC). In addition, the District's Director of Planning serves as Project Chariman.

On November 11, 1982, the District entered into a contractual agreement with the consulting firm of Schimpeler-Corradino Associates to develop the Study. The cost of the project is $121,000 of which the District has committed $45,000 as its share. The balance of the cost is shared between the four cities of the Pomona Valley, SANBAG and SCAG.

A comprehensive work program was developed by the PMC to guide the consultants' work. The work program contains seven major tasks. Each task is designed to produce a series of specific work products leading to the development of an action plan for service improvements in the Pomona Valley. The following is a list of the seven work tasks and their corresponding objectives:

Task 1: Develop Project Goals and Objectives
Task 2: Data Collection and Definition of Needs
Task 3: Develop Service/Management Alternatives
Task 4: Evaluate/Select Service Alternatives
Task 5: Evaluate/Select Management Alternatives
Task 6: Implementation Plan
Task 7: Final Report and Program Adoption

To date, Tasks 1-6 have been completed by the consultant and approved by the PMC. Task 7, the Final Plan, has also been approved by the PMC and pending formal approval by the four City Councils and the District's Board of Directors. At this time, the Final Plan is scheduled to be presented to the four City Councils on December 15th for conceptual adoption. Formal adoption is scheduled to be taken in January 1984 by the four City Councils and the District's Board of Directors.

2. Service Improvement Plan

The Final Plan recommends a series of improvements to existing fixed-route and paratransit services operating within the Pomona Valley. Collectively, the recommended improvements are designed to form an integral part of a new network of public transportation services for this area. The Service Implementation Plan itself is divided into five principal components. These elements include: (1) the Recommended Service Plan; (2) an Optional Operating Plan; 3) a Pilot Demonstration Project; (4) Other Service Improvements; and (5) a Monitoring Program.

The Recommended Service Plan is the primary component of the Implementation Plan. It addresses improvements to SCRTD services as well as improvements to paratransit services for the elderly and handicapped. Issues included in the Recommended Service Plan include a five-year program for: (1) staging of improvements; (2) annual capital and operating costs; (3) annual ridership and revenue projections; (4) implementation responsibilities; (5) estimated financial resources; (6) financing plans for capital and operating costs; and (7) service equity.

Under the Recommended Service Plan, SCRTD fixed-route improvements are proposed to be implemented in early 1984. Several SCRTD bus lines are affected. As proposed, regional Lines 187, 480 and 482 would undergo route modifications designed to improve mobility both within the Pomona Valley and to the Montclair area of San Bernardino County. Local Lines 192, 194, 291 and 293 are proposed to be discontinued. The more productive portions of these routes, however, are proposed to be retained and operated primarily by new local Routes 1 and 2. These new routes will be implemented and operated exclusively within the Pomona Valley. These improvements to the fixed-route system may be implemented by

redeploying existing equipment and at no increase in operating costs. A slight decrease in vehicle hours is projected. The District would continue to manage and operate all fixed-route service as it does today.

Improvements to existing paratransit service for the elderly and handicapped are proposed to be implemented after July 1984. As proposed, existing paratransit services for this targeted market will be greatly expanded. Ownership and management of this system will be administered through a Joint Powers Authority (JPA) comprised of the Cities of La Verne, San Dimas, Pomona, and Claremont. The District may be asked to participate as an advisory JPA member only. The JPA is recommended to be formed early in 1984 and will assume all responsibility for the operation and maintenance of paratransit services in the Pomona Valley.

An Optional Operating Plan is the second component of the Implementation Plan. This section is included as a contingency plan in light of the uncertainties facing SCRTD in July 1985 with the possible expiration of the Proposition A Fare Program and its impact on District services. Under this scenario, strategy options are identified that could be used by the JPA to replace local fixed-route service in the Pomona Valley with paratransit services. This option would only be exercised in the event that SCRTD would be forced to remove service from the area as part of an economy move associated with expiration of the current Proposition A Fare Program.

A pilot demonstration project for the general public is the third element of the Implementation Plan. The pilot program is an experimental demand-response system proposed to provide service for the general public in the Pomona Valley. Ownership and management of this system will be the sole responsibility of the JPA. This system is proposed to be implemented after July 1985 and operate for a period of one

year, which may be extended at the discretion of the JPA. This system along with the elderly and handicapped system described above will be coordinated with the fixed-route system to allow for the transfer of riders at key transfer locations within the Pomona Valley.

The fourth element of the Implementation Plan addressed the Monitoring Program. The monitoring program is included as a decision-making tool for the JPA to ensure the efficiency and effectiveness of their paratransit services.

3. Feasibility

The study assumes the area will be declared a Transportation Zone. With a Transportation Zone status, the area would qualify for regional and federal subsidies to support paratransit services in the Pomona Valley. Without this status it is doubtful that the area could qualify for any change in the amount of regional and federal dollars currently allocated to the region. Hence, proposed increases in paratransit service levels would not be possible. The LACTC must decide whether the Pomona Valley warrants Transportation Zone status and is expected to begin to act upon this matter after completion of the study.

F. CONCLUSION

Two broad categories of substituting private carriers for District service exists: 1) suspending existing service for private carrier substitution and 2) the subcontracting of service to private carriers.

Under the first category, in order to induce carriers to provide service on unprofitable lines, SCRTD would have to allow them to set the fares and levels of service characteristics relatively freely. This may result in a higher quality of service at higher

fares. As a public carrier, a minimum level of District service may still have to be maintained at regular fares in order to serve the general public equitably for services the private carrier may deem unprofitable. There also is the distinct possibility that in certain situations a lower level of service would eventually be provided to ensure profitability.

The second category, subcontracting service to private carriers, would permit the District to regulate the fare and the level and quality of service to be consistent with the District's service standards and goals. At least a limited amount of subsidy would be necessary to induce private operators to compete. If private carrier operating costs were substantially lower, however, this option could still be considered cost-effective.

Paratransit costs have been found to be about $25.00 (FY 1982-83) per vehicle hour including overhead and administrative costs. This compares to the District's cost per bus hour of $55.00 (FY 1982-83). The maximum that can be carried by a dial-a-ride service (in many-to-many mode), however, is about eight boardings per hour. This is lower than the least productive District service when computed on an all day basis. A comparative analysis was made of SCRTD's fixed-route lines 451-453 and 452-454 and the hypothetical substitute of dial-a-ride service. This analysis showed that the cost of providing such service would not be substantially lower in cost. In fact, one clear conclusion to be drawn from the theoretical comparison is that for the same total operating cost and for the same cost per passenger (boarding), only under the most favorable assumptions and circumstances will the same number of passengers be served with paratransit service compared to the present fixed-route services.

Paratransit service cannot be considered a more cost-effective substitute for fixed-route service. Each mode serves different markets. The one and possibly only important exception may be night and Sunday service in some low density fringe areas.

Paratransit could, however, be viewed as a supplement and a complement to fixed service.

The above opinion was substantiated by the OCTD dial-a-ride project manager. OCTD has had ten years of operating experience with various dial-a-ride services in various portions of their service area. In this regard, it is important to note that OCTD's ability to subcontract service is a key factor in making their present comprehensive dial-a-ride services both operationally and financially feasible.

While the subcontracting of services to private operators will soon be permitted by State law, there are still a number of union labor issues which must be resolved. The District's contract with UTU prohibits subcontracting to private agencies and, in the past, the UTU has been strongly opposed to any form of subcontracting work presently performed by the District's drivers. Additionally, Section 13(c) of the Urban Mass Transportation Act of 1964 requires protective arrangements for employees who might be adversely affected by a project assisted with federal funds. Thus, should Union representatives view subcontracting as a threat to union jobs, it is likely that they may seek protection under this requirement and federal funding could be witheld.

With respect to consideration of possible service subcontracting by the District, although a cautious experimental approach appears prudent, there is the potential for many benefits, including innovations in public-private bus carrier joint and cooperative efforts, if the District could subcontract selected fixed-route services. For example, service operated by private carrier under District service contracts, could under the right circumstances, provide full District support services to the public while at the same time saving on the costs of operation per unit of service. This procedure would also avoid the potential problem of the PUC granting permanent operating rights to private carriers within the District's service area.

These innovations would not necessarily have adverse effects on the District's unionized labor force. Perhaps various assurances can be offered in the contract negotiations to allay union fears that a large scale transfer of unionized jobs to the private sector would occur. It appears a compromise oriented approach would be to seek Union concurrence for the District to experiment with service subcontracting in a limited fashion over the life of the next labor contract.

III. Internal Management Cost Reduction Alternatives

A. Investigation of budgetary savings resulting from vacant positions included in the Fiscal Year 1984 Budget.

In order to determine the budgetary savings resulting from vacant positions, it is necessary to examine current labor expenditure patterns, current and historical vacancy trends and other related issues (e.g., the amount of time needed to fill a contract or non-contract position once it becomes vacant). All of this information was obtained from periodic reports published by either the Accounting or Personnel Departments and through discussions with Personnel Department employees assigned position control responsibilities.

1. Identify current position vacancies in all labor groups with the aid of Personnel Department.

   The Personnel Department's "Non-Contract Vacancy Status Report" provided information concerning job vacancies in that labor group for the period between July and November 1983. The position vacancies for all Contract labor groups change on a daily basis and are difficult to establish. This constant change, and the relatively small salary savings, in Contract labor groups is a result of using internal promotions and job bidding to fill vacancies. In many instances, only entry level Contract vacancies are filled from outside the District, but even these are filled quickly due to the use of eligibility lists. Current Contract vacancies have therefore not been studied further.

2. Acquire historical information on position vacancies from Personnel and use this to project vacancies for the remainder of Fiscal Year 1984.

   Discussions with Personnel Department employees enabled staff to estimate the length of time that current Non-Contract position vacancies would remain unfilled. Reports containing information regarding terminations for any reason for each of the last twelve months were used to determine the projected vacancies for the last half of Fiscal Year 1984.

3. Project savings from vacancies based on budgeted and actual amounts.

Salary savings for Fiscal Year 1984 to date are displayed in Figure A-1. The most significant savings have historically been in the Non-Contract labor group and this trend is expected to continue. Savings for the balance of the year were calculated by projecting the number of vacancies expected monthly based on the current actual number of vacancies, average monthly Non-Contract turn-over and average monthly Non-Contract hires. This was multiplied by the average Non-Contract employee monthly salary of $2,700. This process yielded a projected savings of $2,381,400 for the seven month balance of the Fiscal Year, which added to the savings to date constitutes a total of $4,615,400 for the year in Non-Contract salary savings.

This is consistent with the expectation that savings are somewhat higher toward the beginning of the Fiscal Year when new positions are authorized. However, it is estimated that at least $2,000,000 of these savings will be in grant funded positions. If the funds are not expended, there is a corresponding decrease in revenue from these grants and the net budgetary savings is zero. Subtracting the grant-funded positions in the Metro Rail and the Employee Development Departments the estimated Non-Contract budgetary savings becomes $2,615,000. This investigation of budgetary savings resulting from vacant positions has focused upon Non-Contract positions. The most recent monthly Revenue and Expense Statement (Blue Book) shows that this employee group has the greatest potential for budgetary savings. At least part of these budgetary savings result from the length of time it has taken to recruit and hire quality technical and professional Non-Contract personnel while these positions were budgeted for twelve months. As stated earlier, this is not the case with Contract positions. Also working against the possibility of Contract salary budgetary savings are the effects of increased overtime due to service

FIGURE A-1

LABOR

	CONTRACT	NON-CONTRACT	TOTAL
FY 1983 Budget	$188,747,000/82%	$40,167,000/18%	$228,914,000/100%
FY 1983 Actual	$186,456,000/83%	$39,127,000/17%	$225,583,000/100%
FY 1983 Budget Savings	$ 2,291,000/69%	$ 1,040,000/31%	$ 3,331,000/100%
FY 1984 YTD Budget	$ 64,397,000/81%	$14,762,000/19%	$ 79,159,000/100%
FY 1984 YTD Actual	$ 63,792,000/84%	$12,428,000/16%	$ 76,220,000/100%
FY 1984 YTD Budget Savings	$ 605,000/21%	$ 2,334,000/79%	$ 2,939,000/100%

increases, recent significant Cost of Living Adjustments (COLA) increases for Contract workers, and the underfunding of additional Contract personnel under the recent service augmentation. All of these factors negatively impact potential Contract salary budgetary savings.

Figure A-1 shows the disproportionate budgetary savings from Non-Contract labor as compared to Contract labor.

B. Investigation of actual costs of District medical and dental plans versus budgeted costs.

1. Work with Benefits Administrator to determine rate of expenditures year to date.

While working with the Benefits Administrator and the monthly expenditure data which he compiles, it was determined that the District has incurred medical and dental premium expenditures totaling $9,018,000 as of November, 1983. A monthly detail by employee group is reflected in Figure B-1. There is some fluctuation month to month, as noted on the exhibit, due to increases/decreases in employment levels.

2. Forecast future medical and dental plan premiums based upon informal bids to be submitted prior to current plans expiration on January 1, 1984.

Forecasting future medical and dental plan premiums beyond one year is very difficult due to the volatile state of the health care industry. Non-Contract employees' current plans expire on January 1, 1984 and the recommended renewals were approved by the Board, October 20, 1983.

Last year, the Non-Contract overall premium increase was down well below the norm and the 1984 requested premium rate will go down from the 1983 rate by 1.3%. The Contract employees' medical and dental plans which are a part of the individual union contracts expire June of each year. There will not be any cost savings realized this year on the Contract employees' premium rates as they remain fixed for the entire fiscal year.

FIGURE B-1

MEDICAL AND DENTAL EXPENDITURE

BY GROUP

	UTU	ATU	BRAC	N/C
JULY	$1,049,155	$ 391,997	$110,980	$277,595
AUGUST	1,047,556	392,193	116,511	279,083
SEPTEMBER	1,040,705	389,044	115,584	280,503
OCTOBER	1,042,303	388,959	117,801	280,934
NOVEMBER	1,045,959	390,022	123,519	283,328
LESS EMPLOYEE CONTRIBUTION				-145,469
YEAR TO DATE TOTAL	$5,225,678	$1,952,215	$584,395	$1,255,975

Based upon the new proposed Non-Contract premium rates and the existing Contract premium rates which were obtained from the Benefits Administrator, and the forecasted level of employment, it is now estimated that total medical and dental premium expenditures for the year will be $21,605,000.

3. Estimate variance (+ or -) from budgeted amounts for medical and dental plans.

The expenditure level for insurance premiums is determined by the premium rate and the total number of employees receiving insurance subsidies. The Fiscal Year 1984 Budget included funds at a level of 4,250 full-time operators. At the present time, there are 4,480 full-time operators. This increase in personnel, coupled with lesser increases in other Contract groups, will require an additional $1,394,300 in premium expenditures. Non-Contract expenditures are down $734,000 due to the 1.3% saving on the new premium rates and vacancy saving on unfilled positions. The net increase in total premium expenditures is estimated to be $660,000.

C. Examination of the District's self-insured programs (PL/PD) for potential budget savings.

Since 1973, the District has been self-insured for Workers Compensation and Public Liability and Property Damage (PL/PD). The purpose of this analysis is to examine the PL and PD programs for potential budget savings during Fiscal Year 1984.

The District's self-insurance limit is $1.5 million per occurrence for Public Liability and Property Damage. For each PL or PD claim, an estimate is made of the current value of the claim, based on injury, lost earnings, disability, general damages for pain and suffering, the District's liability for the accident, comparative negligence of a third-party claimant, property damage, the cost of medical care and future medical expenses, and defense attorney fees. A reserve estimate which is established for each claim incorporates these costs. The estimated amount is added to District's reserve account. This reserve account is continually adjusted to reflect new claims,

changes in the anticipated costs of existing claims, and payments on settled claims.

An amount is budgeted annually to cover adjustments to the reserve for the estimated cost of new claims which will be filed during the budget year, plus a sum to accommodate changes in the value of claims pending at the beginning of the year. For Fiscal Year 1984, $29,840,900 has been budgeted.

1. Establish Fiscal Year 1984 PL/PD payments (actual) versus the budgeted amounts for these programs.

   Figure C-1 shows budgeted amounts, actual payments and monthly variances for the 16 months from July 1982 through October 1983. The budget variance at the end of Fiscal 1983 was $150,000 or .5% under budget. As of the end of October 1983, the Fiscal Year 1984 budget variance was $946,069 or 9.8%.

   The "actual payments" reflect adjustments to the reserve to account for changes in anticipated costs of claims as well as for amounts to cover new claims. Because the statute of limitations gives a claimant 100 days to file a claim, and because it may take several more months to investigate a claim and develop a valid estimate of incurred losses, it is not usually possible to establish an accurate reserve immediately following an accident.

   Hence, "actual payments" are apt to vary widely from month to month and as a result, there may be wide fluctuations in monthly variances. Beginning with Fiscal Year 1984, the Insurance Department has been performing a monthly trend analysis in order to more accurately evaluate the adequacy of the reserve balance. With this information, it may be possible to more accurately budget monthly costs, thereby reducing the magnitude of monthly variances.

2. Project the District's future dollar liability for these programs based upon cases pending.

   The District's liability for PL and PD claims, based on cases pending, is estimated by the claims administrator on an on-going basis through the process of establishing and revising the reserve for each claim. While it is likely

FIGURE C-1

MONTHLY PL AND PD EXPENDITURES

	BUDGET	ACTUAL	MONTHLY VARIANCE
JUL 1982	$ 2,000,000	$ 2,000,000	$ 0
AUG 1982	2,000,000	1,491,109	508,891
SEP 1982	2,000,000	2,758,891	(758,891)
OCT 1982	2,000,000	2,000,000	0
NOV 1982	2,000,000	2,000,000	0
DEC 1982	2,000,000	2,100,000	(100,000)
JAN 1983	2,000,000	2,750,000	(750,000)
FEB 1983	2,000,000	2,749,431	(749,431)
MAR 1983	2,000,000	3,000,569	(1,000,569)
APR 1983	3,000,000	2,000,000	1,000,000
MAY 1983	3,000,000	2,000,000	1,000,000
JUN 1983	3,000,000	2,000,000	1,000,000
TOTAL	$27,000,000	$26,850,000	$ 150,000
JUL 1983	$ 2,263,900	$ 2,199,199	$ 64,701
AUG 1983	2,263,900	2,100,000	163,900
SEP 1983	2,829,700	2,375,801	453,899
OCT 1983	2,263,900	2,000,331	263,569
YEAR TO DATE	$ 9,621,400	$ 8,675,331	$ 946,069

that some claims will be settled without payment or for considerably less than their reserves, there are other claims which are still being investigated and for which the reserves will be determined to be inadequate. The existing reserve balance, which was $87.3 million at the end of September 1983 is a conservative estimate of the District's future liability for cases pending.

3. Research historical information on seasonal ebb/flow of claims.

Figure C-2 correlates claim data with seasonal climatic conditions. The number of claims incurred is shown by quarter since July 1980, when L. J. Russo, Inc. became the District's claims administrator. Data for the past two years indicates that there is some correlation between the number of claims and weather conditions. The rainy season occurs primarily during the third quarter, and in Fiscal Years 1982 and 1983, the highest claims per quarter occurred during the third quarter. The correlation between number of claims and weather conditions is not expressly incorporated into either the trend analysis performed by the Insurance Department or this evaluation. It should be noted, however, that if there were an unusually high accident rate and consequently, an abnormally high claim rate as a result of rainy weather conditions, the effect would be to reduce any potential savings in the amount budgeted for PL and PD reserve adjustments.

4. Calculate variance (+ or -) between actual and budgeted amounts for these programs.

As of October 1983, the cumulative variance from budget for PL and PD is $946,069 or 9.8%.

The Insurance Department's trend analysis projects values for outstanding claims on the basis of past growth rates in claim values. Based on this data and on average monthly payments, the Department makes a monthly projection of incurred losses for the PL and PD program. The Department's most recent analysis indicates a savings of at least

PL & PD CLAIMS

By Quarter

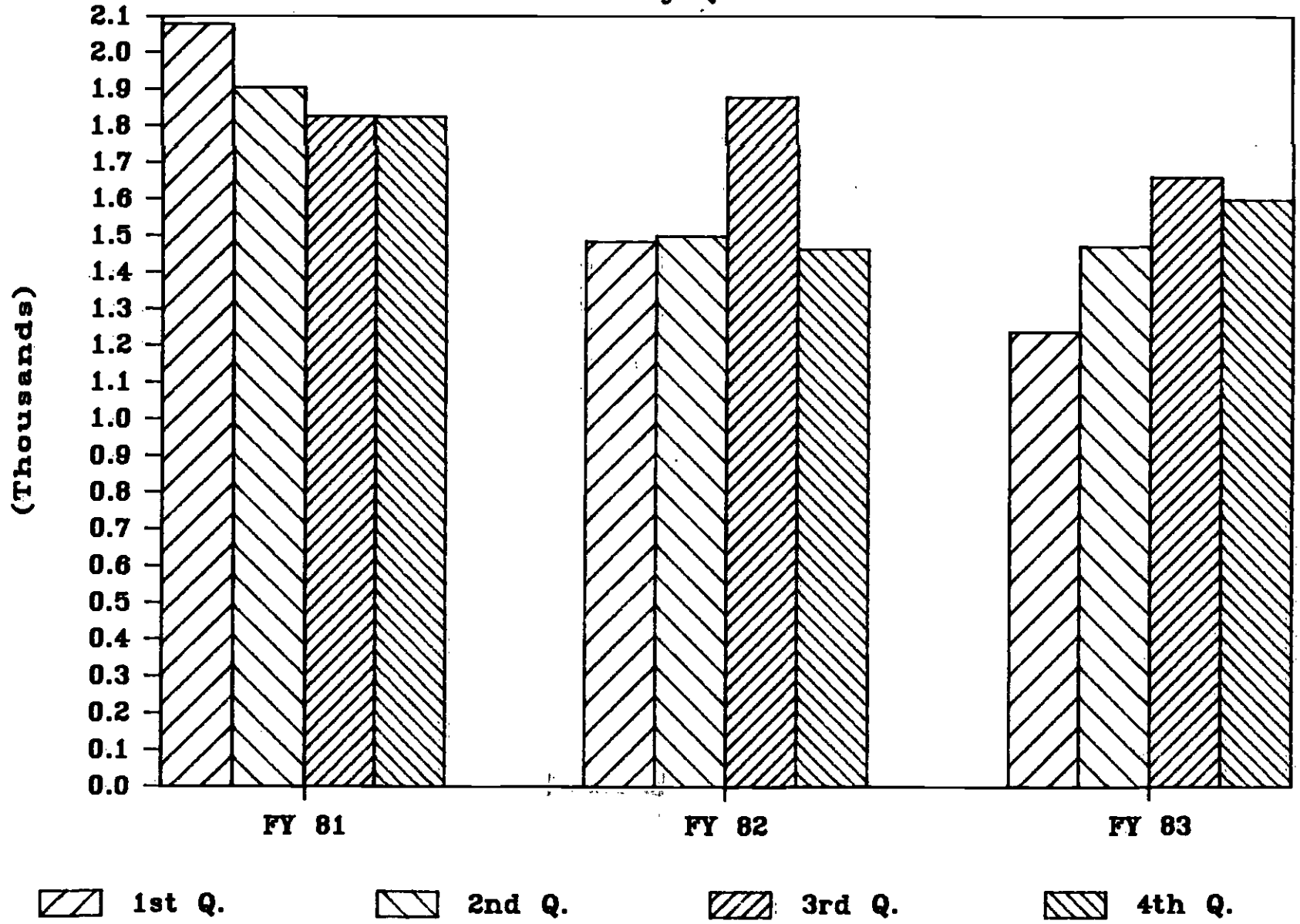


FIGURE C-2

$3,000,000 in the amount budgeted to cover reserve adjustments during Fiscal Year 1984.

Again, it should be noted that any unusually high claim rate, as, for example, a result of bad weather during the rainy season, would increase the reserve which covers incurred losses. The net effect would be to increase payments to the reserve, thereby decreasing the savings currently projected for the current fiscal year.

D. Studying the current use of Part-time operators to determine if the full potential of this labor group is being utilized.

1. Determine if the full complement of part-time operators allowed is available for work.

The maximum number of part-time operators allowed is determined by the District's labor agreement. The District must guarantee a particular number of full-time operator positions in order to be allowed a particular percentage of part-time operators. The Fiscal Year 1984 Budget called for a 12.3% parttime operator ratio. This ratio was based on estimates of the total number of assignments available and on the contractual requirement to maintain a minimum number (4,250) of full-time operators after January 1, 1983. Part-time operators were added until all assignments were covered at the target operator ratio of 1.30. This process yielded a staffing configuration of 12.3% part-time operators, although the contractual constraint at this time was actually 14%.

With the service augmentation this fall, the District was in a position to maintain full-time positions in excess of 4,300, thus becoming eligible to increase the part-time ratio to 15% of the operator work force. The District has in fact adopted the 15% figure as a goal and budget revisions for the service augmentation will be based on the 15% ratio.

If achieved, this will represent savings over operating the same service with fewer part-time operators. However, it does not represent a savings over the originally anticipated

lower level of service. A number of constraints have prevented the District from meeting these established goals. The rapid addition of service at the beginning of Fiscal Year 1984 required a rapid increase in the operator work force. The only way to meet this need within the time constraints was to convert already trained part-time operators to full-time.

This also requires time and training because of the additional lines with which the operators must become familiar. However, it eliminates recruitment, screening and basic training time. The number of conversions has caused the part-time operator ratio to decline since the beginning of Fiscal Year 1984. The District is now concentrating its resources on recruiting and training new part-time operators. Basic training capacity is being doubled to meet the newly established goals before the time at which these resources must be re-directed to Olympics service. In the interim, however, the parttime operator ratio is currently not only below the maximum allowable number, but also below the number budgeted, as illustrated in Figure D-1.

2. Study the number of hours worked by the average part-time operator compared to the maximum allowable.

Maximum Allowable Hours	5.00
Actual Hours	3.75-4.00

The maximum number of work hours allowable for part-time operators is five hours per day, five days per week. This maximum is established by the District's labor agreements. The average number of hours worked has been estimated by two different methods. A tally of work runs assigned to part-time operators approximately one year ago found that these assignments averaged 3 hours, 58 minutes. An analysis of the District Payroll Section's labor distribution reports from January, 1983 through November, 1983 indicates an average work day of 3 hours, 46 minutes during this period.

PART—TIME OPERATOR RATIO

(by 4—4—5 accounting period)

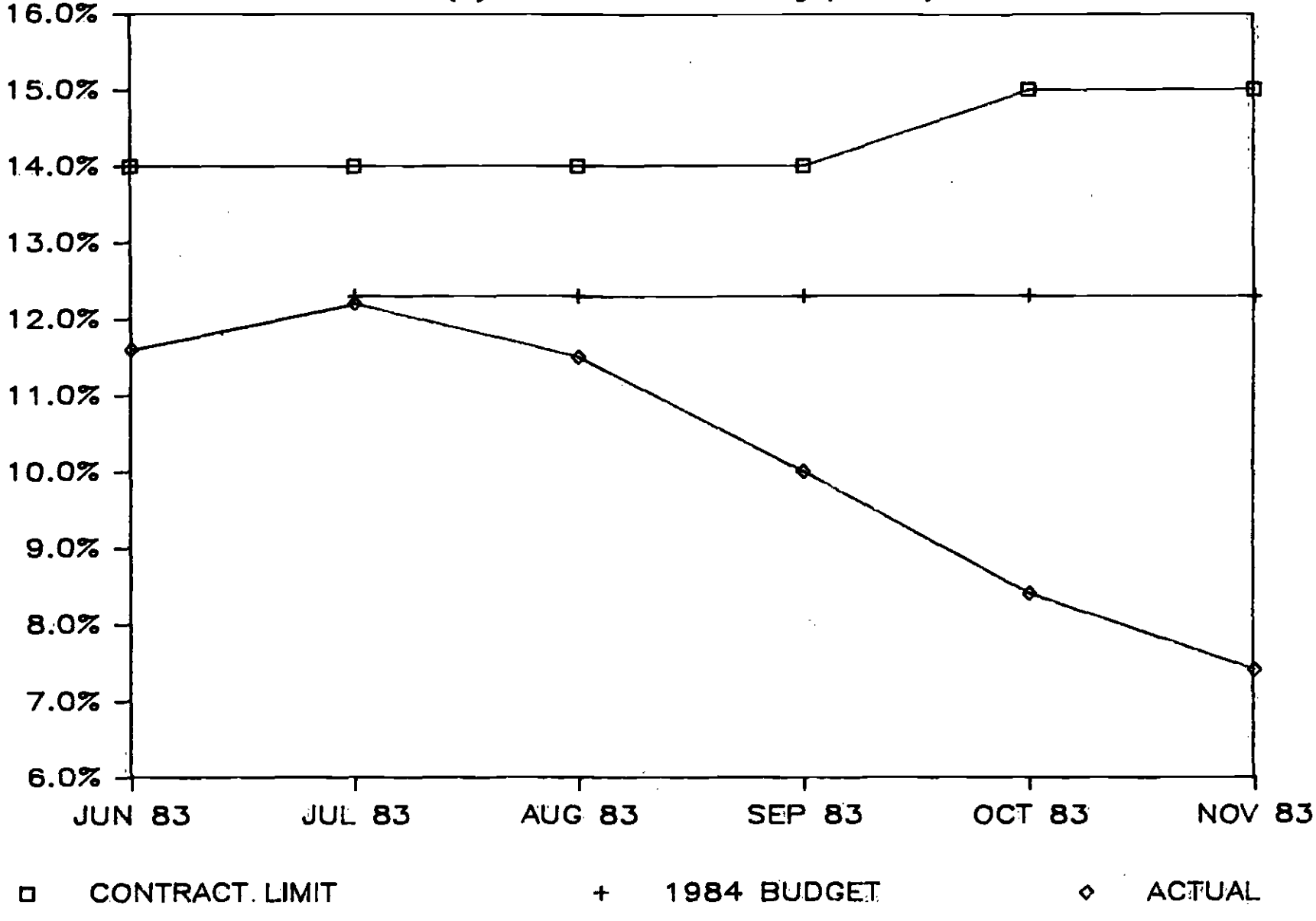


FIGURE D-1

Both of these methodologies represent indirect measures. Therefore, it is fair to state that the average part-time operator works between 3-3/4 hours and 4-hours per day. As discussed below, the assignment of part-time operators is tied to specific scheduled bus runs. The assignment of these operators to longer pieces of work would not necessarily represent a cost savings.

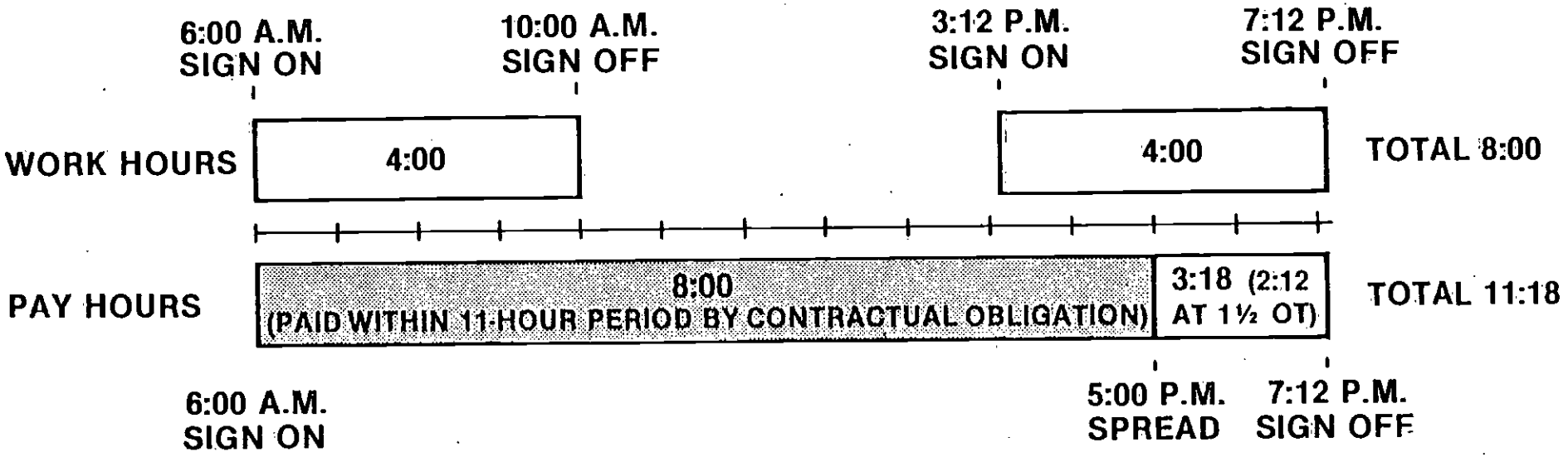
3. Analyze the assignment of part-time operators to scheduled runs.

The assignment of part-time operators to scheduled runs is conducted according to a computer generated priority listing. This listing is created from an internal comparison of all eligible runs in each division with morning and afternoon trips handled independently. Eligible runs are those between 2-1/2 and 5 hours long which are "non-biddable trippers" and which have at least three hours of "spread time" (idle time) between the end of the morning piece and the beginning of the afternoon piece. Were the spread time less than 3 hours, these would be combined into regular runs. Since they are not regular runs, the staffing decision facing the District is whether to assign them to Extra Board operators or whether to assign them to part-time operators.

It is this decision that the computer priority listing is designed to make on the basis of cost savings. The prioritization takes into account the different manner in which salaries are calculated for part-time operators and for Extra Board operators. This is illustrated in Figure D-2. The initial ranking is based on minimizing overtime pay (at time and a half) to Extra Board operators by assigning the earliest and latest runs of the day the highest part-time priority. Since part-time operators never work more than five hours, they are never eligible for overtime pay. This ranking is then refined by taking into account the actual time worked and the hours paid to the part-time

Comparative Pay Hours for Typical Tripper Pair

WORKED BY FULL-TIME OPERATOR



WORKED BY TWO PART-TIME OPERATORS

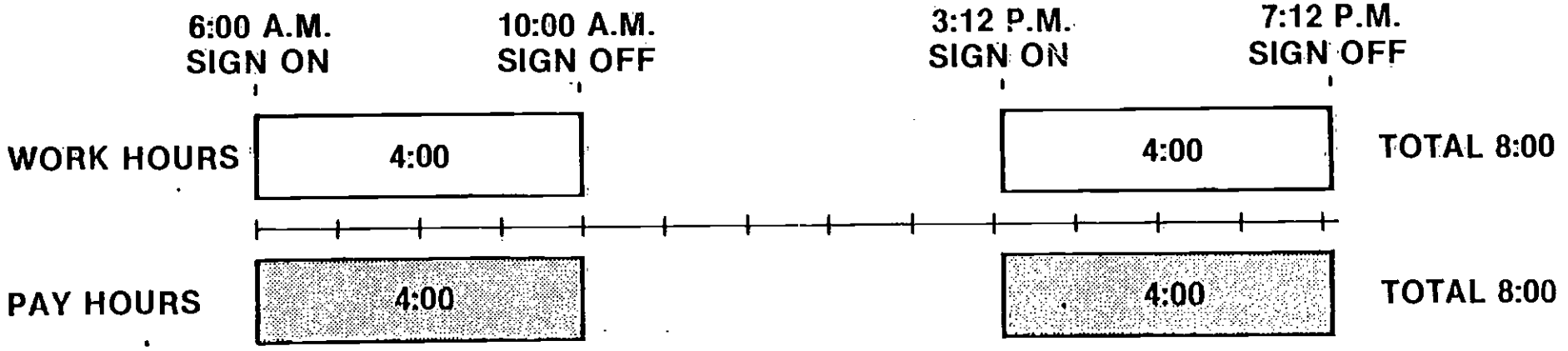


FIGURE D-2

operator. Each individual run is compared by the computer program to the one ranked below it. If a switch in ranking would be more cost effective, that switch is made until no further switches would improve the cost effectiveness of the ranking.

In general, the District will gain the greatest savings by assigning shorter pieces of work to part-time operators because they are paid only for time actually worked, while Extra Board operators are paid for spread time, which may include idle time. However, the computer program allows this general rule to be re-tested in each individual case by an actual calculation of pay hours.

A priority assignment print-out of the type actually provided to Division Management is shown as Figure D-3. The District believes that the priority ranking does represent the most efficient means possible of assigning part-time operators to scheduled runs. Lack of adherence to this priority ranking has been caused by conflicting managerial considerations such as responsiveness to operator preferences or hardships. Currently, the list is being utilized as a guideline, but not as an absolute constraint. Stricter adherence to the list is planned to be implemented progressively as the part-time operator ratio increases. In accordance with this plan, the efficiency of the staffing pattern should improve dramatically in the second half of the Fiscal Year.

4. Estimate impact of part-time operators on full-time operator overtime costs.

As illustrated in Figure D-4, (and also described in question 5 below) each assignment covered by two part-time operators instead of one full-time operator saves the District an average of 2.2 scheduled overtime hours or 3.3 pay hours per day. This equates to 858 pay hours per year or .4 person-years based on a 40 hour work week; alternately, based on an operator's typical 56 hour work week, it equates to a saving of .3 person-years.

T8U000

PAGE 1 OF 9 -- AM ASSIGNMENTS -- (RUN DATE 101083)

NON-PIDDABLE AM TRIPPERS EFFECTIVE 10-16-83
- PART TIME ELIGIBLE -
DIVISION - 3201

PRIOR-ITY	RUN NO.	SIGN ON	SIGN OFF	WORK TIME	NAME	BADGE NO.
1	33-501	432	804	332		
2	16-501	504	816	312		
3	463-501	515	814	259		
4	56-501	510	818	308		
5	33-502	511	822	311		
6	69-502	512	823	311		
7	30-501	509	831	322		
8	55-501	455	844	349		
9	18-502	515	836	321		

FIGURE D-3

Figure D-4

Staffing Change	Per Operator Equivalent	Per 50 Operator Equivalent
Overtime Hours Daily	2.2	110
Pay Hours Daily	3.3	165
Pay Hours Weekly	16.5	825
System Impact		
Pay Hours Yearly	858	42,900
Operator Impact		
Pay Hours Weekly	Less than .01	.2

When this change is averaged over the total number of full-time operators, however, the impact on the individual operator's pay is small. Exchanging 50 full-time operators for 100 part-time operators would save 825 pay hours per week, which would in turn reduce the average pay hours for 4,250 operators by .2 hours or 12 minutes per week.

5. Estimate potential additional savings to be realized by adjusting and/or increasing use of part-time operators and identify actions which must be taken.

Figure D-5 indicates the average savings to be realized for each potential operator position filled by 2 part-time operators.

For each required operator equivalent, savings of approximately $21,300 may be realized by utilizing two part-time operators rather than one full-time operator to cover the assignment, even assuming an identical wage rate.

Running the current expanded level of service with 15% part-time operators rather than the originally planned 12.3% could create annual savings of $1,554,900 as follows:

Part-Time Ratio	Assign.	Operator FTE* Req.	# PT Op.	# FT Op.	Additional P.T. Staffing Pairs	$ Saved
12.3	3,600	4,680	612	4,374	---	---
15.0	3,600	4,680	758	4,301	74	$1,554,900
Saved over 4 months (March - June, 1984)						$518,300

* Full-Time Equivalent

The RTD has undertaken the following actions to achieve these savings:

1) The goal of 15% part-time operators has been adopted by the Transportation Department.
2) Budget and personnel plans adjusted to support the service augmentation have been based on the 15% ratio.

Figure D-5

A. WAGES AND FRINGES	FULL-TIME OPERATORS	PART-TIME OPERATORS
x Average Daily Pay Hours	11.3	2 x 4 hours
= Total Daily Pay Hours	11.3	8
x Average Hourly Wage	$10.75	$10.75
= Daily Pay	$121.48	$86.00
x 260 Work Days Per Year	x 260	x 260
= Yearly Pay	$31,584	$22,360
x non-work time factor	x .87	x 1
= Yearly Pay	$27,478	$22,360
+ Fringes	43%	9%
= Yearly Expenditure	$39,294	$24,372

B. ABSENTEE COVERAGE	1 OPERATOR	1 OPERATOR EQUIVALENT
x Factor	x .32	x .18
= No. Covering Operators	.32	.18
x Daily Pay Hours	11.3	11.3
= Total Daily Pay Hours	3.62	2.03
x Average Hourly Rate	$10.75	$10.75
= Daily Pay	$38.92	$21.82
x 260 Work Days Per Year	x 260	x 260
= Yearly Pay	$10,119.20	$5,673.20
+ Fringes	43%	43%
= Yearly Expenditure	$14,470.46	$8,112.68

C. LABOR COST DIFFERENTIAL (Rounded to Nearest $100)

	Full-Time	Part-Time	Difference
Wages and Fringes	$39,300	$24,400	
Absentee Coverage	$14,500	$ 8,100	
Total	$53,800	$32,500	$21,300

d. On-Board Survey

In June of 1983, the data collection phase of a large scale on-board survey was completed. The survey was the largest survey ever taken by RTD. Over 200,000 questionnaires were handed out on 95% of RTD's lines, with an approximate return of 25 to 30%. This survey was also one of the most complex transit surveys every attempted (See Attachment C for a copy of the questionnaire).

There were two important purposes for taking such a large and detailed survey. First, RTD wanted to obtain origin/destination and mode-of-arrival data on its riders, in order to update the transit trip tables currently in use at RTD. In turn, this would be used to validate the patronage and bus assignment projections of the RTD models. These projections are very important in planning the future rail and line haul transit programs for Los Angeles.

The Second purpose of the survey was to verify the socioeconomic characteristics, the time of day, and distance of the trips made by RTD's patrons.

Factors such as the characteristics of peak versus non-peak riders, transit use patterns of the elderly, handicapped and student riders, and average trip lengths of the various categories of patrons will be used to evaluate new transit pricing strategies. The strategies to be evaluated include distance-based fares and peak period pricing. By ascertaining the effect these strategies would have on the ridership, RTD could evaluate the equity of adopting such a fare structure.

e. Line Segmentation Analysis

RTD is now preparing, under a grant from UMTA, a software package that will allow planners to evaluate patronage patterns by time of day and location. The package will be user-oriented. Various reports, all taken from the extensive ridership database, will be available. For example, information on individual bus stops or whole transit corridors could be isolated quickly. Currently, this is a tedious and time consuming process.

The package will allow a quicker and more accurate evaluation of bus service performance. This, in turn, should translate into more efficient scheduling and earlier identification of service inadequacies.

2. Longer Term Projects

a. User Side Subsidies

The District has had modest success with two user side subsidy programs. One program involves District sale of tokens to merchant associations. The tokens are then distributed to shoppers for a specified minimum purchase ($5 - $15). Two cities have also purchased tokens from the District for distribution to merchants. A second program involves employer subsidized sale of District passes to employees. In both cases, the District sale of the fare media (tokens and passes) is at full value, i.e. no discounts.

When the Reduced Fare Program ends in July 1985, there will be a much greater need for these two user side fare subsidy programs. They will be needed to mitigate the impact upon the rider of the steep fare increase and to lessen the ridership loss from the higher fares.

In addition to expanding existing programs, the District will consider new user side programs. One area for study will be the elimination of discount fares for school students. Although not required by Federal, State or local legislation, historically, transit operators in the United States have universally offered reduced fares for student riders. Now, for the first time, cities have adequate funds available to them, through the Local Return Sales Tax Funds, to purchase full fare passes or other fare media for resale to students at a discount rate.

Lastly, transit or transportation coupons for low income persons should be studied for possible application in Los Angeles County. The program would be administered by the appropriate county social/welfare service department or would be administered by the cities. Admittedly, a workable program may be subject to potentially complicated and politically controversial eligibility requirements. As with the above school fare program, Local Return Sales Tax Funds would be used to purchase full value fare media from the District for resale to low income persons meeting the specified eligibility requirements. A major advantage of this user side program is that, if extensively used by the cities, it would eliminate many of the valid concerns about the adverse effect of high fares upon low income transit dependent groups.

b. Computer Run Cutting Packages

SCRTD, as a part of its TRANSMIS program, will be taking bids for a computerized run cutting package. RTD's past experience with one package, RUCUS, has demonstrated that considerable savings can be had when such a package is used. The main drawback to the version of RUCUS that RTD has currently, is that it is very slow and cumbersome to

use. Newer packages, including a newer version of RUCUS, exist. These are expected to be more efficient to use. If this is the case, such packages could likely be employed on a regular basis and the cost of operating hours could be substantially lowered.

c. New Minimum Loading Standards

The potential benefit of setting new minimum service loading standards is currently being studied. These minimum standards would be applied to "policy" headway lines and the less utilized portions of demand scheduled lines. As an example, the policy might state that the average number of passengers per trip at the peak load point must be a specified pecentage of the average seat capacity. This type of policy needs further study to determine if it would be feasible to implement and if it would adversely affect service allocation.

d. Timed Transfer

The following is a full report that was recently completed for SCRTD on the subject of timed transfers and pulse scheduling.

Background

Timed transfer, in its simplest form, is the scheduled meet of two buses on divergent routes to facilitate passenger transfers. The aim of timed transfer is to increase patronage by reducing transit users travel time associated with transferring.

This operational strategy has been used for years and is found in a variety of forms. These forms can be grouped into four classes: 1) a simple two-bus meet occurring on an irregular basis, 2) a regularly scheduled meet of all or most trips on two lines, 3) multi-line, regularly scheduled meets (pulse point), and 4) several pulse points serving a region (focal point system).

Single sight pulse points have been used in North America since the 1930's. Locally, Pomona Bus Lines utilized pulse scheduling from 1946 to 1966. Eight buses on four lines were timed to meet every 30 minutes at Mission Boulevard and Garey Avenue. Multiple site focal point timed transfer system was first operated in Edmonton, Alberta, Canada in 1964. Today, focal point systems are operated in such West Coast Cities as Portland, Vancouver, Fresno, Tacoma and San Francisco. Numerous transit properties are currently operating a single pulse point system.

The SCRTD currently operates a pulse point timed transfer only during late night hours in downtown Los Angeles (the Owl line up). All of the lines which operate into downtown Los Angeles between 1:00 A.M. and 5:00 A.M. are on the same 60 minute headway. These 19 Owl lines do not meet at one point. Rather there is a progression of meets at various intersections to accommodate most transfer patterns. This operation is controlled by two Road Supervisors.

The SCRTD does operate service from transit centers. This service, however, is not operated as a true timed transfer. The various lines that are routed through these centers are generally scheduled on an individual basis. Normally, the frequency of service is high enough to mitigate the need for scheduled meets.

Timed Transfer Objectives

The two most commonly stated objectives of a time transfer system are to minimize transit users travel time and to improve the transit systems accessibility to a larger geographic area. The reduction in travel time objective is met by reducing the waiting time associated with transferring. This, however, must be weighed against the additional time that through riders must spend on the bus as it is routed to the pulse point and waits for the meet to take place. The accessibility objective is met because transfers become easier and more routine. For lines which operate on long headways (more than 30 minutes) the amount of time spent waiting to make a transfer becomes a significant portion of a passengers total travel time for lines not scheduled to meet. Since most riders are not willing to wait more than 20 minutes to transfer, the market for long headway lines with random meets is people who have both origins and destinations along the route of line. In effect, timed transfers extend the usable route of each line to the total of all routes of the lines meeting at the transfer point.

The SCRTD is currently operating at its allowable limit in terms of bus service. On July 1, 1985, the amount of

subsidy available to the District, through Proposition "A" will decrease. This will probably require a reduction in service. These factors require that if the District were to implement a timed transfer system a cost reduction objective be added to the above objectives.

It should be noted that virtually all timed transfer systems that have been implemented during the past 15 years have come at a time of service expansion. These transit properties were receiving new funds to operate more service and to expand into new areas. Because of this it is very difficult to extrapolate the exact effect of timed transfers on ridership and operating costs.

Timed Transfer Considerations

Frequency of Service

In the areas where transit service is provided on headways of 20 minutes or better, the implementation of timed transfers would negatively affect more riders that it would benefit. The main reasons for this are that: 1) normally less than 25% of the riders will transfer at any one point so that 75% or more of the passengers are through riders; 2) most timed transfers operations require that through buses and therefore, all through riders, wait 3 to 8 minutes at the transfer point; 3) transferring between high frequency lines does not normally require a large amount of waiting time. As the frequency of service decreases, the average transfer wait time increases. Thus, the benefit of timed transfers increases as the frequency of service decreases.

The vast majority of timed transfer systems are served by lines operating every 30 or 60 minutes. Some properties operate pulse points on frequencies as high as every 15 minutes. These are few in number and are usually operated at this level during rush hours only.

Headways

In order for all trips on two or more lines to meet at any point, the lines must all have the same headway. Given the same headway, the lines must then be scheduled to be at the transfer site at the same time. At a timed transfer location, the common headway becomes the cycle time or pulse time of the center. For example, if all lines are on a 60 minute headway, a pulse will occur every 60 minutes.

If there is a great disparity in passengers demand between the various lines serving a pulse point, it is not efficient to operate all lines on the same headway. For the time transfer concept to still be valid, all lines

must have headways that can be evenly divided into the line with the longest headway. This will create a series of meet types. All lines would meet when the longest headway line(s) arrived. (This would be a center's major meet). A number of lesser meets would occur depending on the number of lines and their frequency of service. For example, a center served by four lines with the following headways: Line A = 15 min., Line B = 30 min., Line C = 60 min., and Line D = 120 min. would have Lines A and B meet every 30 minutes, Lines A, B and C meet every 60 minutes, and all lines meet every two hours.

This means that the amount of service cannot be fine tuned to meet demand. Since overloads are not acceptable, an excessive amount of service will be provided on some lines.

Roundtrip Running Time

The length of each route and therefore its running time, serving a timed transfer center is critical to the efficiency of the system. To be efficient the amount of time required for a bus to travel between the center and the lines terminal plus a small amount of layover at the far terminal must be an integer multiple of the lines headway. For example, a line with a 60-minute headway would have a bus at the center every 60 minutes. If the target amount of layover is 10% of the roundtrip running time, then layover should be 6 minutes for every 60 minutes of travel time. Ideally, the roundtrip running time should be 60 minutes minus 6 minutes; 120 minutes minus 12 minutes, etc..

A complicating factor in this process is the fact that for most bus routes, the amount of time required to complete a roundtrip varies by the time of day. For the most efficient operation, the route length should be designed for the longest period of static running time. Normally this is the midday period. During the other time periods, the route length could be extended or contracted to reduce the excess layover time. The headway during the non-base times may also be changed so long as the new headway will allow transfer meets. In other words, the new headway must be an even multiple of the old headway or the cycle time of the center and therefore, all other lines must be changed.

On-Time Performance

The on-time performance of all buses at a timed transfer location is very important. if a bus is late to a meet and the other buses do not wait, the transferring passengers from the late bus will be worse off than if there were no timed transfer. This is because the

transferring passengers must now wait nearly an entire headway for the next receiving bus. One way to increase transfer reliability is to make all buses wait a small amount of time at the center. This transfer window is normally between 3 and 8 minutes at most existing systems.

The size of the transfer window should be large enough to ensure at least a 95% connection rate. But this should be balanced against the needs of the through (non-transferring) passengers.

If a line has very poor schedule reliability it should be reassessed to determine if some scheduling technique can be applied to the line to improve its performance. If this cannot be done, the line probably should be dropped from the timed meets.

Number of Buses

The number of buses that will meet at a transfer point depends on the number of lines and whether the lines are through routes or terminate at the Center. A line that operates through the Center will have two buses at the meet, one bus for each direction. Terminating lines will have only one bus at the Center.

The maximum number of buses at timed transfer sites that are currently in operation ranges from 4 to 12. As the number of buses involved increases, so does the probability some trips will miss the meet. The complexity of operation and the amount of physical space required for the Center also increase with the number of buses.

One technique for reducing the number of buses involved in any one meet and yet maintain all direct transfer possibilities is to hold concurrent meets at two nearby sites. These synchronized meets however eliminate direct driver sight of all other lines. The operators will thus not know if a bus is late and will not stay past their scheduled departure time. This reduces the systems reliability.

Transfer Site

For efficiency of operation and to keep negative passenger impacts to a minimum, the site of the timed transfer system should be located where bus lines wuld normally converge. This is generally at major activity centers or areas where geographic restrictions create transportation funnels.

A transit center at an activity center increases the chances for joint use and/or development, thus reducing the capital cost the operator must meet. In addition, the

activity center will generate increased ridership which will allow for more frequent service.

All sites should have a minimum of passenger amenities and schedule information. These would give shelter to passengers who for some reason miss a meet and must wait a long period of time to complete their trip.

A timed transfer center can be located in a wide variety of settings. Many operating pulse points are functioning at street intersections, most are at off-street transit centers and a few are within multi-use facilities. The determining factor is normally the availability of capital subsidy funds.

Start-up Costs

The implementation of an efficient timed transfer system can be expensive. The implementation costs can be divided into two categories, capital and administrative. The capital costs include the design and construction of the centers as well as any additional buses required. The capital costs can be kept to a minimum. Tacoma implemented several focal point centers in 1980. These low cost centers ranged from $5,000 to $125,000. The Tacoma Centers were designed primarily for on-street operations with few passenger amenities and were designed for temporary use.

The administrative costs for implementing a transfer system are primarily staff time. A great deal of staff time is required to implement a focal point system.

Planning - The route structure, operating policies and transit center design requires a large effort to ensure an efficient operation.

Scheduling - Every line in the center must be carefully analyzed to obtain the best possible running time. Complicated schedules may have to be developed in order to minimize costs.

Supervising - Policies and procedures must be developed to provide alternative courses of action to get late buses back on time and for holding buses at the center to meet late buses.

Operator Instructing - Bus driver cooperation is an essential part of a workable timed transfer system. Drivers must not only be informed about the differing requirement for this kind of center, but their input into its creation is very important.

Marketing - As with any new bus system, public support and acceptance comes only if they are informed about the changes and the reasons for them.

Operating Costs

A timed transfer system is generally more expensive to operate than a conventional transit system for the following two reasons:

1) a transfer system requires more staff support. There is an increased need for supervision of the operation to ensure that drivers are adhering to the strict operating procedures as well as to input some flexibility into the system. The scheduling effort to maintain the system is also gtreater. As ridership levels and street congestion change, so does the bus running time. To maintain a 95% on-time performance level, the schedules must be constantly monitored and adjusted;

and 2) there is a greater potential that more buses will be required to operate a timed transfer system than a conventional system. Given the same route network, the inclusion of a 3 to 8 minute transfer window may require additional equipment on some lines. In addition, routing lines into a transit center will also require more time. The need for common headways normally leads to more, rather than less, service being operated on a line when it is incorporated into a timed transfer system. Finally, it may be that route length of some lines can not be changed to improve the efficiency of operation. The added cost, in terms of long layover time, may have to be accepted in order to reach some destinations.

Even if a system is very carefully designed, the above factors will cause an operating cost increase. The only way to reduce or maintain operating expenses is to reduce service levels or route miles.

Conclusion

The primary goal of a timed transfer system is to increase ridership by reducing travel time associated with transferring. A well designed system will reduce the time required to transfer. However, this must be weighed against the additional time that through riders must expend and the additional operating costs required to implement and operate a timed transfer system. Before any timed transfer location is selected for implementation, the above considerations must be thoroughly investigated and trade-offs made consistent with objectives.

Certain areas within the District service area merit further consideration for timed transfer possibilities. However, this will take considerable planning effort, and will need to be approached judiciously, before firm recommendations can be made.

3) The Personnel Department has increased the volume and frequency of part-time operator recruitment and selection activity.

4) The Transportation Instruction Department has increased its capacity for training and qualifying part-time operators.

Because of the time required for recruitment, selection, training and qualifying, the improved ratio will not actually be achieved until approximately March 1984 or the final third of the Fiscal Year, thus cutting potential savings to $518,300.