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GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 5.1.2

SPECIFICATION OF THE BUS OPERATING COST MODEL

## Prepared for:

Southern California Rapid Transit District

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## Introduction

This report describes the bus operating cost model developed for use in the cash flow analysis for long-term planning at the Southern California Rapid Transit District (SCRTD). It discusses the structure of the model and the sources of data used as input to its specification.

The bus model is designed to compute annual operating expenses for bus operations associated with alternatives evaluated in both base year and inflated dollars. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service derived from the demand forecasts for each alternative evaluated.

The bus operating costs are sensitive to level of service measures such as annual vehicle-miles, annual service-hours, peak vehicle requirements, and the quantity of service utilized (i.e., passengers). The major assumption underlying this model is that the SCRTD will be the operator of bus service provided.

## **Overview of the Cost Model Structure**

A fixed/variable cost allocation model was selected for use. The basic concept underlying this approach relates the cost of service to the resource quantities supplied and used in the service provision. In addition, this model approach provides sensitivity to service level changes by classifying costs which may or may not vary with changes in the level of service.

The model is structured to provide detail on incremental costs that would be associated with the use of articulated buses. Existing costs reflect buses currently in the SCRTD fleet and include both standard 40-foot urban coaches and articulted buses. Provision is made to estimate changes in costs associated with the use of articulated buses if plans are formulated to change the current ratio of standard to articulated buses. The experience of SCRTD indicates articulated buses generally cost more to operate in terms of mechanic labor, fuel, and maintenance parts and supplies. The additional capacity provided by articulated buses may, however, provide savings in operating labor if fewer buses are required as a result of their use.

In addition, the model is sensitive to variation in inflation rates over time. The experience of SCRTD and other transit properties indicates that prices of diesel fuel and parts and supplies associated with the maintenance and repair of vehicles will generally inflate at a rate greater or less than the overall Consumer Price Index (CPI), a generally accepted "baseline" rate of inflation.

#### Input Data Base

The bus operating cost model is structured to reflect the SCRTD organization. It is based on SCRTD departments and specific costs have been used to calibrate the model from actual and projected account expenditures for Fiscal Year (FY) 1984. Both the Annual Budget for FY 1984 and the Revenue and Expense Statement for March, 1984 were used as reference documents for expenditures. In addition, input was received from the appropriate departments on distribution of labor resources. Table 1 provides a summary of the SCRTD chart of accounts and appropriate cost allocation.

## + Table 1 BUS COST ALLOCATION

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Department and	Estimated FY 84 Cost		ce Allocated Peak	Passen-			
Expense Item	(\$000)	Hour <u>s Mile</u>	s Buses	gers	Fixed	Variable	If Variable How?
Board of Directors							
Wages	0		X		X		
Fringes Services	3 76		X X		X X		
Materials and Supplies	3		x		x		
Utilities	9		Х		Х		
Miscellaneous Expenses	61		Х		X		
General Manager							
Wages	382		X		Х		
Fringes	3		X X		X X		
Services Materials and Supplies	110 10		x		-X		
Utilities	9		x		X		
Miscellaneous Expenses	97		Х		Х		
Office of District Secret	ary						
Wages	215	,	X		Х		
Fringes	2 60		X		X		
Services Materials and Supplies	9		X X X X		X X		
Utilities	õ		ź		. <del>X</del>		
Miscellaneous Expenses	38		x		, <b>X</b>		
Legal			. •	-			
Wages	304	· · · · ·	X		X	•	
Fringes	2 .		X · X		X	·	- · ·
Services	242	•			X		
Materials and Supplies	26		X .		X X		
Utilities Miscellaneous Expenses	8 10		X X		x		
Assistant General Manager							
for Operations						· .	
Wages	233		Х		Х		
Fringes	2		X		X		
Services Materials and Supplies	1 5		X X		X. X		
Utilities	2		x		x		
Miscellaneous Expenses	17		x		x		
Transportation Operating Divisions							
Wages	4,991		х			x	By 159 Peak Vehicles
wages Fringes	1,229		X				By 159 Peak Vehicles
Operator Wages	126,322	x				X X X X	By 777 Revenue Hours
Operator Fringes	31,534	х				X	By 777 Revenue Hours
Services	3		x			X X	By 159 Peak Vehicles By 159 Peak Vehicles
Materials and Supplies	92 28		X X			X	By 159 Peak Vehicles
discellaneous Expenses	23		x			x	By 159 Peak Vehicles
Stops and Zones							
Wages	654		Х		X		
Fringes	3 1		X		X		
Services			X		X X		
Materials and Supplies	127		x		۸		



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•	Estimated	н <u></u> н	esource	Allocated					
Department and Expense Item	FY 84 Cost (\$00 <u>0</u> )	lours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?	
Transportation Services	• <b>•</b>								
Wages	1,303			x		x			
Wages Wages	2,470 529	X X				X	ХВ	y 476,800 Revenue Hours	
								of Service	
Fringes Wages	135 873	Х		X		х	Х Ву	y 476,800 Hours of Service	
Wages Fringes	436 111			X X				y 159 Peak Vehicles y 159 Peak Vehicles	
Fringes	21					x	Λ D	y 155 / Car Venicies	
Services Materials and Supplies	1-3 24			X X X X		X X			
Utilities	25 51			X X		x	X By	y 159 Peak Vehicles	
Utilities Miscellaneous Expenses	4			X		X			
Transportation Instruction									
Wages	2,553			x				y 172 Peak Vehicles	
Fringes Wages	580 209			X X		х	X By	72 Peak Vehicles	
Wages	564	X X						y 447,000 Hours of Service	
Fringes Fringes	144 15	х.		Х		x		y 447,000 Hours of Service	
Services Materials and Supplies	1 26	•		X X		Х Х			
Utilities	1	· · ·	, ·	X.	•. •	Х	• .	• • • • • • • • • •	
Miscellaneous Expenses	. 3	· .	•	Χ.	•	· X			
Transportation General							•		
Wages Fringes	737 40	X X				X X			
Services	5	X				Х		· · ·	
Materials and Supplies Utilities	701 150	X X				X X			
Miscellaneous Expenses	27	х			•	X			
Maintenance Operating Divisions				,				•	
Servicing Deep Clean Wages	1,441			X				y 32 Peak Vehicles	
Servicing Deep Clean Fringe Servicing Wages	es 372 8,163			X X				y 32 Peak Vehicles y 5.6 Peak Vehicles	
Servicing Fringes	2,110 373			X X			X By	y 5.6 Peak Vehicles y 188 Peak Vehicles	
Servicing Supervisor Wages Servicing Supervisor Fringe	es 96			Х			X B	y 188 Peak Vehicles	
Wheelchair Maintenance Wages Wheelchair Maintenance Fring				X X				y 34.4 Peak Vehicles y 34.4 Peak Vehicles	
Non-Revenue Wages	868	Х				•	X B	y 264,889 Hours	
Non-Revenue Fringes Farebox Maintenance Wages	193 322	х		х				y 264,889 Hours y 206 Peak Vehicles	
Farebox Maintenance Fringes	s 72			X X				y 206 Peak Vehicles y 60.7 Peak Vehicles	
Campaigns and Reserve Wages Campaigns and Reserve Fringe	es 281			x			ХВ	y 60.7 Peak Vehicles	
Inspection Wages Inspection Fringes	2,444 544		X X					y 1,251,605 Miles y 1,251,605 Miles	
Running Repair Wages	19,845		Х				X B	y 154,169 Miles	
Running Repair Fringes Supervision and Adminis-	4,416		х					ý 154,169 Miles	
tration Wages Supervision and Adminis-	4,092			X			X B	y 172 Peak Vehicles	
	1,008			X			X B	y 172 Peak Vehicles	

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BUS COST ALLOCATION (continued)	

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_	Estimated		kesource	Allocate	Passen-			
Department and Expense Item	FY 84 Cost (\$000)	Hours	Miles	Peak Buses	gers	Fixed	Variable	If Variable How?
	(((((((((((((((((((((((((((((((((((((((							
Maintenance Operating								
Divisions (continued)								
Servicing Wages Fixed	333			x		x		
Servicing Fringes Fixed	86			X X		X X		
Training and Other Fringe				A		л		
Benefits	378			Х			ХЕ	By 172 Peak Vehicles
Services for Divisions	248			x				y 172 Peak Vehicles
Lubricants Revenue Equipment	1,119		Х					Directly by Miles
Fires and Tubes Revenue Equipment			Х				X D	Directly by Miles
Bus Parts Revenue Equipment	21,620		Х				ΧĹ	Directly by Miles
Tools and Expendable Equipmen				Х				By 172 Peak Vehicles
Other Materials and Supplies				Х				By 172 Peak Vehicles
Utilities	146			Х				y 172 Peak Vehicles
liscellaneous Expenses	40			х			X E	by 172 Peak Vehicles
Central Maintenance								
Running Repair Wages	933		. x				X E	y 3,280,069 Miles
Running Repair Fringes	208							y 3,280,069 Miles
Engine Rebuild Wages	1,254		X X X X X					By 2,439,026 Miles
Engine Rebuild Fringes	279		X					y 2,439,026 Miles
Transmission Shop Wages	933		Ŷ				X E	By 3,280,069 Miles
Transmission Shop Fringes	208		, X				X E	y 3,280,069 Miles
Electrical Shop Wages	1,029		X				XE	3y 2,972,563 Miles
Electrical Shop Fringes	229		Х				X E	By 2,972,563 Miles
Small Units Shop Wages	868		X				XE	y 3,523,037 Miles
Small Units Shop Fringes	193		X X X X					By 3,523,037 Miles
Engine Teardown Wages	322		· X	· •		•		By 9,512,200 Miles
Engine Teardown Fringes	72		X					by 9,512,200 Miles
Radiator Shop Wages	257 57							By 11,890,250 Miles
Radiator Shop Fringes	418		X					By 11,890,250 Miles
Machine Shop Wages Machine Shop Fringes	93		X X					By 7,317,077 Miles By 7,317,077 Miles
Sheet Metal Shop Wages	386		X X X					By 7,926,833 Miles
Sheet Metal Shop Fringes	86		x ÿ					Sy 7,920,833 Miles
Welding Shop Wages	450		x				X	By 6,794,429 Miles
Welding Shop Fringes	100		X					by 6,794,429 Miles
Jpholstery Shop Wages	482		X					by 6,341,467 Miles
Jpholstery Shop Fringes	107		x			•		By 6,341,467 Miles
Paint and Trim Shop Wages	1,319		x					by 2,320,049 Miles
Paint and Trim Shop Fringes	295		X				X E	y 2,320,049 Miles
Body and Frame Shop Wages	2,091		Х					y 1,463,415 Miles
Body and Frame Shop Fringes	465		Х				X E	By 1,463,415 Miles
liscellaneous RepairShop Wage	s 322		Х					y 31,707,333 Miles
tiscellaneous Repair Shop Frin	iges 72		Х					Bý 31,707,333 Miles
ervice Wages	378			X				By 121 Peak Vehicles
Service Fringes	98			X				By 121 Peak Vehicles
Central Shop Supervision Wage				X				By 138 Peak Vehicles
entral Shop Supervision Frin	nges 207			Х			XE	By 138 Peak Vehicles
Central Shop Administration	760		•	v		v		
Wages	369			X		X X		
Fraining and Other Fringes	113			X		X		
Services Utilities	338 3			X X X		x		
discellaneous Expenses	14			Ŷ		x		
Trenses	T.+			A				

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Department and	Estimated FY 84 Cost		Resource	Allocate Peak	d to Passen-			
Expense Item	(\$000)	Hours	Miles	Buses	gers	Fixed	Variable	If Variable How?
Facilities Maintenance Depa	rtment						_	
Electrical Maintenance Wage	s 740			х			ХB	v 147 Peak Vehicles
Electrical Maintenance Frin				X				/ 147 Peak Vehicles
Property Maintenance Wages	1,801			X				/ 147 Peak Vehicles
Property Maintenance Fringe				x				/ 147 Peak Vehicles
Administration and Super-		•				N	<b>ر ۲</b>	147 Fear venicies
vision Wages	500			X		X X		
Training and Fringe Benefit				X X		X		
Services	61	-		X		λ	ХВ	y 147 Peak Vehicles
Aterials and Supplies	2,016			X		х	A D	147 Peak venicles
Utilities	1			X		X		
liscellaneous Expenses	16			X		Α.		
aintenance General Departm	ent							
nstruction Wages	444			Х				y 188 Peak Vehicles
Instruction Fringes	109			Х			X B	y 188 Peak Vehicles
Wages	1,647			Х		Х		
Fringes	36			Х		Х		
Services	315			Х		Х		
laterials and Supplies	44			Х		Х		
Utilities	130			Х		Х		
iscellaneous Expenses	71			Х		Х		
quipment Engineering Depar	tment .							
Wages	765			X		X X		
Fringes	5	• •	· .	X	. ·	X		
Services	152			X .	-	. X		•
Materials and Supplies	41			Х		X		·
Utilities fiscellaneous Expenses	14 .			X X		X X		
elecommunications Departme	nt							
lectronic Maintenance Wage				X ,			X S	y 56 Peak Vehicles
Electronic Maintenance Frin	ges 265			X				y 56 Peak Vehicles
dministration Wages	1,404		•			Х		,
Fringes	16			X X X		X		
Services	88			x		x.		
Materials and Supplies								· .
Revenue Equipment	163			Х			X D	irectly by Peak Vehicl
Aterials and Supplies	361			X		х	D	
Utilities	24					X.		
fiscellaneous Expenses	19			X X		X		
Safety Department								
Wages	226			х		х		
Fringes	'4			Х		Х		
Services	92 67			Х		Х		
Materials and Supplies	67			X		Х		
Utilities	3			X		X		
Miscellaneoùs Expenses	33			Х		X		

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	Estimated		Resout	r <u>ce Alloca</u>				
Department and Expense Item	FY 84 Cost (\$000)	llours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
Transit Police Department								
Police Wages Police Fringes Police Wages Police Wages Administrative Wages Fringes Services	976 268 488 134 2,198 90 349 59	X X		X X X X X	X X	× X X X	X X X X	By 13,688,235 Passenger: By 13,688,235 Passenger: By 420,706 Hours By 420,706 Hours
Materials and Supplies Utilities Miscellaneous Expenses	32 36			X X		X X		
Scheduling Department								
Schedule Maker Wages Schedule Maker Fringes Checker Wages Checker Fringes Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	288 73 1,224 309 1,685 4 7 33 17 80	X X		X X X X X X X X		X X X X X X	X X X X	By 596,000 Hours By 596,000 Hours By 40.5 Peak Vehicles By 40.5 Peak Vehicles
Assistant General Manager for Planning and Commu-	· · ·				•			· · · · · · · · · · · · · · · · · · ·
nications Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	114 1 1 1 1 2	•••,		X X X X X X		X X X X X X X	••••••	
Planning								
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	1,419 7 1,243 106 51 101			X X X X X X	· ·	X X X X X X		
Marketing and Communication	ns							
Ticket Clerk Wages Ticket Clerk Fringes Wages Fringes	529 116 1,490 20 404				X X X X X	X X X	X X	By 21,154,545 Passenger By 21,154,545 Passenger

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Department and	Estimated FY 84 Cost		Resource	Allocate Peak	ed to Passen-					
Expense Item	(\$000)	Hours	Miles	Buses	gers	Fixed	Variable		If Variab	le How?
Customer Relations									-	
Telephone Clerks Wages Telephone Clerks Fringes Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	2,159 483 904 4 42 20 158 29				X X X X X X X X X	X X X X X X	X X	By By	4,951,064 4,951,064	Passengers Passengers
Assistant General Manager for Government and Communit Affairs	t <u>y</u>									
Wages Materials and Supplies Utilities Miscellaneous Expenses	95 1 1 5			X X X X		X X X X				
Government Affairs										
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	229 3 75 2 17 36			X X X X X X		X X X X X X				
Community Relations			÷ .	•	• • •	: ;				•
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	328 4 33 30 7 48			X X X X X X		X X X X X X X				
Assistant General Manager for Equal Opportunity										• •
Wages Materials and Supplies Utilities Miscellaneous Expenses	95 1 1 5			X X X X		X X X X			·	
Human Relations										
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	249 2 3 4 6 11			X X X X X X		X X X X X X				
Employee Education, Traini	ng,									
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	958 294 66 9 26			X X X X X X		X X X X X X X				



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Table 1			
BUS OST	ALLOCATION	(continued)	
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	Estimated	Resour	ce Allocated	l to			
Department and	FY 84 Cost (\$000)	Hours Miles	Peak Bus es	Passen- gers	Fixed	Variable	If Variable How?
Controller-Treasurer-Audito	r			<u> </u>			
Wages Fringes Services Materials and Supplies Utilities			X X X X X X		X X X X X		
Miscellaneous Expenses	-36		X		х	-	
Payroll Clerk Wages Payroll Clerk Fringes Cash Clerk Fringes Cash Clerk Fringes Wages Fringes Services Materials and Supplies Utilities discellaneous Expenses	370 83 673 148 1,852 15 275 86 21 16	X X	X X X X X X	X X	X X X X X X	X X X X	By 447,000 Hours By 447,000 Hours By 16,621,429 Passenget By 16,621,429 Passenget
ata Processing							
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	2,863 76 2,099 316 46 80		X X X X X X X		X X X X X X X	·	
nsurance							· ·
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	212 19 121 15 5 6		X X X X X X		X X X X X X		
Assistant General Manager For Transit System Development							
Wages Materials and Supplies Utilities Miscellaneous Expenses	105 1. 1 5		X X X X	•	X X X X		
Sus Facilities Engineering							
Wages Fringes Services Materials and Supplies Utilities Miscellaneous Expenses	711 4 129 25 11 20		X X X X X X		X X X X X X		
Assistant General Manager for Management							
Wages Materials and Supplies Utilities Miscellaneous Expenses	95 1 1 5		X X X X		X X X X		

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Table 1 BUS COST ALLOCATION (continued).

Department and	Estimated FY 84 Cost	Resource Allocated to Peak Passen-			_			
Expense Item	(\$000).	Hours Miles	Buses	gers	Fixed	Variable	If Variable How?	
Contracts and Purchasing								
	0.43							
Stores Wages	941		X			X	By 159 Peak Vehicles	
Stores Fringes	206		X		v	X	By 159 Peak Vehicles	
Wages	2,969		X		X			
Fringes	39		X		X			
Services	30 79		X X		X X			
Materials and Supplies	79 30		X		x			
Utilities Miscellaneous Expenses	50 61		X		X			
	01		л		~			
Personnel Department								
Wages	1,429		X X		X			
Fringes	7				X			
Services	588		X		X			
Materials and Supplies	123		X		X			
Utilities	27		X		X			
Miscellaneous Expenses	55		x		X			
General Services								
Wages	1, 396		х		х			
Fringes	3		х		Х			
Services	46	•	Х		X			
Materials and Supplies	190		х		X			
Utilities	3		. X		X X X X			
Miscellaneous Expenses	3		х	•	х			
Print Shop		•	•	• •	·			
Wages	750		. X		х			
Fringes	5		X		X			
Services	253		Х		Х			
Timetables	490			Х		х	Directly by Passenger:	
Materials and Supplies	211		Х	•	Х		· · ·	
Utilities	4		· X		X			
Aiscellaneous Expenses	- 2		Х		. <b>X</b>			
Management and Budget						·		
Wages	522		х		х			
Fringes	4		x		X X			
Services	Z		х		v			
Materials and Supplies	2 20		х		x			
Utilities	8		X X		Х			
hiscellaneous Expenses	7		Х		х			
abor Relations								
Wages	224 2 45 7		x		х			
Fringes	2		х		х			
Services	45		Х		Х			
Materials and Supplies	7		X		Х			
Utilities	2		X X X		х			
Miscellaneous Expenses	-7		X		х			

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Table 1 BUS COST ALLOCATION (continued)

	Estimated		Resource	Allocated				
Department and	FY 84 Cost			Peak	Passen-	ń. 1	V	
Expense Item	(\$000)	Hours	Miles	Buses	gers	Fixed	Variable	If Variable How?
Employee Activities								
suproyee Activities								
Wages	115			х		х		
Services	72			X		X		
Materials and Supplies	33			X		X		
Utilities	7			x		X		
discellaneous Expenses	153			x		x		
iondepartmental Expenses								
Wages	1,043			х		x		
Fringes	13,463			X X		X		
workmen's Compensation	8,460	Х					х	By 777 Hours
Workmen's Compensation	3,254		х				x	By 59,451 Miles
orkmen's Compensation	1,301			х		X		_, _,
Services	1,575			X		X		
Fuel	25,858		х				х	Directly by Miles
Aterials and Supplies	763			X		Х		, , ,
Utilities	2,252			x		X		
Premiums for Physical	-,							
Damage	86			х		х		
Premiums for PL&PD								
Insurance	27			х		х		
Premiums for Corporate	21							
Insurance	20 .			х		х		
Provisions for Uninsured PL	22,615			~	х <sup>.</sup>	~	х	By 101,174 Passengers
PL	22,015				~		А	at \$4,916 Each
Provisions for Uninsured	1,521		х				Χ.	By 39,634 Miles at
PD		· ·	A					\$634 each
Expenses for PL	2,098	•	. •		x		x	By 101, 174 Passengers
Apenaes for FL	2,050			•	<b>^</b> .		л	at \$456 per Step
Expenses for PD	1,094		X				x	By 39,634 Miles at \$45 per Step
Fuel and Lube Taxes Non-								Per coop
Revenue Equipment	120	х				х		
Fuel and Lube Taxes		**						
Revenue Equipment	1,874		х				<b>X</b> :	Directly by Miles
Leases and Rentals	5,851		<b>A</b> ,	X			x	
iouso, and Kentais								
Total:	425 697							
NOLULI.	,				-			

## Model Outline

As indicated above, the model is composed of cost components associated with the SCRTD departments. Costs are related to specific operating characteristics and quantities (i.e., hours, miles, vehicles, and passengers). These relationships are discussed and even though expenses are assumed fixed, they are assigned to a specific operating characteristic or quantity in order to evaluate individual routes. The model definitions and relationships are as follows:

## **Board of Directors**

<u>Wages:</u> These are wages associated with the Board of Directors Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits allocated to the department employees in the budget. Variable fringe benefits of employees are generally allocated to the non-departmental budget unless otherwise indicated. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: These are costs of services for this department using the chart of accounts for the SCRTD budget. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are costs associated with the materials and supplies expenditures of this department as allocated using the chart of accounts for the SCRTD. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs allocated to the department using the SCRTD chart of accounts. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other allocated expenses for the department using the SCRTD chart of accounts. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### **General Manager Department**

<u>Wages:</u> These are wages associated with the General Manger Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: These are department expenditures for services used by the department. They are assumed fixed but are related to peak vehicles for individual routecost allocation. <u>Materials and Supplies</u>: These are costs of materials and supplies for the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Office of the District Secretary Department

<u>Wages</u>: These are wages associated with the Office of the District Secretary Department employees. They are assumed fixed but are related to peak vehicles for route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: These are department expenses for services allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are costs of all materials and supplies utilized by the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are expenditures for telephone and other utilities allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Legal Department

<u>Wages</u>: These are wages associated with the Legal Department employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits for employees of the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: These are the department expenditures for services. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs of all materials and supplies utilized by the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous costs allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Assistant General Manager for Operations

<u>Wages:</u> These are wages associated with all employees of the Office of the Assistant General Manager for Operations. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits for employees of the this office. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services:</u> These are costs for all services allocated to this office. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs for all materials and supplies used by the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are costs for telephone and other utilities allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses allocated to the department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Transportation Operating Divisions

<u>Wages</u>: These are wages associated with the division managers, assistant division managers, dispatchers, and clerical help for each division. Based on 13 operating divisions, these are variable in steps of plus or minus 159 peak vehicles (a representation for one transportation operating division at SCRTD) and are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits for those employees associated with each transportation operating division. They include fringe benefits that were allocated to the non-departmental budget in the SCRTD budget. These fringes are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.



<u>Operator Wages</u>: An analysis was accomplished of operator pay-hours and it was determined that over the last year operator pay-hours are 1.5794 times revenue hours of service. Using this as a base and with an estimated 7,152,000 revenue hours for FY 84, a budget was determined for operator pay. These wages are variable in steps of plus or minus 777 revenue hours and are associated with revenue hours for individual route-cost allocation. The 777 revenue hours is the equivalent of one-half of a full-time operator equivalency based on analysis that revealed the average revenue hours per full-time operator is 1,554.

<u>Operator Fringes</u>: These are fringe benefits for bus operators. These were calculated and were previously shown in the non-departmental budget allocation. They are variable in steps of plus or minus 777 revenue hours and are related to revenue-hours for individual route-cost allocation.

<u>Services</u>: These are the costs of services for the Transportation Operating Divisions as allocated with the SCRTD chart of accounts. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs of materials and supplies associated with the Transportation Operating Divisions. These are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs allocated to the Transportation Operating Divisions. These are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses associated with the Transportation Operating Divsions. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual routecost allocation.

#### Stops and Zones Department

<u>Wages:</u> These are wages associated with the Stops and Zones Department employees. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits for this department's employees. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services allocated to this department. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the department. It includes the costs of bus stop signs. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## **Transportation Services Department**

<u>Wages</u>: These are wages of all administrative personnel, managers, supervisors, and assistants in the Transportation Services Department. It also includes wages for traffic loaders and service directors. These wages are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Wages:</u> These are street supervisor wages which are considered fixed. An analysis of the street supervision needs of the SCRTD revealed that there are 85 current positions in the schedule. And an analysis revealed that approximtely 70 of these positions would be considered fixed if coverage of the service area were to remain fairly constant. These wages are assumed fixed but are related to revenue-hours of service for individual route-cost allocation.

<u>Wages:</u> These are wages for the 15 street supervisors that are considered variable. These wages would vary in steps of plus or minus 476,800 revenue-hours of service and are related to revenue-hours for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits calculated for the 15 street supervisors that are variable by revenue-hours of service. These will vary in steps of plus or minus 476,800 revenue-hours of service and are related to revenue-hours of service for individual route-cost allocation.

<u>Wages</u>: These are wages associated with the radio dispatchers for the SCRTD service area. An analysis was accomplished of the needs for radio dispatchers given cutbacks in service and these wages are associated with those dispatchers which are assumed to be fixed and are related to peak vehicles for individual route-cost allocation.

<u>Wages</u>: These are wages for the radio dispatchers which are considered variable. An analysis revealed that 13 employees could be considered variable depending upon level of service. These wages vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits associated with the 13 radio dispatchers. They vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits associated with the department. They are considered fixed and are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: These are services related to the Transportation Services Department. They are considered fixed and are allocated to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are materials and supplies expenditures for the department. They are considered fixed but are allocated to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone expenses associated with the variable radio dispatch functions. They are variable in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs associated with this department. They are considered fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses for the department. They are considered fixed but are related to peak vehicles for individual route-cost allocation.

#### Transportation Instruction Department

<u>Wages</u>: These are wages associated with senior instructors, trainers, and clerktypists associated with the 12 operating divisions. These wages will vary in steps of plus or minus 172 peak vehicles (a representation of each of the operating divisions) and are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits associated with those employees attached to the 12 operating divisions. They will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wages</u>: These are wages associated with the administration of the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Wages:</u> These are the wages of the 16 instructors associated with training incoming bus operators. They will vary in steps of plus or minus 447,000 hours of service and are related to hours of service for individual route-cost allocation.

<u>Fringes</u>: These are fringe benefits associated with the instructors of incoming bus operators and were previously included in the non-departmental allocation. They will vary in steps of plus or minus 447,000 hours of service and are related to hours of service for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits associated with the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: These are the costs of services allocated to the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs of materials and supplies for the Transportation Instruction Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility expenditures allocated to the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses associated with the department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Transportation General

<u>Wages:</u> These are wages of the employees of the administrative arm of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits allocated to the Transportation General administrative arm employees. They are assumed fixed but are related to hours of service for individual route-cost allocation.

Services: This is the cost of services provided for the Transportation General. They are assumed fixed but are related to hours of service for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs of materials and supplies for the administration of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

<u>Utilities</u>: This is the telephone and other utility costs allocated to the Transportation Depaartment administrative arm. They are assumed fixed but are related to hours of service for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses allocated to the administration of the Transportation Department. They are assumed fixed but are related to hours of service for individual route-cost allocation.

#### Maintenance Operating Divisions

Servicing Deep-cleaning Wages: These are wages associated with the deepcleaning effort of the bus servicing. It was estimated that 15 percent of the 432 employees assigned to the operating divisions, or 65 employees, were involved in this effort. These wages will vary in steps of plus or minus 32 peak vehicles and are assigned to peak vehicles for individual route-cost allocation.

<u>Servicing Deep-cleaning Fringes</u>: These are the fringe benefits calculated for the 65 employees assigned to the deep-cleaning effort at the Operating Divisions. These costs will vary in steps of plus or minus 32 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Servicing Wages</u>: These are the wages associated with the 367 employees in the Maintenance Operating Divisions assigned to vehicle servicing. These wages will vary in steps of plus or minus 5.6 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Servicing Fringes</u>: These are fringe benefits calculated for the 367 employees assigned this effort at the Maintenance Operating Divisions. These costs will vary in steps of plus or minus 5.6 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Supervisor Wages: These are the wages associated with the supervision of the bus servicing effort at the Maintenance Operating Division. Based on 11 employees involved in this effort, these costs will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Supervisor Fringes: These are fringe benefits calculated for the 11 supervisors involved in the bus servicing effort. They will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wheelchair Maintenance Wages</u>: These are the wages of the approximately 60 employees assigned to this effort at the Maintenance Operating Divisions. These costs will vary in steps of plus or minus 34.4 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wheelchair Maintenance Fringes</u>: These are the calculated fringe benefits for the 60 employees involved in the wheelchair maintenance effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 34.4 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Non-revenue Wages</u>: These are the wages of the 27 mechanics in maintenance of the non-revenue vehicles. They will vary in steps of plus or minus 264,889 hours of service and are related to hours of service for individual route-cost allocation.

<u>Non-revenue Fringes</u>: These are the fringe benefits calculated for the 27 employees assigned to the maintenance of the non-revenue vehicles. They will vary in steps of plus or minus 264,889 hours of service and are related to hours of service for individual route-cost allocation.

<u>Fare Box Maintenance Wages</u>: These are wages associated with the 10 mechanics involved in the farebox maiintenance effort. These costs will vary in steps of plus or minus 206 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Fare Box Maintenance Fringes</u>: These are the fringe benefits calculated for the 10 employees involved in the fare box maintenance effort. They will vary in steps of plus or minus 206 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Campaigns and Reserve Wages</u>: These are the wages associated with the 34 mechanics assigned to campaigns and the reserve fleet of SCRTD. These costs will vary in steps of plus or minus 60.7 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Campaigns and Reserve Fringes:</u> These are the calculated fringe benefits of the 34 employees involved in campaigns and reserve fleet maintenance for the SCRTD. These costs will vary in steps of plus or minus 60.7 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Inspection Wages</u>: These are the wages of the 76 mechanics involved in inspection of buses at the Maintenance Operating Divisions. These wages will vary in steps of plus or minus 1,251,605 miles of service and are related to miles of service for individual route-cost allocation.

Inspection Fringes: These are the calculated fringe benefits of the 76 employees assigned to the inspection effort in the Maintenance Operating Divisions. They will vary in steps of plus or minus 1,251,605 miles of service and are related to miles of service for individual route-cost allocation.

<u>Running Repair Wages</u>: These are the wages associated with the 617 mechanics involved in the running repair effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 154,169 miles of service and are related to miles of service for individual route-cost allocation.

<u>Running Repair Fringes</u>: These are the calculated fringe benefits for the 617 employees assigned to the running repair effort at the Maintenance Operating Divisions. They will vary in steps of plus or minus 154,169 miles of service and are related to miles of service for individual route-cost allocation.

<u>Supervision and Administration Wages</u>: These are wages associated with the administration and supervision of the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Supervision and Administration Fringes</u>: These are the calculated fringe benefits for those supervisory and administrative employees of the Maintenance Operating Divisions. Based on 12 operating divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Servicing Wages Fixed: These are the wages of the additional servicing employees assigned to campaign and reserve fleet maintenance divisions. These wages are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Servicing Fringes</u>: These are the calculated fringe benefits for those service employees assigned to the campaign and reserve fleet Maintenance Operating Divisions. These are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Training and Other Fringe Benefits</u>: These are the training and other allocated fringe benefits of the Maintenance Operating Divisions. Based on 12 Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Services for Divisions</u>: These are the costs of services for the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Lubricants Revenue Equipment</u>: This is the cost of lubricants for the Maintenance Operating Divisions. These costs will vary directly by the miles of service and are related to miles of service for individual route-cost allocation.

<u>Tires and Tubes Revenue Equipment</u>: This is the cost of tires and tubes for the revenue equipment. These costs will vary directly by the miles of service provided and are related to miles of service for individual route-cost allocation.

<u>Bus Parts Revenue Equipment</u>: This is the cost of bus parts for the Maintenance Operating Divisions repair effort. These costs will vary directly by the miles of service provided and are related to miles of service for individual routecost allocation.

<u>Tools and Expendable Equipment</u>: This is the cost of tools and other expendable equipment associated with the Maintenance Operating Divisions. Based on 12 Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Other Materials and Supplies: This is the cost of other materials and supplies utilized by the Maintenance Operating Divisions. Based on 12 Operating Divisions, these costs will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses associated with the Maintenance Operating Divisions. Based on 12 Maintenance Operating Divisions, they will vary in steps of plus or minus 172 peak vehicles and are related to peak vehicles for individual route-cost allocation.

#### **Central Maintenance**

<u>Running Repair Wages</u>: These are wages associated with the 29 employees involved in the running repair effort in the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

<u>Running Repair Fringes</u>: These are the fringe benefits calculated for the 29 mechanics involved in the running repair effort at the Central Maintenance Facility. They will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

<u>Engine Rebuild Wages</u>: These are the wages for the 39 mechanics involved in the engine rebuild effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,439,026 miles and are related to miles for individual route-cost allocation.

<u>Engine Rebuild Fringes</u>: These are the fringe benefits calculated for the 39 mechanics involved in the engine rebuild effort of the Central Maintenance Facility. These costs will vary in steps of plus of minus 2,439,026 miles and are related to miles for individual route-cost allocation.

<u>Transmission Shop Wages</u>: These are the wages for the 29 mechanics involved in the transmission shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

<u>Transmission Shop Fringes</u>: These are the fringe benefits calculated for the 29 mechanics involved in the transmission shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,280,069 miles and are related to miles for individual route-cost allocation.

<u>Electrical Shop Wages</u>: These are the wages for the 32 mechanics in the electrical shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,972,563 miles and are related to miles for individual route-cost allocation.

<u>Electrical Shop Fringes</u>: These are the fringe benefits for the 32 employees of the electrical shop in the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,972,563 miles and are related to miles for individual route-cost allocation.

<u>Small Unit Shop Wages</u>: These are the wages of the 27 mechanics involved in the small unit shop of the Central Maintenance Facility. These costs wil vary in steps of plus or minus 3,523,037 miles and are related to miles for individual route-cost allocations.

<u>Small Unit Shop Fringes</u>: These are the fringe benefits calculated for the 27 mechanics involved in the small unit shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 3,523,037 miles and are related to miles for individual route-cost allocation.

<u>Engine Teardown Wages</u>: These are wages associated with the 10 mechanics involved in the engine teardown effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 9,512,200 miles and are related to miles for individual route-cost allocation.

<u>Engine Teardown Fringes</u>: These are the fringe benefits calculated for the 10 mechanics involved in the engine teardown effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 9,512,200 miles and are related to miles for individual route-cost allocation.

<u>Radiator Shop Wages:</u> These are the wages associated with the 8 mechanics involved in the radiator shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 11,890,250 miles and are related to miles for individual route-cost allocation.

<u>Radiator Shop Fringes</u>: These are the fringe benefits associated with the 8 employees involved in the radiator shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 11,890,250 miles and are related to miles for individual route-cost allocation.

<u>Machine Shop Wages</u>: These are the wages associated with the 13 mechanics involved in the machine shop effort of the Central Maintenance Facility. These will vary in steps of plus or minus 7,317,077 miles and are related to miles for individual route-cost allocation.

<u>Machine Shop Fringes</u>: These are the fringe benefits calculated for the 13 mechanics involved in the machine shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 7,317,077 miles and are related to miles for individual route-cost allocation.

<u>Sheet Metal Shop Wages</u>: These are the wages associated with the 12 mechanics involved in the sheet metal shop of the Central Maintenance Facility. They will vary in steps of plus or minus 7,926,833 miles and are related to miles for individual route-cost allocation.

Sheet Metal Shop Fringes: These are the fringe benefits calculated for the 12 mechanics involved in the sheet metal shop of the Central Maintenance Facility. They will vary in steps of plus or minus 7,926,833 miles and are related to miles for individual route-cost allocation.

<u>Welding Shop Wages</u>: These are the wages associated with the 14 mechanics involved in the welding shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,794,429 miles and are related to miles for individual route-cost allocation.

<u>Welding Shop Fringes</u>: These are the fringe benefits calculated for the 14 mechanics involved in the welding shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,794,429 miles for individual routecost allocation.

<u>Upholstery Shop Wages</u>: These are the wages associated with the 15 mechanics involved in the upholstery shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,341,467 miles and are related to miles for individual route-cost allocation.

<u>Upholstery Shop Fringes</u>: These are the fringe benefits calculated for the 15 mechanics involved in the upholstery shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 6,341,467 miles and are related to miles for individual route-cost allocation.

<u>Paint and Trim Shop Wages</u>: These are the wages associated with the 41 mechanics involved in the paint and trim shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,320,049 and are related to miles for individual route-cost allocation.

<u>Paint and Trim Shop Fringes</u>: These are the fringe benefits calculated for the 41 mechanics involved in the paint and trim shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 2,320,049 miles and are related to miles for individual route-cost allocation.

Body and Frame Shop Wages: These are the wages assocated with the 65 mechanics involved in the body and frame shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 1,463,415 miles and are related to miles for individual route-cost allocation.

Body and Frame Shop Fringes: These are the fringe benefits calculated for the 65 mechanics involved in the body and frame shop effort of the Central Maintenance Facility. These costs will vary in steps of plus or minus 1,463,415 miles and are related to miles for individual route-cost allocation.

<u>Miscellaneous Repair Shop Wages</u>: These are the wages associated with the injector shop, the glass repair shop, and the screen process of the central

maintenance facility. There are a total of 10 employees involved in this effort and approximately one-third are involved with each of these shops. These costs will vary in steps of plus or minus 31,707,333 miles and are related to miles for individual route-cost allocation.

<u>Miscellaneous Repair Shop Fringes</u>: These are the fringe benefits associated with the 10 employees involved in the injector shop, the glass repair shop, and the screen process shop of the Central Maintenance Facility. These costs will vary in steps of plus or minus 31,707,333 miles and are related to miles for individual routecost allocation.

<u>Service Wages</u>: These are the wages associated with the 17 service workers assigned to the Central Maintenance Facility. These costs will vary in steps of plus or minus 121 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Service Fringes</u>: These are the fringe benefits associated with the 17 service workers assigned to the Central Maintenance Facility. These will vary in steps of plus or minus 121 peak vehicles and are assigned to peak vehicles for individual route-cost allocation.

<u>Central Shop's Supervision Wages</u>: These are the wages associated with the supervision in the Central Maintenance Facility. Based on 15 supervisors, these will vary in steps of plus or minus 138 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Central Shop's Supervision Fringes</u>: These are the fringe benefits calculated for the central shop supervision. Based on 15 employees involved in this effort, these will vary in steps of plus or minus 138 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Central Shop's Administration Wages</u>: These are the wages associated with the administration in the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Traning and Other Fringes</u>: These are the costs of training and other fringe benefits associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are telephone and other utility costs allocated to the central maintenance facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are travel and other miscellaneous expenses associated with the Central Maintenance Facility. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

### Facility Maintenance Department

<u>Electrical Maintenance Wages</u>: These are the wages associated with the 23 mechanics assigned to electrical maintenance within the Facility Maintenance Department. Based on maintenance for 14 facilities, these will vary in steps of plus or minus 147 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Electrical Maintenance Fringes</u>: These are the fringe benefits calculated for the 23 mechanics assigned to electrical maintenance effort of the Facility Maintenance Department. Based on the maintenance of 14 facilities these will vary in steps of plus or minus 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

<u>Property Maintenance Wages</u>: These are the wages associated with the 13 service workers and 47 mechanics assigned to this effort. Based on the maintenance of 14 facilities, these will vary in steps of plus or minus 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

<u>Property Maintenance Fringes</u>: These are the fringe benefits calculated for the 13 service workers and 47 mechanics assigned to the property maintenance effort. Based on the maintenance of 14 facilities these will vary in steps of plus or minus. 147 peak vehicles and are are related to peak vehicles for individual route-cost allocation.

<u>Administration and Supervision Wages</u>: These are the wages associated with the administration and supervision of the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Training and Fringe Benefits</u>: This is the cost of training and other allocated fringe benefits for the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies used by the maintenance effort of the Facility Maintenance Department. Based on maintenance of 14 facilities these costs will vary in steps of plus or minus 147 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utilities allocated to the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses related to the Facility Maintenance Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.



#### Maintenance General Department

Instruction Wages: These are the wages associated with the 11 instructors in the maintenance department. They will vary in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

Instruction Fringes: These are the fringe benefits calculated for the 11 instructors associated with the maintenance department. They will vay in steps of plus or minus 188 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wages</u>: These are the wages associated with the <u>Maintenance</u> General Deparment. They are assumed fixed but are related to peak vehicles for individual routecost allocation.

<u>Fringes</u>: These are costs of training and other fringe benefits utilized by the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Maintenance General Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### **Equipment Engineering Department**

<u>Wages</u>: These are the wages the employees of the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are training and other fringe benefits allocated to the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.



<u>Utilities:</u> This is the cost of telephone and other utilities allocated to the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Equipment Engineering Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Telecommunications Department

<u>Electronic Maintenance Wages</u>: These are the wages for the 37 electronic maintenance employees assigned to the Telecommunications Department. They will vary in steps of plus or minus 56 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Electronic Maintenance Fringes</u>: These are the fringe benefits calculated for the 37 employees involved in this effort. They will vary in steps of plus or minus 56 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Administrative Wages</u>: These are the wages associated with the administration of the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are costs of training and other fringe benefits allocated to the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services associated with the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies associated with the maintenance of the radios on the revenue equipment. These costs will vary directly by the number of peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies associated with the Telecommunications Department efforts. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses associated with the Telecommunications Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Safety Department

<u>Wages</u>: These are the wages for employees of the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are costs of training and other fringe benefits allocated to the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies associated with the Safety Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses of the Safety Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## Transit Police Department

<u>Police Wages</u>: These are wages for the 34 uniformed officers assigned to passenger security efforts for SCRTD. These costs will vary in steps of plus or minus 13,688,235 passengers and are related to passengers for individual route-cost allocation.

<u>Police Fringes</u>: These are the fringe benefits calculated for the 34 officers assigned to passenger security efforts for the SCRTD. These costs will vary in steps of plus or minus 13,688,235 passengers.

<u>Police Wages:</u> These are the wages associated with the 17 officers assigned to transportation service inspections. These costs will vary in steps of plus or minus 420,706 hours and are related to hours of service for individual route-cost allocation.

<u>Police Fringes</u>: These are the fringe benefits calculated for the 17 police officers assigned to transportation service inspections for the SCRTD. These costs will vary in steps of plus or minus 420,706 hours and are related to hours of service for individual route-cost allocation.

Administrative Wages: These are the wages associated with the administration and other duties of the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation. <u>Fringes</u>: These are training and other fringe benefits allocated to the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services provided for the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Transit Police Department. They are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses of the Transit Police Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

#### Scheduling Department

<u>Schedule-maker Wages</u>: These are the wages of those schedule-makers considered variable with large amounts of service hour changes. These costs are variable in steps of plus or minus 596,000 hours and are related to hours of service for individual route-cost allocation.

<u>Schedule-maker Fringes</u>: These are the fringe benefits calculated for the 12 schedule-makers considered variable based on large amounts of service changes. These costs will vary in steps of plus or minus 596,000 hours and are related to hours of service for individual route-cost allocation.

Checker Wages: These are the wages associated with the 51 checkers assigned to the Scheduling Department. These costs will vary in steps of plus or minus 45.5 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Checker Fringes</u>: These are the fringe benefits calculated for the 51 checkers assigned to the Scheduling Department. These costs will vary in steps of plus or minus 40.5 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wages:</u> These are the wages for the administration and other employees of the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are the costs of training and other fringe benefits allocated to the Scheduling Department. These costs are considered fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services provided for the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual routecost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are the costs of telephone and other utilities expenses allocated to the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses of the Scheduling Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## Assistant General Manager for Planning and Communications

<u>Wages</u>: These are the wages associated with the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Fringes: These are the costs of training and other fringe benefits allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed by are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs of materials and supplies for the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are the costs of telephone and other utility services allocated to the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses for the Assistant G.M. for Planning and Communications. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## **Planning Department**

<u>Wages</u>: These are the costs of wages associated with employees of the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are the costs of training and other fringe benefits allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services provided for the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual routecost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Utilities: These are the costs of telephone and other utilities allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses allocated to the Planning Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## Marketing and Communications Department

<u>Ticket Clerk Wages</u>: These are the wages associated with the 22 ticket clerks involved in sales of materials to SCRTD passengers. These costs will vary in steps of plus or minus 21,154,545 passengers and are related to passengers for individual route-cost allocation.

<u>Ticket Clerk Fringes</u>: These are the fringe benefits calculated for the 22 ticket clerks assigned to sell materials to SCRTD passengers. These costs will vary in steps of plus or minus 21,154,545 passengers and are related to passengers for individual route-cost allocation.

<u>Wages:</u> These are the wages for administrative and other employees assigned to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Fringes</u>: These are the costs of training and other fringe benefits allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Services</u>: This is the cost of services allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Miscellaneous Expenses:</u> These are the costs of travel and other miscellaneous expenses allocated to the Marketing and Communications Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

## **Customer Relations Department**

<u>Telephone Clerk's Wages</u>: These are the costs of wages for the 94 telephone clerks assigned to the Customer Relations Department. These costs will vary in steps of plus or minus 4,951,064 passengers and are related to passengers for individual route-cost allocation.

<u>Telephone Clerk's Fringes</u>: These are the costs of fringe benefits for the 94 telephone clerks assigned to the Customer Relations Department. These costs will vary in steps of plus or minus 4,951,064 passengers and are related to passengers for individual route-cost allocation.

<u>Wages</u>: This is the cost of wages for administrative and other personnel assigned to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Services</u>: This is the cost of services allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Materials and Supplies</u>: These are the costs for materials and supplies utilized by the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utility expenses for the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses allocated to the Customer Relations Department. These costs are assumed fixed but are related to passengers for individual route-cost allocation.

#### Assistant General Manager for Governmental and Community Affairs

<u>Wages:</u> This is the cost of wages for employees of the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are the costs of telephone and other utilities allocated to the Assistant G.M. for Government and Community Affairs. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses for to the Assistant G.M. for Government and Community Affairs. These

costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## Government Affairs Unit

<u>Wages:</u> This is the cost of wages for employees of the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefit costs allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual routecost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: These are the costs of telephone and other utilities expenses allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: These are the costs of travel and other miscellaneous expenses allocated to the Government Affairs Unit. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

## **Community Relations Department**

<u>Wages:</u> This is the cost of wages for employees of the Community Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are costs of training and other fringe benefits allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Services</u>: These are the costs of services utilized by the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation. <u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Community Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

## Assistant General Manager for Equal Opportunity

<u>Wages</u>: This is the cost of wages for employees of the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies used by the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Assistant GM for Equal Opportunity. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

## Human Relations Department

<u>Wages</u>: This is the cost of wages for employees of the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Services</u>: This is the cost of services utilized by the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Human Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Employee Education, Training, and Development Department

<u>Wages</u>: This is the cost of wages for employees of the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations. <u>Fringes:</u> This is the cost of training and other fringe benefits allocated to the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Services</u>: This is the cost of services utilized by the Employee Educaton, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Employee Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the <u>Employee</u> Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Employee Education, Training and Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

## **Controller-Treasurer-Auditor Department**

<u>Wages:</u> This is the cost of wages for employees of the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Services</u>: This is the cost of services utilized by the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Controller-Treasurer-Auditor Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

## Accounting and Fiscal Department

<u>Payroll, Clerk, Wages</u>: These are the costs associated with the 16 payroll clerks assigned to the department. These costs will vary in steps of plus or minus 447,000 hours and are related to hours of service for individual route-cost allocation. <u>Payroll, Clerk, Fringes</u>: These are the fringe benefits calculated for the 16 payroll clerks assigned to the accounting and fiscal Department. These costs will vary in steps of plus or minus 447,000 hours and are related to hours of service for individual route-cost allocation.

<u>Cash Clerk Wages</u>: These are the costs associated with the 28 cash clerk employees of the department. These costs will vary in steps of plus or minus 16,621,429 passengers and are related to passengers for individual route-cost allocation.

<u>Cash Clerk Fringes</u>: These are the fringe benefits calculated for the 28 cash clerks assigned to the department. These costs will vary in steps of plus or minus 16,621,429 passengers and are related to passengers for individual route-cost allocation.

<u>Wages:</u> These are the wages associated with the other employees of the Accounting and Fiscal Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Accounting and Fiscal Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Accounting and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Accounting and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

Utilities: This is the cost of telephone and other utility expenses allocated to the  $\overline{\text{Accounting}}$  and Fiscal Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

## Data Processing Department

<u>Wages</u>: This is the cost of wages for employees of the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Data Processing Department. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Services</u>: This is the cost of services utilized by the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations. <u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Data Processing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Office of Insurance

<u>Wages</u>: These are wages for the Office of Insurance employees. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Fringes</u>: This is the cost of training and other fringe benefits for the department employees. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses associated with the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Office of Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Assistant General Manager for Transit System Development

<u>Wages</u>: These are wages for the employees of the Assitant G.M. for Transit System Development Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Assistant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

Utilities: This is the cost of telephone and other utility expenses allocated to the Assistant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Assitant G.M. for Transit System Development. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### **Bus Facilities Engineering**

<u>Wages</u>: These are wages for the employees of the Bus Facilities Engineering Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to Bus Facilities Engineering. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocations.

Services: This is the cost of services utilized by the Bus Facilities Engineering. These costs are assumed fixed, but are related to peak vehicles for individual routecost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by Bus Facilities Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenditures allocated to the Bus Facility Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses utilized by Bus Facility Engineering. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

### Assistant General Manager for Management

<u>Wages</u>: This is the cost of wages for the employees of the Assitant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Materials and Supplies</u>: This is the cost of materials and supplies for the Assistnat G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Assistant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Assitant G.M. for Management. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Contracts and Purchasing Department

Stores Wages: These are the wages associated with 13 storekeepers and 26 stockclerks assigned to 13 different operating facilities and considered variable.

These costs will vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individal route-cost allocation.

Stores Fringes: These are the fringe benefits calculated for the 13 storekeepers and 26 stockclerks assigned to the various operating facilities. These steps will vary in steps of plus or minus 159 peak vehicles and are related to peak vehicles for individual route-cost allocation.

<u>Wages</u>: These are the wages of administrative and other employees assigned to the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Contracts and Purchasing Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Contract and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Contract and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Contracts and Purchasing Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Personnel Department

<u>Wages</u>: This is the cost of wages for those employees assigned to the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Personnel Department. These costs are assumed fixed but are related to peak vehicles for individual routecost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utility expenses allocated to the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation. <u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses for the Personnel Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### General Services Department.

<u>Wages</u>: These are the wages associated with employees of the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: These are costs of training and other fringe benefits allocated to the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services provided for the General Services Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the General Services Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Print Shop

<u>Wages</u>: This is the cost of wages for those employees assigned to the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Print Shop. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Timetables</u>: This is the cost of timetables printed by the Print Shop. These costs will vary directly by the number of passengers served and are related to passengers for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations. <u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Print Shop. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Office of Management and Budget

<u>Wages</u>: This is the cost of wages for those employees of the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

Services: This is the cost of services utilized by the Office of Management and Budget. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses utilized by the Office of Management and Budget. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Labor Relations Department

<u>Wages</u>: This is the cost of wages for employees of the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: This is the cost of training and other fringe benefits allocated to the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Labor Relations Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations. <u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Labor Relations Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### **Employee Activities Department**

<u>Wages</u>: This is the cost of wages for those employees of the Employee Activities Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services utilized by the Employee Activities Department. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies utilized by the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

<u>Utilities</u>: This is the cost of telephone and other utilities allocated to the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Miscellaneous Expenses</u>: This is the cost of travel and other miscellaneous expenses allocated to the Employee Activities Department. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocations.

#### Non-Departmental Expenses

<u>Wages</u>: This is the cost of wages not assigned to any other departments within the organization of SCRTD. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fringes</u>: Most fringes within the budget process at SCRTD are assigned to the non-departmental expenses. As this model was developed, fringe benefits for employees that are considered variable were reallocated out of the non-departmental expense category and assigned to departments that were appropriate. These reallocated dollars were removed from the non-departmental expense fringe category and the balance are the fringe benefits associated with all non-variable SCRTD employees. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Workman's Compensation</u>: These are workman's compensation claims estimated to relate to the bus operators. These costs will vary in steps of plus or minus 777 hours based on an approximate 4,600 bus operators and are related to hours of service for individual route-cost allocation.

<u>Workman's Compensation</u>: These are workmen's compensation claims associated with the maintenance department at the SCTRD. Based on approximately 1,600

maintenance employees, these costs will vary in steps of plus or minus 59,451 miles and are related to miles of service for individual route-cost allocation.

<u>Workman's Compensation</u>: These are workmen's compensation claims not associated with bus operators or the maintenance department operations. These costs are considered fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Services</u>: This is the cost of services assigned to the Non-departmental Expenses. These costs are assumed fixed but are related to peak vehicles for individual route-cost allocation.

<u>Fuel</u>: This is the cost of fuel for revenue vehicles operated at SCRTD. These costs will vary directly by the miles of service provided and are related to miles of service for individual route-cost allocation.

<u>Materials and Supplies</u>: This is the cost of materials and supplies assigned to the <u>Non-departmental</u> Expenses category. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Utilities</u>: This is the cost of telephone and other utilities assinged to the Nondepartmental Expense category. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Premiums for Physical Damage</u>: This is the cost for premiums for physical damage insurance for SCRTD property. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Premiums for PL and PD Insurance</u>: This is the cost of premiums for PL and PD Insurance. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Premiums for Corporate Insurance</u>: These are premiums for the Corporate Insurance for SCRTD. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

<u>Provisions for Uninsured PL</u>: This is the provision for the Uninsured portion of the liability insurance for the SCRTD. Based on approximately 4,600 claims annually, these costs will vary in steps of plus or minus 101,174 passengers and are related to passengers for individual route-cost allocation.

<u>Provisions for Uninsured PD</u>: These are costs associated with the uninsured portion of the property damage insurance for SCRTD. Based of approximately 2,400 claims these costs will vary in steps of plus or minus 39,634 miles and are related to miles of service for individual route-cost allocation.

<u>Expenses for PL</u>: These are the expenses for processing the liability claims for the SCRTD. Based on approximately 4,600 claims in this category per year these will vary in steps of plus or minus 101,174 passengers and are related to passengers for individual route-cost allocation.

<u>Expenses for PD</u>: These are the expenses for processing the property damages claims for the SCRTD. These costs, based on approximately 2,400 claims in this category for a year, will vary in steps of plus or minus 39,634 miles and are related to miles for individual route-cost allocation.

<u>Fuel and Lube Taxes, Non-Revenue Equipment</u>: This is the Fuel and Lube Taxes for the fuel purchases for non-revenue equipment for the SCRTD. These costs are assumed fixed and are related to hours of service for individual route-cost allocation.

<u>Fuel and Lube Taxes, Revenue Equipment</u>: These are the Fuel and Lube Taxes from the purchase of fuel for the revenue equipment operations for the SCRTD. These costs will vary directly by the miles of service and are related to the miles of service for individual route-cost allocation.

<u>Leases and Rentals</u>: This is the cost of Leases and Rentals for SCRTD equipment and facilities. These costs are assumed fixed, but are related to peak vehicles for individual route-cost allocation.

#### **Operating Statistics**

The following projected operating statistics were supplied by SCRTD for the FY 84 operations. These statistics will be used to calibrate the model in the FY 84 base year.

Annual Revenue Vehicle Miles:	95,122,000
Annual Revenue Hours of Service:	7,152,000
Unlinked Passenger Trips:	465,400,000
Peak Vehicles:	2,063

## Inflation

All the costs identified in the operations cost model are projected FY 84 expenditures. These costs will be used to project future costs. Operating costs will be presented in both future-year dollars and in 1984 dollars.

Table 2 prsents the projected baseline inflation rates applied in calibrators to the bus operating cost model developed in Minneapolis, Minnesota and Table 3 presents the projected baseline inflation rates applied in calibrators to the bus operating cost model developed in St. Louis, Missouri. These rates are the United States Cities Average All-Item value for the Consumer Price Index (CPI-U). Tables 2 and 3 also present incremental inflation rates that were developed for components of operating cost which it is believed will differ from the CPI. As can be seen, incremental rates can be assumed for wages, fringes, bus parts, diesel fuel, and utility costs. It is recommended that a baseline rate be established for SCRTD projections and incremental rates, if appropriate, be established for wages, fringes, bus parts, and diesel fuel.

The baseline CPI and incremental inflation rates were applied to compute compounded inflation factors for specific cost components. The general form of the equation for computing the factors was:



# Table 2 INPLATION RATES AND FACTORS (PY 83 IS BASE YEAR)

Inflation Category	Inflation Rate or Factor	1983	1984	1985	1986	1987	1988	1989	1990.	1 <b>99</b> 1	1992	. 1993	1994	199 <u>5</u>	1996	1997	1998	1999	2000
Baseline <sup>(1)</sup> (CPI-U)	Rate Factor (Infl.\$) Factor (Cons.\$)	0.00% 1.0000 1.0000	4.90% 1.0490 1.0000	4.80% 1,0994 1.0000	5.10% 1.1554 1.0000	5:40% 1,2178 1.0000	6.00% 1.2909 1.0000	6:00% 1.3683 1.0000	1.4532	6.40% 1.5462 1.0000	1.6451	1.7521	6.40% 1.8642 1.0000	6.40% 1.9835 1.0000	6.40% 2.1004 1.0000	6.40% 2,2455 1.0000	6.40% 2,3892 1,0000		
Diese) Fuel <sup>(2)</sup>	Incremental Rate Pactor (Infl.\$) Pactor (Cons.\$)	0.00% 1.000 1.000	3.63% 1.0853 1.0346	3.51% 1.1755 1.0693	4.03% 1.2828 1.1103		3.73% 1.5383 1.1916	3.60% 1.6859 1.2321	3.47% 1.8490 1.2724		2.2515	3.73% 2.4818 1.4165	3.59% 2.7298 1.4643	3.47% 2.9992 1.5121	1.79% 3.2448 1.5375	1.76% 3.5096 1.5629	1.73% 3,7949 1.5884	1.70% 4.1023 1.6137	
Bus Parts <sup>(3)</sup>	Incremental Rate Pactor (Inf <b>i.\$)</b> Pactor (Cons.\$)	0.00% 1.0000 1.0000			0.00% 1.1675 1.0105	0.00% 1.2306 1.0105		0.00% 1.3827 1.0105	0.00% 1.4684 1.0105		0.00% 1.6624 1.0105		0,00% 1.8837 1.0105	0.00% 2.0043 1.0105		0.00% 2.2691 1.0105	0.00% 2.4143 1.0105	0.00% 2.5688 1.0105	
Other Direct Costs	Incremental Rate Factor (Infl.\$) Factor (Cons.\$)	0.00% 1.0000 1.0000	0.00% 1.0490 1.0000	0:00% 1.0994 1.0000	0:00% 1.1554 1.0000	0:00% 1.2178 1.0000	0:00% 1.2909 1.0000	0.00% 1.3683 1.0000	0.00% 1.4532 1.0000	0.00% 1.5462 1.0000	0.00% 1.6451 1.0000	0.00% 1.7521 1.0000	0.00% 1.8642 1.0000	0.00% 1.9835 1.0000	0.00% 2.1004 1.0000	0.00% 2.2455 1.0000	0.00% 2.3892 1.0000	0.00% 2.5421 1.0000	0.00% 2.7048 1.0000

(1) Source: Minnesota State Department of Finance, January, 1984.

(2) Source: Argonne National Laboratory, Center for Transportation Research, Energy and Environmental-Systems Division, April, 1982.

(3) MTC Estimte

Table 3								
INFLATION	RATES	AND	FACTORS	(FY	83	IS	BASE	YEAR)

Inflation Category	Inflation Rate or Factor	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	<u>19</u> 94	1995
Baseline <sup>(1)</sup> (CPI-U)	Rate Factor (Inflated \$) Factor (Constant \$)		4.30% 1:0430 1.0000	5.10% 1.0962 1.0000	5.60% 1.1576 1.0000	6.10% 1.2283 1.0000	6.20 <b>%</b> 1.3043 1.0000	6.50% 1.3891 1.0000	6.70% 1.4822 1.0000	6.80% 1.5830 1.0000	6.60% 1.6875 1.0000	6.50 <b>%</b> 1.7971 1.0000	6.50% 1.9140 1.0000	6.40% 2.0365 1.0000
Wages <sup>(2)</sup>	Incremental Rate Factor (Inflated \$) Factor (Constant \$)		-4.20% 1.001 .9597	-3.10% 1.0210 .9314	0.00% 1.0782 .9314	0.00% 1.1440 .9314	0:00% 1.2149 .9314	0.00% 1.2939 .9314	0.00% 1.3805 .9314	0.00% 1.4744 .9314	0.00% 1.5717 .9314	0.00% 1.6739 .9314	0.00% 1.7827 .9314	0.00% 1.8968 .9314
Fringes <sup>(2)</sup>	Incremental Rate Factor (Inflated \$) Factor (Constant \$)		5.70% 1.1000 1.0546	4.90% 1.2100 1.1038	4.40% 1.3310 1.1498	3.90% 1.4641 1.1921	3.80% 1.6105 1.2347	3.50% 1.7716 1.2753	0.00% 1.8903 1.2753	0.00% 2.0188 1.2753	0.00% 2.1520 1.2753	0.00% 2.2919 1,2753	0.00 <b>%</b> 2.4409 1.2753	0.00% 2.5971 1.2753
Diesel Fuel <sup>(3)</sup>	Incremental Rate Factor (Inflated \$) Factor (Constant \$)		3.63% 1.0793 1.0348	3.51% 1.1722 1.0694	4.03% 1.2851 1.1102	3.88% 1.4134 1.1508	3.73% 1.5537 1.1912	3.60% 1.7106 1.2315	3:47% 1.8846 1,2715	4.03% 2.0887 1.3195	3.87% 2.3074 1.3674	3.73% 2.5435 1.4153	3.59 <b>%</b> 2.8001 1.4630	3.47% 3.0765 1.5107
St, Louis Electricity(4)	Incremental Rate Factor (Inflated \$) Factor (Constant \$)		3.70% 1.0800 1.0355	19.9% 1.3500 1.2315	0.00% 1.4256 1.2315	0.00% 1.5126 1.2315	0.00% 1.6063 1.2315	0.00% 1.7108 1.2315	0.00% 1 <sup>.</sup> .8254 1.2315	0.00% 1.9495 1.2315	0.00% 2.0782 1.2315	0.00% 2.2132 1.2315	0.00% 2.3571 1.2315	0.00% 2.5080 1.2315
Other Direct Costs	Incremental Rate Factor (Inflated \$) Factor (Constant \$)		0.00% 1.0430 1.0000	0.00% 1.0962 1.0000	0.00% 1.1576 1.0000	0.00% 1.2283 1.0000	0.00% 1.3043 1.0000	0.00% 1.3891 1.0000	0.00% 1.4822 1.0000	0.00% 1.5830 1.0000	0.00% 1.6875 1.0000	0.00% 1.7971 1.0000	0.00% 1.9140 1.0000	0.005 2.0365 1.0000

(1) Source: Data Resources, Inc., March, 1983.

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(2)<sub>Bi-State Estimate.</sub>

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<sup>(3)</sup>Source: Argonne National Laboratory, Center for Transportation Research, Energy and Environmental Systems Division, April, 1982.

<sup>(4)</sup>Source: Union Electric Co., St. Louis, one-half their current and potential rate requests.

$$CTIF_{in} = (1.0 + CPI_1 + INCR_{1n}) \times (1.0 + CPI_2 + INCR_{2n}) \times \dots \times (1.0 + CPI_n + INCR_{in})$$

Where:

The inflation factors computed in this manner were used to estimate costs in inflated dollars. The so-called "uninflated" costs reflected the incremental inflation only, but did not directly include the baseline CPI values. The inflation factors were computed as follows:

$$CIIF_{in} = \frac{1.0 + CPI_{1} + INCR_{1n}}{1.0 + CPI_{1}} \times \frac{1.0 + CPI_{2} + INCR_{2n}}{1.0 + CPI_{2}} \times \dots \times \frac{1.0 + CPI_{1} + INCR_{n}}{1.0 + CPI_{1}}$$

$$\frac{1.0 + CPI_{1} + INCR_{n}}{1.0 + CPI_{1}}$$
where:
$$CIIF_{in} = \text{compounded incremental inflation factor for cost}$$

$$CTIF_{in} = (CIIF_{in}) \pi_{i} \quad (1.0 + CPI_{i})$$
Note that  $CIFF_{in} \frac{\text{cannot}}{\text{be computed simply as:}}$ 

$$CIIF_{in} \neq (1.0 + INCR_{in}) \times (1.0 + INCR_{2n}) \times \dots \times (1.0 + INCR_{in})$$

#### Articulated Bus Unit Costs

Current cost experience for SCRTD, as reflected in the cost allocation model, is for buses already in the SCRTD fleet. This fleet includes standard 35-foot and 40-foot urban coaches but also includes a small percentage of double-decked buses and articulated buses.

If plans exist to change the current ratio of standard buses to articulated buses, the model should be sensitive to these changes and the cost differentials that may exist between standard urban coaches and articulated buses.

No data was readily available on articulated bus costs of SCRTD at the time of the visits to gather materials for development of this bus cost model. If data now exists to differentiate between standard buses and articulated SCRTD buses, this should be utilized. If not, Table 4 presents a comparison between Bi-State factors and articulated bus cost data. These ratios could serve to differentiate between SCRTD standard buses and articulated buses until SCRTD data is collected and analyzed.

## Table 4

## COMPARISON OF VEHICLE MAINTENANCE UNIT COST FACTORS FOR BI-STATE CURRENT FLEET AND ARTICULATED BUSES

Cost Area	Bi-State Current Factor	Articulated Bus Factor
Station Service Personnel	1 Worker per 7.36 buses	1 Worker per 5 articulated buses.
Station Repairmen	1 Worker per 202,338 miles	1 Worker per 152,076 Articulated Miles.
Main Shop Repairmen	1 Worker per 4.41 buses	1 Worker per 3.15 Articulated Buses/
Tires and Tubes	2.16 ¢ per Mile	4.32 ¢ per Mile
Diesel Fuel	23.71 ¢ per Mile	27.50 ¢ per Mile
Maintenance Parts and Supplies	11.50 ¢ per Mile	17.30 ¢ per Mile



# GENERAL PLANNING CONSULTANT:

TECHNICAL MEMORANDUM 5.5.1

OPERATING AND CAPITAL

FUNDING PROGRAM

(PRELIMINARY)

Prepared for:

Southern California Rapid Transit District

Prepared by:

Schimpeler.Corradino Associates

in association with

Barton-Aschman Associates Cordoba Corporation Deloitte Haskins & Sells Myra L. Frank & Associates Robert J. Harmon & Associates Manuel Padron The Planning Group, Inc.

> October, 1984 YP1010841500

> > . . .,

## FINANCIAL OPERATING PLAN

### I. INTRODUCTION

This document describes the Financial Operating Plan (F.O.P.) of the SCRTD for the years 1985 through 2000. This F.O.P. covers operating and capital costs and revenues of RTD's bus system, as well as Metro Rail MOS-1 segment and the light rail line from L.B. to L.A. The F.O.P. model was developed using a computerized spread sheet program - Lotus 1-2-3. This program is capable of evaluating different operating and funding scenarios, as well as various assumptions about general background economics conditions. The purpose of the model is to provide the decision makers in SCRTD with a tool capable of estimating future operating and capital deficits or surpluses resulting from various operating and capital investment assumptions and policies. A brief description of all the items included in the model will be discussed in the next chapter; here we first describe the general framework of the F.O.P. model and its basic structure.

The F.O.P. model covers all the operations and capital investments of SCRTD from FY 1985 through FY 2000. The model is completely general and allows the inclusion of any transit projects scheduled for construction in L.A. County and/or operation by SCRTD. However, in its present version only the following three transit subsystems were included:

 Metro Rail MOS-1 line from union station to Wilshire/Alvarado as defined in the Environmental Assessment Report and scheduled to start operations in the year 1990.

- The light rail line from L.B. to downtown L.A. as described in the L.B.-L.A. Environmental Impact Report as LA-1/MC-1/LB-2 baseline alternative, scheduled to start operations in the year 1990.
- 3. The entire SCRTD bus system adjusted in the year 1990 to operate in coordination with the mentioned above rail lines; that is, adjusted to provide desired feeder and background support for the two (2) rail services.

All money amounts in the F.O.P model are presented in their current (inflated) dollars, unless otherwise noted; all calculations are in inflated dollars. The basic structure of the model consists of the following steps:

## A. <u>Operating costs and revenues</u>

- All operating costs are stated in current (inflated) dollars, and are the results of the appropriate UTPS runs.
- Passenger revenues for all elements of the transit system are added to other revenue sources to produce the total revenues of the system.,
- 3. The operating deficit is estimated by subtracting the operating revenues from operating costs.
- 4. All local, state and federal grants uniquely dedicated for operating subsidies are calculated and summed.

- 5. The unique operating grants are compared with the operating deficit; if grants are sufficient to cover deficit, no further action is taken. If grants do not suffice, the left over deficit is covered by the 40% pool within Prop A which can be used for operating or capital funds at the discretion of LACTC.
- 6. A test is made to check whether the 40% pool within Prop. A is enough to cover the operating deficit. If the funds suffice the balance remaining in the 40% Prop. A pool after covering the operating deficit is transferred for capital investment. If those monies are not sufficient an error message is printed.

## B. <u>Capital costs and funding</u>

- All capital costs (on a commitment basis) are calculated and summed up.
- 2. All local, state and federal fundings (grants), including the balance (after operating requirements) left in the 40% pool within Proposition A are evaluated and summed.
- 3. The capital grants are subtracted from capital costs to indicate surplus or deficits of capital funds. The deficit is assumed to be covered by UMTA sec 3 grant; any surplus is the amount of funds available for other transit capital projects.

## II. DEFINITION OF LINE ITEMS IN F.O.P. MODEL

A major part of the effort of developing the F.O.P. model was devoted to identifying the dollar amounts available to SCRTD from various local, state and federal grants and funding sources. Those funds, as well as other basic necessary information for the model are presented in Table I. The information in the table pertains to FY 1983 through FY 2000. Each row in the table is identified by its left most column. A brief description of revenue sources and those factors which define revenue levels is given below:

## A. <u>Basic background information</u>

Background information includes two main groups of the items: (a) arrival C.P.I. changes; and, (b) annual population and income in L.A. County. The C.P.I. values are based on LACTC predictions of C.P.I. to be used for long term forecasts. The basic population and income figures were produced by SCAG for long range transportation planning. The per capita income and population predictions are used to evaluate sales tax revenues which are the basis for Proposition A and TDA monies. Based on past experience the taxable sales in L.A. County are in the range of about 50% to 53% of total income of residents in L.A. County. Two scenarios were developed to reflect sales tax trend: high level of funds driven by sales tax receipts which assume 0.53 of total income, and low level of sales tax receipts which assumes spending of 0.50 of total income.

Additional assumptions relate to SCRTD's share of most federal, state and local taxes dedicated for transit in L.A. County. Based on a formula established by the California Legislature which account for population and transit service (measured by transit revenues) SCRTD's share is 86% of each grant.

## B. <u>Operating Costs and revenues</u>

Operating costs and revenues are the results of specific UTPS computer runs calibrated to reflect SCRTD cost and fare structures. The UTPS simulations were performed for the years in which significant changes in the transit system occur. The revenues reflect SCRTD's policy which assumes that the base transit fares return to pre-Proposition A level (in nominal \$) in FY 1986 and will rise to double the pre-Proposition A level (in terms of constant dollars) in FY 1989. From FY 1990 on, the fare will stay the same in constant dollars through FY 2000. Both fares and costs are adjusted for inflation according to the projected C.P.I. values. Rail operating costs for Metro Rail MOS-1 and Long Beach-Los Angeles were taken from their respective Environmental Impact reports. Revenues of both rail system are included in total revenues produced by the UTPS simulations.

## C. Construction and Capital Costs

Construction costs of the Metro Rail and Long Beach-Los Angeles light rail lines are stated in terms of committed funds for construction. The funds for Metro Rail are based on the proposed construction schedule as stated in Metro Rail EIR. The funds for L.B.-L.A. are based on preliminary construction estimates of the LACTC. Other capital expenditures include the following items:

1. Bus acquisitions and replacements which are based on detailed schedules through FY 1997 and estimates of needs for the rest of the period.

 Capital costs for buildings and structures, land acquisition and office equipment and furnishings are based on detailed schedules developed by SCRTD through FY 1989, and predictions of needs FY 1990 through FY 2000.

## D. Non- operating revenues consist of two items:

- Auxiliary Transportation revenues which are mainly income streams anticipated by the SCRTD from advertising.
- 2. Non Transportation revenues which are income streams gained by the SCRTD as interest on various accounts.

## E. Local Grants and Funds

Proposition A is collected as 0.5% of taxable sales in Los Angeles 1. This fund can be used for both capital and operating County. assistance according to the following formula which provides that in FY 1983, FY 1984 and FY 1985, 25% of the money is given to cities in L.A. County: 86% of the remaining 75% of the fund is dedicated to SCRTD to cover the operating deficit resulting from fare reductions. The amount left in SCRTD's share after covering the operating deficit can be used From FY 1986 on, Proposition A money is for capital investment. divided by another formula as follows: 25% is dedicated to cities in L.A. County, and 35% is assigned to capital investment in rail projects The remaining 40% can be used for both capital and in L.A. County. operating expenses at the discretion of LACTC. The assumptions made in the F.O.P. model is that 86% of the discretionary 40% Proposition A money will be used by SCRTD first to cover the leftover operating deficit after accounting for all available operating grants. The money remaining after accounting for the operating deficit will be used capital investment.

- 2. TDA is a state fund distributed to counties based on the local share of sales tax collected at each county. The TDA for Los Angeles County is by definition 0.25% of taxable sales. Out of the total amount returned to L.A. County, 6% is assigned to various non R.T.D. non transit projects. 86% of the remaining 94% of these funds are committed by formula to SCRTD. Out of this, 15% is assigned to capital investments and 85% for operating subsidy. TDA, being based on taxable sales, is also influenced by the model's assumptions on taxable sales in Los Angeles County.
- 3. Local operating contractual payments are funds transmitted to SCRTD by Riverside, Orange and San Bernardino Counties for transit services provided by SCRTD. Those payments are expected to continue on the same level (adjusted for C.P.I) through the year 2000.
- 4. Benefit Assessment funds are the amount of monies to be received from bonds issued against income anticipated from Benefit Assessment District revenues associated with the five (5) Metro Rail MOS-1 stations.
- 5. City of Los Angeles funds are the present commitments of the city to the construction of Metro Rail MOS-1 and are derived by the city from 25% local return pool within Proposition Å.

## F. <u>State Funds and Grants</u>

- 1. STA-State Transit Assistance funds are allocated to counties by formula based on their population and transit revenues. STA monies are 60% of the TP&D (Transportation planning and development account) which are generated by a formula which is dependent on state gasoline tax revenues and money generated by state sales tax revenues. SCRTD receives 86% of STA money allocated to Los Angeles County and uses it at its discretion to cover operating deficits or for capital investment. The STA figures used are the predictions of SCAG.
- 2. Article XIX funds are general funds allocated by the state for highways and fixed guideways construction. The funds stated in the F.O.P. model are the stated commitments of the state for the construction of Metro Rail MOS-1.

## G. Federal funds and Grants

1. Section 9 Federal funds are formula dollars assigned for both operating subsidy and capital investment. This fund is defined through FY 1986. At present there is no clear definition of what amount of section 9federal support will be available starting FY 1987 and continuing through FY 2000. To account for this uncertainty, two scenarios were developed with respect to funds available from FY 1987 through FY 2000. Both scenarios are identical for FY 1985 and 1986. For the first two years the stated amount available in section 9 monies are SCAG estimates. By law \$47.5M in inflated dollars can be used for capital investment. Scenario 1 which represents the pessimistic assumption

from SCRTD's point of view assumes that the future section 9 fund will stay the same as in FY 1986 in terms of inflated dollar, i.e. will decline in terms of constant dollars. The operating subsidy is also kept fixed at a level of \$47.5M inflated dollars. Scenario 2 is the more optimistic; it assumes that from FY 1987 through FY 2000 the total section 9 monies will stay fixed as in FY 1986 in terms of constant dollars thus increasing in inflated dollars from year to year. The operating subsidy will also stay fixed in terms of constant 1986 dollars, while the amount available for capital investment will be the difference between the total amount available in section 9 fund and the assigned operating subsidy.

- 2. UMTA section 3 funds are discretionary funds available for capital investment in transit projects. In the F.O.P. model it is assumed that the deficit in capital investment for the two rail projects (after accounting for all dedicated local, state, and federal grants) will be covered by UMTA section 3 grants.
- 3. Other federal assistance consists mainly of federal funds committed for technical studies and is assumed to stay at it's present level in constant dollars, thus increasing only due to inflation.

## III. MODEL STRUCTURE AND OUTPUT

The output of the F.O.P. model is presented in table II and is self explanatory. As stated above it was programmed using LOTUS 1-2-3 and thus is very flexible when it is necessary to evaluate different financial assumptions and various scenarios regarding future development. It is rather easy to evaluate the financial operating plan assuming different C.P.I. values, population growth etc., and thus produce an almost infinite number of reports. The figures included in the model represent SCRTD's best estimates of the relevant information. Eight (8) possible alternatives were programmed into the F.O.P. Model; they represent two scenarios for each of the following variables.

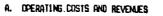
- A. Available UMTA section 9 fund Two scenarios were assumed regarding the size and distribution of this fund in the future the details of these assumptions were stated above.
- B. Available Proposition A and TDA funds due to two alternative assumptions on percentage of spent income, are presented.
- C. Size of SCRTD transit service The following two possible policies are assumed:
  - The level of service of SCRTD will stay systemwide at its current level.
  - 2. The level of service will be adjusted so that the total operating costs of the system including rail service will not exceed \$500M in 1983 dollars.

Opérating costs and revenues for both SCRTD bus and rail systems are the result of the appropriate UTPS simulations.

## TABLE I

## GENERAL BACKGROUND INFORMATION AND FUNDING SOURCES

[7]	0.20	4.38	5.30	5, 98	7.20	6.58	6.10	5.40	5.50	5.50	5,58	5, 58	5:58	5,50	5,50	5.50	5,58	5.58	
ACTX************************************	169.69	:04, 30	189.83	116.31	124.68	132.79	142.89	148.49	156.66	165.28	174.37	183.95	194.68	204.75	216, 81	227.83	249, 43	. 253,65	
LA. COUNTY ROP.	7, 580	7,637	7 <sub>1</sub> 632	7, 745	7,738	7,852	7,839	7, 348	7, 995	545 ;8	8,285	8, 128	8,178	5,213	8,251	8, 283	8, 335	8,362	
FERSONAL INCOMENENTIAL	4,645	4, 689	4,755	4, 807	4,674	4,346	5,017	5,085	5, 153	5, 222	5,281	5,362	5,434	5,587	5,582	5:657	5,734	5,812	
PERSONAL INCOME 18311	13,685	13,734	13, 327	14,083	14,/276	14;487	14,695	14,894	15,033	15,235	15,468	15,725	15, 316	16,132	16,350	15, 569	16, 795	17, 223	
"RIABLE SALESIBILINI	54,658	55, 598	56,779	57, 795	59, 282	64,272	61, 519	62.740	63,955	65, 176	66, 281	67,656	68,919	78,212	71, 498	72, 732	74, 112	75,445	•
TATABLE SALES(1), M)	54,658	57, 981	62,359	67:220	73,564	88,834	86,672	93, 165	100,193	107,721	115,573		133,754	143,753	154,443	165, 987	178, 185	191, 366	
ORDERA REVEN. (16, M)	273	298	312	336	368	462	433	466	501	539	578	622	667	719	172	629	831	957	
2939-0-351111, 81	95.7	101.5	169.1	117.6	126,7	148. :-	151.7	163. J	175.3	188.5	282.3	217.8	234.1	251.6	278.3	298:3	3:1.0	334.9	
RTD 2402-0.401(15,K)	94. Q	93.7	107 <b>.</b> 3.	11526	126.5	137.7	649.1	162.2	172, 3	185.3	178.8	214.1	230.1	247.3	265.6	265.3	386.5	325.1	
L.A.CGATY TOALLS, N	135.6	145. P	155, 9	168. 1	183.9	208. 1	216.7	232.9	250.5	269.3	288, 9	311.1	334,4	359.4	386, 1	414.7	445.5	476.4	
TOA FOR RTOLLS, MY	110.5	117.2	126.8	135.9	148.7	161.7	175.2	188.3	202.5	217.7	233.6	255	270.3	294.5	312.1	335, 3	31.0.1	386.8	
TDA ASK(IS,N)	93.9	99.6	187.1	115.5	126. 1	137.5	148.3	168.9	172.1	185.0	198.5	213.8	8.652	247.0	265.3	285.0	396, 1	328.7	
7EG (ESK(EK,K)	16.6	17.5	18,9	59.4	22:3	24. J	.26, 3	59.5	39.4	32.7	35, 0	37:7	46.5	43.6	46.8	54.3	54.0	-58,9	
STA (828.41	26.6	27.1	27.7	27.5	26.3	28, 3	38.3	27.7	28, 1	26.4	26.1	24.3	22.7	2:.2	19.4	17.2	15.2	13.6	
STA FOR RIDCIS. *}	23.7	25.2	27, 1	28. 5	29.2	33.5	38, 1	36, 6	39, 2	38.8	40.5	33.8	39, 3	38.7	37.4	34.9	32.6	38.6	
UNTA SEC 3 SI (14:M)	104. 1	122.1	130.8	135.3	135.3	135.3	135.3	:35, 31	135.3	135.3	135.3	135, 3	135.3	135.3	135.3	135.3	135, 3	135.3	
ukta sec 9 sl(824,ki	182.4	113.8	115.0	112.3	184.7	98.3	92.7	87.3	83.4	79, 0	74,9	71.0	67.3	63.8	68.4	57.3	54.3	51.5	
SEC 9 OP SILLS MI	47.5	4715	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47,5	47.5	47.5	47.5	47.5	47.5	47.5	47:5	
SEC SICP SILLS M	-56.6	74.6	83.3	87.8	87.8	87.8	87.8	87.8	87. B	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	
JATA SEC 9 SE(B26.K)	199.4	113.0	115.0	112.3	112, 3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	112.3	
win sec 9-sects, n)	194.9	122.1	132.8	135.3	145.1	154.5	163.9	172.8	182.3	192.3	282.9	214. B	8.255	238.2	251.3	265.1	279.7	235.1	
SEC 9 CP S2114, #1	47:5	47.5	47.5	47.5	50. J	5. <i>k</i> ?	57.5	68.6	64.0	67.5	71.2	75.1	79.3	83.6	88.2	33, 1	98.2	183.6	
SEC 9 CP S2(14;K)	56.5	74.6	83, 3	87.8	94, 1	100.3	186.4	112.1	110.3	124.8	131.7	i 38. 9	146.5	154.6	163.1	172.1	101.5	191.5	
											•								
L+ A SEC. 8 YCH. AS.			ð: 58	0.53	Ø. 56	0.60	8.68	1.63	0.67	0.70	8.74	Ø. 78	0.83	0.87	6,92	Ø. 37	1.82	1. 8B	
UTHER FED. OF FUNDS.			0.15	Ø. 16	e. 17	6. 18	6.19	4.24	<b>#.</b> 21	1.22	e. 23	0.24	8:25	1.26	¢. 27	8.28	P. 23	6. 38	
LOCAL DP CONT. (15, N)			5, 5	5.7	6.1	6.4	6.8	7.2	7.6	3.7	8.4	8.3	3:4	3, 3	10:4	15.0	11.6	12.2.	



					1 2000	AT ING - COS										
	FY-85	FY-86	FY-87	FY-88	FY-69	FY-96	FY-91	FY-92	FY-93	FY-94	FY-95				<b>C</b> 1 <b>M</b>	<b>51 44</b>
METRO OP COGT (835; M)	9.9	8.9	8.8	0.0	8.8	15:4	15.4	15.4		15.4	15.4	FY-96 15.4	FY-97	FY-98	FY-99	FY-08
LB-LA OP COST (831, M)	9,8	8.9	0.0	0.8	12.7	12.7	12.7	12.7	15.4 12.7	13.7	12.7	12.7	15.4	15.4	15.4	15.4
BUS OP-COSTS (834, M)	410; 3	486.5	426.6	445.5	456.7	481. 0	489.7	418.5	427.3	436.1	444.9	453.7	12.7	12.7	12.7	12.7
TOTAL OP COST (835, K)	419.3	486.5	426.6	446.5	479.4	429.0	437.8	446.5	455.3	464.1	472.9	481.7	462.4	471.2	472.0	472.0
TOTAL OP DOST (15, M)	450.7	472.8	531.8	593.1	675.3	637.6	437.0 665.8	736.1					498.5	499.3	590.0	586. 0
	130.1	172.0	0110		013.3	031.0	003.0	730.1	794.0	65 <u>3</u> .6	517,6	986.3	1,059.5	1,137.8	1,202.1	i;268.2
•					11.DPER	hating Rev	ENJES									
PASS, REVEN, (834, N)	111.4	151.4	192.9	224.5	256.1	248.3	253.2	258.2	263.2	268, 2	273.2	278.1	283.1	288, 1	293.1	298, i
PRSS REVEN. (18, M)	122.3	187.7	240.6	298.2	358.9	368.7	396.7	426.8	458, 9	493.3	530, 1	569.5	61).6	656.6	784.7	756. 1
AUX. REVENEUES(IS, M)	2.6	2.8	2.9	3.1	4.8	4:2	4.4	4.5	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2
NON-TRANS BEV. (16, M)	16:8	16, 0	17.0	17.0	18.0	18. 8	18.0	19.8	19.8	19.0	28.0	28.8	28, 8	·21.0	21.0	21.8
TOTAL REVENUES(14, N)	149.9	296.5	260.5	318.3	382.9	398. 9	419.1	450.4	482.7	517.3	555.3	594. 9	637.2	683.4	731.7	783.3
op Balance(1\$; N)	(389.8)	(266.3)	(271.4)	(274.8)	(292.5)	(245; 2)	(266.7)	(287.7)	(311.2)	(335, 4)	(352.4)	(391.4)	(422:3)	-(454.4)	(470.5)	(485.0)
FAREBOX RATIO	0.27	9,48	0,45	8,58	6.53	0, 58	9.58	0.58	6,58	0.58	0.58	0,58	0.58	9,58	0.59	0.68
						ERATING (		0.00	0,00	0.00	0, 30	0,00	9. JO	0.00	0.33	0,00
LOCAL OP CONT. (15,10)	:5.5	5.7	6.1	6. 4	6.8	7.2	7.6	8.9	8.4	8.9	9.4	9.9	10, 4	11.0	11.5	12.2
STA 58× OP(16,N)	13.6	14:2-	14.5	16.7	19.0	18.3	19:6	19.4	20:2	19.9	19.6	19.4	10.4	17.5	16.3	15.3
TOA 85x(Is,M)	187. 1	115.5	126.4	137.5	148.9	160.0	172.1	185.0	198.5	213.8	229.8	247.0	265.3	285.0	386.1	328.7
SEC 9 0P (14, H)	47.5	47.5	47.5	47.5	47.5	47.5	47:5	47.5	47.5	47.5	47.5	47.5	47.5	47:5	47.5	47.5
OTHER FED. ASS(IS, N)	0.7	8.7	6:7	0,3	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.4
TOTAL OP GRANTS -				-•-								•••				
WITHOUT PROPLACES, NI	174.3	<b>183. 6</b> '	195.3	288.9	223.0	233.8	247:7	269.9	275. 7	291.1	307:3	324.8	343.1	362.2	382.8	485.2
OP GRANT FROM PROPLA	135.4	62.7	76.1	65.9	69.5	12.3	19.0	26. B	35.6	45.4	55.1			02.2		79.8
LEFT FOR OP GRANTS -	10011	<b>1</b> 1111		03.3	03. 0	16-3	17.0	C0. 0	27.0	43.4	1.406	100. J	79.2	92.2	87.7	79.8
PROP.A 481 DIS(IS;M)	(28, 2)	32.9	58.4	71.8	79.6	147.9	153.3	158.5	152.0	160.0	17E 0	100 7			<u></u>	
ENOUGH PROP. A?	· NA	NR.	NA	NA	NA	NA NA	1.33. 3 NA	NA	163.2 Na	:168.7 NA	175.0 Na	.189.7 Na	186:5 NA	193. 1 <sup>.</sup> NA	218.8 NA	249. 3 NA
	<u> </u>															<u> </u>
LEFT FOR CAPITAL IN																
PROP. A-401+PROP. A351	65.7	154, 5	179.2	211,8	231.3	311.0	328, 6	347; 0	365, 5	386, 5	489,8	432, J	456.7	483. 4	538.6	584;2
				B. CAPI	ITAL COSTS	s and fun	DING									
NETRO-RAIL CP (IS, N)	389. 0	469.0			IV. UH	PITAL COST	15									
LB-LA RAIL COLIS NI	25.8	125.0	200 A	105.8	<b>25 A</b>											
BUS ADLS. AREAL (18, M)	3.8	32.0	200.0	125.8 49.0	25.8			<b>54 -</b>								
BUILDINGS (14, M)	24.0	36.0	34.3 19.0		0.0	45.6	-13.9	58.3	79.2	83.2	96.5	61,2	91.5	85.1	89.3	93.8
OFFICE EQU. (18, N)	18.3		13.0	28.9	18.0	21.3	22.5	23.7	25.0	26,4	27.8	29,4	31.8	32.7	34.5	36.4
LAND(1\$,K)	17.6	14.0 10.0	10.0	12.5 5.0	11.0 5:0	11.6 5.3	12.2 5.6	12.9 5.9	-13.6 6.2	14.4. 6.5	15.2 6.9	16.0 7.3	16.9	17:8	. 18.8	·19.8
											0. 7		<u>1.</u> 7	8.1	8.5	9;0
TOTAL OP COSTS(15,N)	476.3	<b>668.0</b>	276.3	219.5	59.0	84.8	54.2	\$2.8	124.0	138.5	146.4	113.0	147.8	143.7	151.1	159.0
LEFT IN PROP. ALLS, N	65.7	150.5	179.2	-211.8		ITAL GRAN		347 0		30- F					<b></b> -	
TDA CP 15x114, NJ	18.9	29.4	-22.3	24.3	231.3 26:3	311.0 28.2	328.6	347.0	365.5	386.5	409.0	432.3	456.7	483.4	530.6	584.2
STA CP Sex(16, W)	13.57	14:23					38.4	32:7	35.8	37.7	40.5	43.6	46.8	59.3	54.0	58.0
SEC 9 CP(14, M)	•		14.59	16.73	19.84	18.38	19.60	19.42	20.23	19.89	19:63	19.36	18.68	17.47	16.28	
BENEFIT RSSIIS, NI	83.3	87.6	87.8	87.8	87.8	87. 8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87:8	87.8	87.8
•	60: 3 7. 0	78.0 10.0														
	, ,	10.0														
CITY OF L.A. ARTICLE III (IS, K)	53.0	72.0														

TOL. CONTRETENDING Montreten Sec. 3 (14, 10)

.

301:8 424.9 383.9 348.6 354.4 445.3 455.4 485.0 500.5 511.0 557.0 503.4 510.0 500.7 745

TABLE 11 PRELIMINARY CASH FLOW M

Heith.

## GENERAL PLANNING CONSULTANT:

LODESTAR USER'S MANUAL

IBM-PC VERSION

Prepared for:

Southern California Rapid Transit District.

Prepared by:

Schimpeler Corradino Associates

in association with

Barton-Aschman Associates, Inc. Cordoba Corporation Myra L. Frank & Associates Manuel Padron

The Planning Group, Inc.

August, 1985

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### LODESTAR USER'S MANUAL

#### 1. INTRODUCTION

LODESTAR (the LOS Angeles Development and Evaluation System for Transit Alternatives and Resources) has been developed by the General Planning Consultant for the Southern California Rapid Transit District as a planning and management tool. The program utilizes a series of spreadsheets developed using Microsoft MULTIPLAN and can be run on the Apple II or the IBM PC. Instructions in this manual are written for the IBM PC.

LODESTAR currently contains the most recent information on projected SCRTD costs and revenues. Capital and operating costs are included for all heavy rail, light rail, and busway systems under consideration for construction or operation by the SCRTD. Eight heavy rail sections, seven light rail lines, and one busway are currently in the program, representing a possible construction scenario through the year 2010. The program incorporates all the revenue sources available to the District from federal, state, and local sources. The program produces a cash flow analysis on a year-by-year basis by comparing projected annual costs and revenues. This analysis highlights annual deficits and surpluses and year-to-date (cumulative) deficits and surpluses.

The program allows the user to modify basic assumptions such as project definition, project implementation schedule, economic variables (consumer price index, etc.) and various revenue projections

and assess the impacts of these modifications on cash flow. Numerous possible scenarios can be run in a short period, providing the user with the necessary information to make informed decisions regarding the District's complex, multi-year transit development and operations program.

This manual provides an overview of the components of LODESTAR. Each of the operating modules are briefly explained in terms of key Supporting models outside of functions and interrelationships. LODESTAR which produce inputs to the system are identified. The mechanics of running LODESTAR on the IBM PC are explained. The instructions assume a reasonable familiarity with MULTIPLAN and the A MULTIPLAN manual should be consulted if problems arise. IBM PC. Finally, a number of potential management uses of LODESTAR are This information includes some key variables, where they explained. are found in the program and examples of scenarios that might be investigated using this program.

This manual is not meant to be the full technical backup for LODESTAR. Rather, it is a complementary document to the detailed Technical Memorandum that will be a product of the General Planning Consultant's Fiscal Year 1986 work program.

### 2. LODESTAR: OVERVIEW OF COMPONENTS

2.1 STRUCTURE

LODESTAR is a cash-flow model. It consists of a set of ten integrated spreadsheets or modules. Each module is capable of receiving input data, acting upon them, and producing output which may serve as input to one or more subsequent modules.

A cash-flow model of this type requires a substantial amount of data to produce meaningful results and many intermediate calculations are required. The subdivision of LODESTAR into ten modules is an effort to provide an efficient way to update data and to modify assumptions within the context of a single module, while retaining the integrated nature of the full model. A module may be operated upon without disturbing any other module or running the entire program.

Each module is capable of accepting data from external sources or from other modules. Communication among the several modules is accomplished through the mechanics of MULTIPLAN. LODESTAR runs in an interactive mode and user prompts are an important part of the operating system. Section 3 of this report provides instructions for running LODESTAR.

Currently, seven of the ten modules are fully operational:

• Management Policy Module -- Module 1

Economic/Demographic Module -- Module 2
 Farebox Revenue Module -- Module 3
 Conventional Funding Module -- Module 5
 Operational Cost Module -- Module 7
 Capital Cost Module -- Module 9
 Cash Flow Management Module -- Module 10

The three non-functioning modules are the Control Systems (Module 4), Innovative Financing (Module 6), and Privatization (Module 8) Modules. Any information from these three modules which is needed to run LODESTAR must be input manually.

Figure 1 is a flowchart illustrating the current operation of LODESTAR. As additional components are completed, the flowchart will be adjusted. The data and schedules shown as input to the Management Policy Module are referred to collectively as Supporting Models. All input data and schedules currently are entered manually in Module 1 - the Management Policy Module, although certain assumptions about capital and operating funds can be changed in Module 10 - the Cash-Flow Management Module.

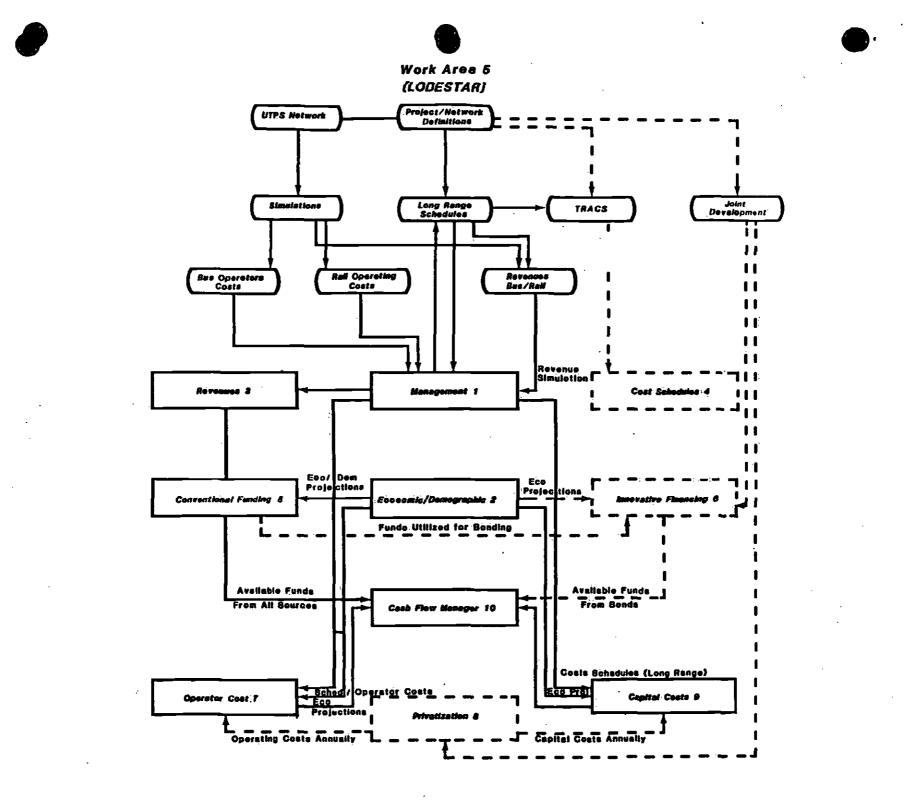
2.2 SUPPORTING MODELS

Supporting models consist of data sets and schedules which must be input to the Management Policy Module - the first module to be run. The cash-flow model works on an annual basis, accumulating capital, operating costs, and funding on a year-by-year basis; but most of the

external inputs are provided either as a total amount and the period of time over which the model must spread it, or as annual information for one or two specific years.

There are six data sets and schedules that the user must input, or change from the values provided in the master copy:

- o list of capital projects for implementation
- o implementation schedule for the capital projects
- capital costs and construction time schedule (entered as a construction duration and implementation year) for each capital project
- o bus operating costs for two horizon years for each defined network
- o rail operating costs for two horizon years for each defined network
- o bus and rail farebox revenues for two horizon years for each defined network



A "defined network" consists of a set of implemented capital projects with the corresponding bus services to serve the projects and regional transit needs. When a new capital project is implemented, a new network comes into existence.

Regional trip tables exist for only a few selected years (currently, these are 1985, 1990, 2000, and 2010). Thus, if a defined network is expected to be implemented in, say, 1992 and be the regional network through 1996, UTPS simulations must be made for 1990 and 2000. This allows interpolation of the costs and revenues for years 1992 through 1996. In this case, 1990 and 2000 are referred to as the two horizon years for this defined network. The 1997 defined network may continue to exist until 2001, in which case the two horizon years for that network will also be 1990 and 2000. For such a network, interpolation would be made in LODESTAR for 1997 through 2000, with extrapolation to 2001.

Every defined network must have two horizon years, unless it will exist for one year only and that year is one of the trip-table years (i.e. 1985, 1990, 2000, or 2010). Interpolation and extrapolation are made on a straight-line basis. Also, extrapolation can be made by LODESTAR for only one year, currently.

## 2.2.1 List of Capital Projects for Possible Implementation

The list of capital projects consists of each major capital project that the user wishes to include as buildable within the time-frame

under consideration (e.g., 20 years, 30 years). A capital project may be a transit line or a line segment, provided that the project can be built in operable segments.

#### 2.2.2 Implementation Schedule of Capital Projects

The implementation schedule for each of the transit capital projects or project segments identified in the long-range plan of 2.2.1 above is also input to the model. As each new project or segment comes into operation, a new transit network must be formulated and travel assignments projected for two horizon years through use of the Urban Transportation Planning System (UTPS). The implementation schedule consists of the year that each identified transit project or segment will be completed and put into operation.

#### 2.2.3 Capital Costs and Construction Period

For each of the capital projects defined in section 2.2.1, the user must provide the duration of construction, a year in which construction is to end (i.e. the implementation year), and an estimated total capital cost. Currently, estimates of the capital costs are provided by LACTC and SCRTD staff and are loaded manually into Module 1. The construction schedule is open to user manipulation to see the effects of compressing or extending construction schedules. Application of the Transit Automated Control System (TRACS) provides information on rail segment construction schedules and other data which are input to the Control Systems Module. This module is

designed to generate rail capital cost data, but is not operational at this time.

#### 2.2.4 Bus Operating Costs

Currently, bus operating costs are provided by a District mainframe computer program that is run together with the UTPS simulations. Bus operating costs can be obtained for two horizon years for each defined network, and these costs and years are input to the Management Policy Module.

#### 2.2.5 Rail\_Operating Costs

Rail operating costs must be provided as an external input, currently. Rail operating costs may be obtained as estimates from SCRTD staff, or may be estimated from data in the Final Environmental Impact Statement if one exists. For other projects, the user must provide estimates of the costs. A rail operating cost model is under development for the Cash-Flow Model, but is not yet operational.

Data are required on rail operating costs for two horizon years for each defined network. Currently, rail operating costs are assumed to be the same in real dollars for each horizon year of a specific network. Unlike bus operating costs, significant changes are not anticipated in the year-to-year operation of a defined rail network that would change real costs of operation.

#### 2.2.6 Bus and Rail Farebox Revenue

Bus and rail farebox revenues are obtained directly from UTPS simulations and related models. These operating revenues are the principal inputs for the Farebox Revenue Module. Revenues are to be obtained for two horizon years from the UTPS simulations. The Farebox Revenue Module will interpolate or extrapolate to obtain annual farebox revenue projections for each year that a defined network will be in operation.

#### 2.3 MANAGEMENT POLICY MODULE

The Management Policy Module is the primary management framework through which broad policy scenarios are defined. It consists of:

- a) the definition of transit corridors;
- b) implementation priorities for the corridors; and
- c) implementation dates for the corridors and bus support networks.

Corridors, and their implementation schedules and dates are the heart of LODESTAR and need to be defined before proceeding with other analyses. The Management Policy Module will provide information regarding operational transit systems, project descriptions; and project priorities.

Virtually all inputs to the Management Policy Module are external to

LODESTAR and are summarized in Section 2.2 -- Supporting Models. Outputs of this module are used by the Farebox Revenue Module, Operating Cost Module, and Capital Cost Module, and will be used by the Control System Module when it becomes operational. Capital cost data will be derived from the Control System Module rather than from the Management Policy Module, once the Control System Module becomes operational.

Figure 2 is a schematic of the Management Policy Module.

2.4 ECONOMIC/DEMOGRAPHIC MODULE

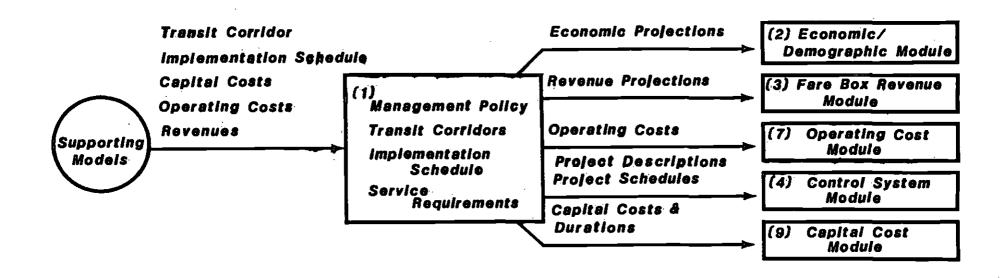
The Economic/Demographic Module generates the population and economic projections needed in several other modules. Inputs to the Economic/Demographic Module are external to LODESTAR.

Demographic data consist of Los Angeles County, California, and United States population projections through Year 2000. These data are used to calculate various ratios to determine the share of various fund categories for Los Angeles County.





#### Module 1



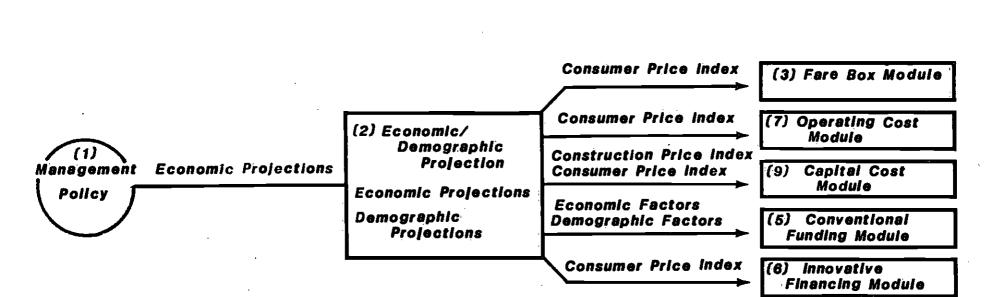
### Figure 2: Management & Policy Module input/Output Dependencies

The economic portion of the module incorporates a wide range of information needed to calculate various ratios and to determine the components of conventional funding for operations and capital expenditures. Examples of information required are: consumer price index projections; California highway construction index projections; Los Angeles and California per capita income projections; Los Angeles and California ratios of taxable sales transactions to personal income; gasoline price projections; gasoline and diesel fuel adjustments due to light duty vehicles; and projections of Los Angeles and California farebox revenues.

Once this module is run and the outputs saved, it is not necessary to run it again in the normal operation of LODESTAR. The exceptions, of course, include updates to these basic data derived from current observations or better projections, or user-generated changes to these data to investigate alternative futures.

The bulk of the output is directed to the Conventional Funding Module. Consumer price and construction cost index projections are used in the Farebox Revenue Module, the Capital Cost Module, and the Operating Cost Module, and will be used in the Innovative Financing Module when it becomes operational.

Figure 3 is a schematic diagram of the Economic/Demographic Module.





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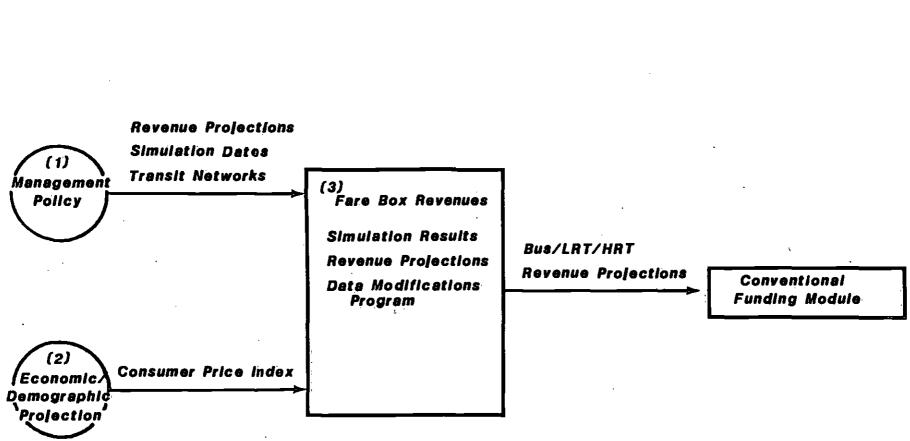
## Figure 3: Economic/Demographic Module input/Output Dependencies

#### 2.5 FAREBOX REVENUE MODULE

The results of UTPS simulations include revenue projections for the bus, heavy rail, and light rail components for each of two horizon years. Two simulations are performed in UTPS for each defined network that results from an assumed implementation schedule.

The Farebox Revenue Module projects the annual farebox revenues for each defined network for each year that the network is expected to constitute the regional transit system. The years for which annual projections are required are determined from the established implementation schedule in the Management Policy Module. The projections are made by straight-line interpolation or extrapolation, as appropriate, of the two horizon years from the UTPS simulations. These projections are then factored by the annual consumer price index to provide revenue projections for the Conventional Funding Module.

Figure 4 is a schematic diagram of the Farebox Revenue Module.



Module 3



#### 2.6 CONVENTIONAL FUNDING MODULE

The Conventional Funding Module calculates the annual value of all currently-known sources of funds for operating and building transit systems in Los Angeles County for the period for which the Cash-Flow Model is being run. These include both user-generated revenues resulting from operating the transit system and revenues from various taxes and other funds, designated for use in building or operating transit systems, (i.e., from federal, state, county, and municipal legislation and appropriations.

The quantity and allocation of funds are determined, in some instances, by direct application of formulae included in the legislation. In other instances, the quantity of funds is fixed; but the allocation of funds to several agencies is discretionary and is based on governmental policy and decisions.

Inputs to the Conventional Funding Module include outputs of the Economic/Demographic Module and revenue projections from the Farebox Revenue Module.

Outputs include yearly projections of:

- a) available operating revenues and subsidies, and
- b) sources of capital funds.

These data are used by the Cash Flow Management Module. In addition,

the Proposition A funds available for debt service will be assessed by the Innovative Financing Module when it becomes operational.

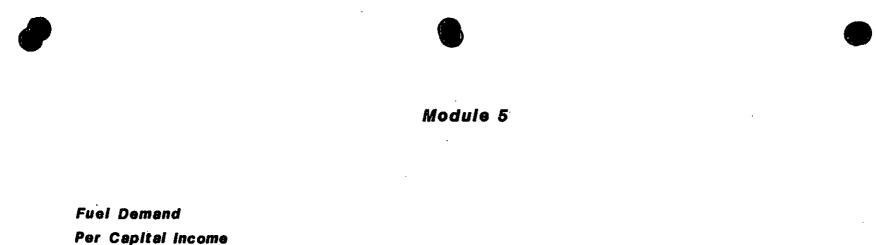
Figure 5 is a schematic diagram of the Conventional Funding Module.

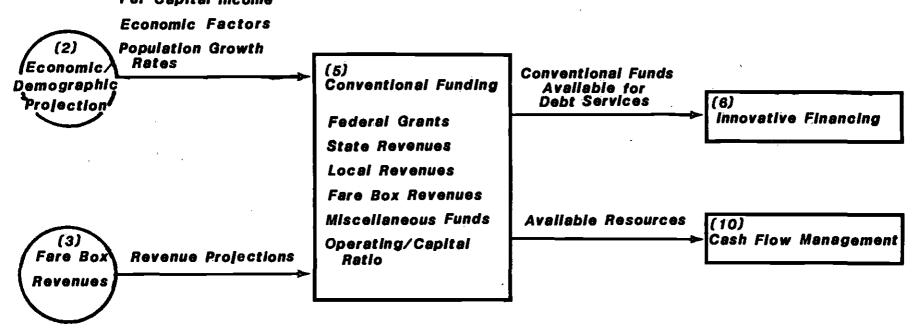
#### 2.7 OPERATIONAL COST MODULE

The results of UTPS simulations, related mainframe supporting models, and the micro-computer-based rail operating cost model include operating cost projections for the bus, heavy rail, and light rail components for each of two horizon years. These costs are currently input to the Management Policy Module. [Future developments are planned to place bus and rail operating-cost models in this module, internalizing the projection of these costs.]

This module performs a similar task to the Farebox Revenue Module by projecting annual operating costs for each year in which a defined network represents the regional transit system. Projections are made by straight-line interpolation or extrapolation, as appropriate, from the horizon years. Application of the consumer price index provides annual operating cost projections for input to the Cash Flow Management Module.

Figure 6 is a schematic diagram of the Operations Cost Module.

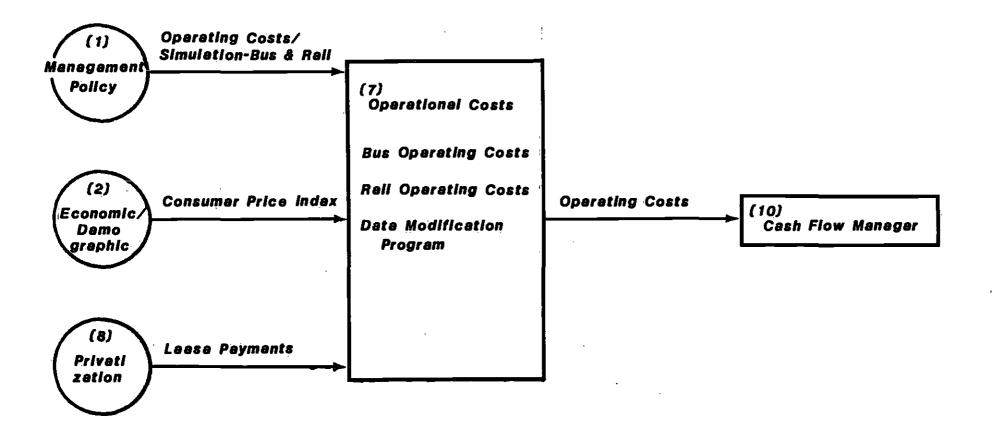




## Figure 5: Conventional Funding Module Input/Output Dependencies



Module 7





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#### 2.8 CAPITAL COST MODULE

The Capital Cost Module generates a schedule of capital expenditures for bus systems, heavy rail, light rail, and any required buildings, land, and equipment. The major input to this module consists of the total project cost and construction duration of each of the transit capital projects or segments. Other inputs include the implementation schedule and the highway construction price index.

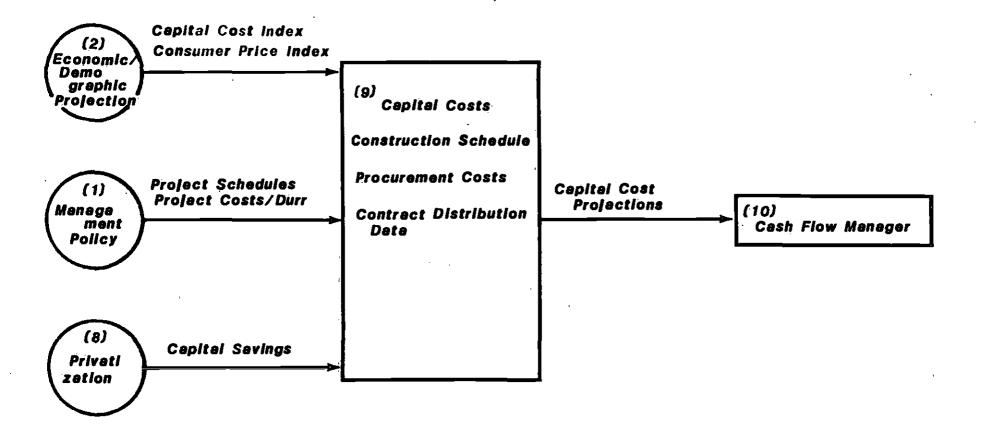
Annual estimates of capital expenditures are calculated for each project by multiplying the total cost by the annual percent completion schedule assumed for a given project duration. Application of the construction price index provides the capital cost projections for the Cash Flow Management Module.

Figure 7 is a schematic diagram of the Capital Cost Module.

#### 2.9 CASH FLOW MANAGEMENT MODULE

The Cash Flow Management Module is the final step in LODESTAR. The module considers all projections of costs and revenues and all sources of grants and subsidies and calculates annual surplus or deficit cash flow for each of the years in the planning period.

Module 9





The user of LODESTAR has the capability of altering management strategies, observing the impact of such changes on the cash flow, and aiding the development of optimal management strategies for the financial planning of the District's obligations.

Figure 8 is a schematic diagram of the Cash Flow Management Module.





Module 10

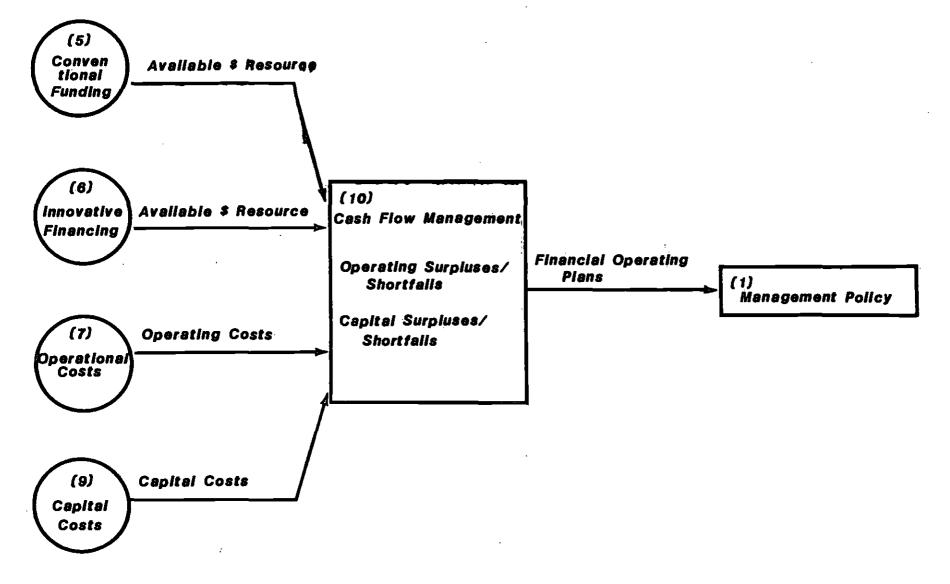


Figure 8: Cashflow Management Module Input/Output Dependencies

#### 3. RÚNNING LODESTAR

#### 3.1 GETTING STARTED

To run LODESTAR, the user needs:

o This manual

o The MULTIPLAN Boot and System Disks

o The LODESTAR Master Disk (copy)

o Some blank disks

o An IBM-PC with two disk drives

o A user's manual for MULTIPLAN (IBM-PC Version)

Running LODESTAR is essentially the same as running MULTIPLAN. The user's manual for MULTIPLAN on the IBM PC should be consulted for detailed operating instructions.

The LODESTAR package consists of two sets of three write-protected disks: the MULTIPLAN Boot disk; the MULTIPLAN System disk; and the LODESTAR disk. DO NOT REMOVE THE WRITE-PROTECT TABS, OR YOU MAY ERASE MULTIPLAN OR THE CASH-FLOW MODEL. One set of disks should be filed as backups. A supply of blank formatted disks should be available for saving modified versions of the LODESTAR modules if desired. To create formatted blank disks, see the "Getting Started" section of the MULTIPLAN User's Manual.

The first step in running LODESTAR is to load the MULTIPLAN Boot disk.

If the user wishes to modify any of the modules, a working copy of the LODESTAR disk should be made before proceeding further. To do this, press the "ESC" key to access the MULTIPLAN utility functions. Select the copy disk function and follow instructions. Remove the MULTIPLAN Boot disk from drive A and insert the LODESTAR disk in that drive. Insert a blank disk in drive B. This second disk can be either an unformatted or a formatted disk.

When the LODESTAR disk has been copied on the disk in drive B, a message will appear requesting that the MULTIPLAN Systems disk be loaded. Remove the LODESTAR disk from drive A and insert the Systems disk in that drive. Press 'RETURN' to load the system. Be sure to leave the newly copied LODESTAR disk in drive B. An empty MULTIPLAN worksheet should be displayed at this point.

The default drive for reading and saving files now must be changed to drive B. However, the system disk should be left in drive A in the event that the user needs to access the 'Help' file at any time. The procedure to change the default drive follows:

- a) Press 'T' for transfer
- b) Press 'O' for options
- c) Press 'Tab' to access setup
- d) Press 'B' for drive B
- e) Press 'RETURN' to the menú.

3.2 LOADING THE CASH-FLOW MODEL

LODESTAR is made up of a series of spreadsheets that are linked to each other in sequence. The sequence of spreadsheets is, therefore, very important. The spreadsheets are linked so that data entered in, say, the Management Policy Module can be used in other modules to recalculate the data in those modules. For recalculation to occur, it is necessary to load the module in which the recalculation is to take place. For example, farebox revenue is entered into Module 1 (Management Policy) for two horizon years. Module 3 (Farebox Revenue) calculates the annual amounts of farebox revenue from the two horizon years provided to Module 1. Therefore, if a change is made in the farebox revenue inputs for any defined network in Module 1, Module 3 must be reloaded for the annual revenue to be recalculated.

To load the Cash-Flow Model, the next step is to load the data from the Management Policy Module to the MULTIPLAN worksheet. The procedure follows:

- a) Press 'T' for transfer;
- b) Press 'L' for load;
- c) Enter the filename 'MODULEL.INPUT' (note: the quote marks are not to be typed; the name must be typed exactly as shown with no spaces and with care to distinguish between '1' and 'I');
- d) Press 'RETURN.'

The Management Policy module should now be displayed on the MULTIPLAN worksheet. The cell pointer is highlighted and may be moved to any cell by using the appropriate direction keys. Only a portion of the data is visible. The remainder may be observed by scrolling the worksheet, using either the direction keys or the 'GO TO' command.

If any changes in data are desired, they can be made by moving the cursor to the appropriate cell and following the procedure:

- a) Type in the new data
- b) Press 'RETURN'

The mechanics of MULTIPLAN result in the recalculation of all data elements in the worksheet to reflect the change just made. If only one data element in the module is to be changed, this presents no problem. However, if the user were to make six data changes, the worksheet would be recalculated six times, once after each change in data -- a time-consuming proposition.

A time-saving method is to suppress the recalculation mode. The procedure follows:

- a) Press 'O' for options.
- b) Press the space bar once to move the choice to 'NO' for the recalc option.

c) Press 'RETURN'.

After all changes to the module have been made, the revised worksheet must be saved to permit subsequent modules to access the revisions. The procedure follows:

- a) Press 'T' for transfer.
- b) Press 'S' for save.
- c) Press 'RETURN' because the file name will not be changed.
- d) Press 'Y' because the old file must be overwritten with the revised file.

This saves the recalculated Module 1 on the working copy of the Cash-Flow Module. If Drive B still contains the Master copy (writeprotected) MULTIPLAN will tell the user that the revised spreadsheet cannot be saved on the write-protected disk. Because this save will replace the original version of Module 1, it should only be saved on a working copy disk created by the user for that purpose.

Note that the recalculation suppression need not be changed at this time. When the 'S' is pressed to save the file, all recalculations resulting from changed data will be made. This make take some time -do not panic -- the machine will return control to the user after recalculating and saving the file. The user will know that recalculation is occurring by the reducing number displayed at the bottom left of the screen, which shows the number of cells remaining to be recalculated. When recalculation is finished, the B disk drive light will come on, showing that the module is being saved.

As each subsequent module is loaded, all linked input modules are read by MULTIPLAN. The data requested by the module being loaded are entered automatically from other saved modules and required calculations are made. LODESTAR does not allow the user to change those data that are input from other modules. For those data items not read from other modules, the user may choose to change input values. To do so, the procedure is the same as described above.

The file names for the modules are:

0	MODULE1.INPUT	Management Policy
0	MODULE2.INPUT	Economic/Demographic
ο	MODULE3.INPUT	Farebox Revenue
0	MODULE5.INPUT	Conventional Funding
0	MODULE7.INPUT	Operational Costs
0	MODULE9.INPUT	Capital Cost
0	MODULE10.INPUT	Cash Flow Management

The modules MUST be accessed in numerical sequence. Initially, after entering changes in Module 1, the user should load and then save each of the other modules in strict numerical sequence, even if no changes are made to the direct inputs of the subsequent modules. The sequential loading and saving of each module allows LODESTAR to recalculate all appropriate values for input to Module 10, the Cash-Flow Manager.

After loading and saving each of the 7 modules, Module 10, the Cash-

Flow Manager, will be displayed with recalculated values for all entries the user has changed in earlier modules. Module 10 represents the cash-flow scenario for the implementation schedule, costs, revenues, and regional demographics that have been input. Use of this information is described in more detail in Chapter 4.

3.3 PRINTING A MODULE

Any module that has been loaded, while it remains in the workspace, may be printed as follows:

a) Press 'P' for Print

b) Press 'P' for Printer

It is necessary to use a 120-column printer. If changes have been made to the module, the file should not be printed until after the file has been saved, unless the user does not wish to save the changes and will not access any subsequent modules.

3.4 MAKING SELECTIVE CHANGES IN INPUTS

After proceeding through the steps in section 3.2 and 3.3, the user may wish to return to one of the earlier modules and make one or two selected changes in input values. For example, the implementation date of one transit capital project or project segment may be changed. In such a case, it is not necessary to reload and save every one of the modules.

Table 1 shows the input values that the user can change and which modules must be reloaded and saved, if that change alone is made. The Table does not specify other calculations that would have to be made outside the Cash-Flow Model, such as rerunning UTPS simulations; however, the user should be aware that many of these changes in input values may require other recalculations to be made outside the Cash-Flow Model.

TAB	LE	1
IND		÷.

MODULES THAT MUST BE RELOADED FOR SPECIFIC USER CHANGES

USER-SPECIFIED INPUT	MODULE NUMBERS AND SEQUENCE TO RELOAD AND SAVE
Defined Network (Implemented Capital Projects plus Supporting Bus Service)	1, 3, 5, 7, 9, 10
Inclusion of a New Capital Project, or Exclusion of a Listed Capital Project	1, 3, 5, 7, 9, 10
Change in Implémentation Year for a Capital Project	1, 3, 5, 7, 9, 10
Change in Capital Cost of a Project	1, 9, 10
Change in Construction Period without changing Implementation Year	1, 9, 10
Change in Bus Operating Cost for a Horizon Year	1, 7, 10
Change in Rail Operating Cost for a Horizon Year	1, 7, 10
Change in Farebox Révenue for a Horizon Year	1, 3, 10
Change in a Regional Economic/ Demographic Forecast	1, 2, 5, 10
Changes in Assumed Discretionary Funds	10

#### 4. MANAGEMENT USES OF LODESTAR

Some probable uses of LODESTAR are presented in this section. In general, changes will be made in the information in the Management Policy module, which specifies project implementation schedule, costs, and farebox revenues. Changes also may be made in key data items in other modules.

4.1 MANAGEMENT POLICY INPUTS

Policy inputs regarding project implementation are made in the Management Policy module. To make changes, this module should be loaded ('TRANSFER', 'LOAD', 'MODULE1.INPUT').

in Figure 9, the management module includes lists of heavy shown As rail, light rail and busway projects. Within the three groups the individual chronological projects are listed in order of implementation. If changes are made in this chronology, new UTPS travel simulations will be required to generate appropriate cost and farebox data, and these data input to this Module.

Policy variables that may be modified include scheduled implementation date (the year the project system will be fully operational) and the duration of the implementation program (DURR). The range of implementation dates is limited by the dates for which travel simulations are available (see SIMULATION DATES in the module). Selected implementation dates must fall between the years for which

simulations are available, i.e. no earlier than one year before the first simulation date or no later than one year after the date of the later simulation. For example, simulations are available for MOS-2 for the years 1990 and 2000. Therefore, an implementation date between 1989 and 2001 inclusive may be selected. There is no such limitation on the lengths of the duration for implementation of the projects. These or any other variables in any module may be changed by moving the cursor to the cell containing the data to be changed, typing in the new data and pressing the return key. If the change is to be retained for future use, the user should save the file ('TRANSFER', 'SAVE') on the blank disk.

Changes in implementation dates and durations allow the manager to review the cash flow implications of speeding up or delaying implementation of individual projects or of shortening or lengthening the construction program.

The operating and capital costs components of this Management Policy module also may be modified as new information becomes available from project engineers or travel forecasters. Changing these data allows the manager to assess the implications of changes in costs on the cash-flow position of the District. Farebox revenue projections also may be changed to reflect changes in fare policy or ridership projections.

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#### MODULE1: MANAGENENT POLICY

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#### THE FOLLOWING TRANSPORTATION IMPROVEMENTS HAVE BEEN IDENTIFIED FOR INCLUSION IN THE LONG RANGE PLAN

HEAVY <b>Rail</b> Desc	EST COST	DURR	LIGHT RAIL DESC	est cost	DURR	BUSWAY Desc	E21 CO	ST DI	RR				
M05-1	871	4	LB-LA	427.2	5	HARBOR	20	۹ :	J				
M05-2	334.5	5	CENTURY	133	4		-						
MDS-3	336.5	5	SF VALLEY	311	3								
MDS-4	462.35	5	COASTAL	170	3						•	· · · ·	
Nos-5	462.35	5	HUNT INGTON	300	3								
EAST LA NETRO	D	5	PASADENA #	296	4								
NDRIALK NETRO		5	TORRANCE #	160	3			•				· · · · ·	
SANTA NONICA		6											

#### THE FOLLOWING IMPROVEMENTS HAVE BEEN INCORPORATED INTO THE IDENTIFIED NETWORKS

THE FOLLOUIN	ig inproven	ents hav	E BEEN	INCORPOR	ATEO IN	to the II	DENTIFIED	NETWORKS	i							OPERATIN	VG COSTS						REVENUE	PROLECT (	INS		
SCH	EDUL <b>ED IM</b> PL	EHENTATI	ION	NETVO	RK DEST	GNATION/	DESCRIPTIC	N			SINULATI		S	Đ			TRO	, U				JS	ME	TRO	L		
<b>.</b>	84 FISCAL 91 FISCAL 92 FISCAL 94 FISCAL 99 FISCAL 102 FISCAL 105 FISCAL	YEAR YEAR YEAR YEAR YEAR YEAR		NU2 = NU3= NU3 = NU4= NU4 = NU4 =	= NOS1 = NU2 M = NU3A = NU3 M = NU3 M = NU4 H	OSZ Nosa Ce OS4 OS5 SF ' Arbor C	YT VALLEY	ł,		•	SJM-1 B5 90 90 90 90 90 100 100	SIM-2 90 100 100 100 100 110 110 110		ISIM-1 434.37 415.48 394.44 373.48 357.81 342.13	483.50 506.36 480.84 455.29 436.18	0.00 16.00 24.53 33.05 41.65	0.00 16.00 24.53 33.05 41.65	0.00 13.20 13.20 20.80 20.80	51M-2 1 0.00 13.20 13.20 20.80 20.80 29.00		253.75 250.65 236.75 236.67	\$1H-2 252.71 304.01 300.30 296.58 296.48 296.38	D.00 8.65 11.16 13.67 16.87	0.00 10.59 22.35 34.11	0.00 14.28 18.42 22.56 27.69	17.45 22.51 27.57 34.29	·
NETWORK 1.D	. 15	86	87	88	61	, f0	<b>7</b> 1	92	13	74	*	96	<del>9</del> 7	<b>98</b>	FIS( 99	CAL Y 100	E A R 101	182	103	104	105	106	107	- 108	107	110	
nëtuork 1	X	••••••	+	•	••••••	X	•											• •						• • • •		·· • ·	
NETWORK 2					•	; <b>x</b>		, ,	•	•	٠	+	•	*	•	X	•										
Network 3a		•			•	; )	•	+			,	+	+	•	•	x	+						· ·			• •-	
NETWORK 3					•	i )	•	+	*		+	+	•	•		x	•								41		
netuork 44					•	• )	t +	٠	+	•	•	•	•	٠		X	•										
NETWORK 4				:									-		٠	X	1		•	+	·	•	•	•	•	<b>X</b>	
NETHORK S															+	X	•	•	٠	+	•	•	+	+	•		
NETWORK 6									·						•	X	٠	٠	•	٠	٠	٠	٠	. •	٠	X	

The graphic in the bottom half of the Management Policy module is a visual representation of project chronology and implementation dates and will show if acceptable parameters have been exceeded. Dashed lines should fall within the guidelines discussed above for scheduled implementation. The 'X's in the graphic indicate horizon years, for which trip tables exist and UTPS simulations may be made.

#### 4.2 ECONOMIC/DEMOGRAPHIC PROJECTIONS

Economic and demographic projections are contained in the second module (Figure 10). The left-most entry on each row indicates the source of the data in that row. This module includes base data that are used by other modules for calculating available revenues and inflated costs and revenues. Generally, these data should not be modified, unless new regional forecasts have been adopted, or other major informational changes have occurred that affect the module.

A manager may, however, wish to review the implications of changes to certain basic assumptions in this Module. For example, the user may want to review the effects on future year costs and revenues of the consumer price index (CPI-U) or the highway construction index growing at a faster or slower rate than assumed. The numbers currently in the module may be changed by moving the cursor to the number, typing in the new figure and pressing the return key. Again, this file should be saved on a new disk, not on the LODESTAR disk. Gasoline prices and the farebox revenues may be changed in this module; but, in reality, any minor modifications would have relatively little impact on

revenues available to the District.

4.3 OTHER CAPITAL COSTS

The Capital Costs module spreads rail and busway capital costs (input from the Management Policy module) over the duration specified in that module. Costs are spread using a construction cost distribution curve (CONTRACT DISTRIBUTION DATA), which is based on CALTRANS data. The user may want to modify the curve if better information is available. For example, a project with a three year duration is assumed to incur obligations of 35.1%, 43.9%, and 21% in each of the three years, respectively. The user could change these numbers to reflect new data on expenditures (rather than obligations) or on the yearly percentages.

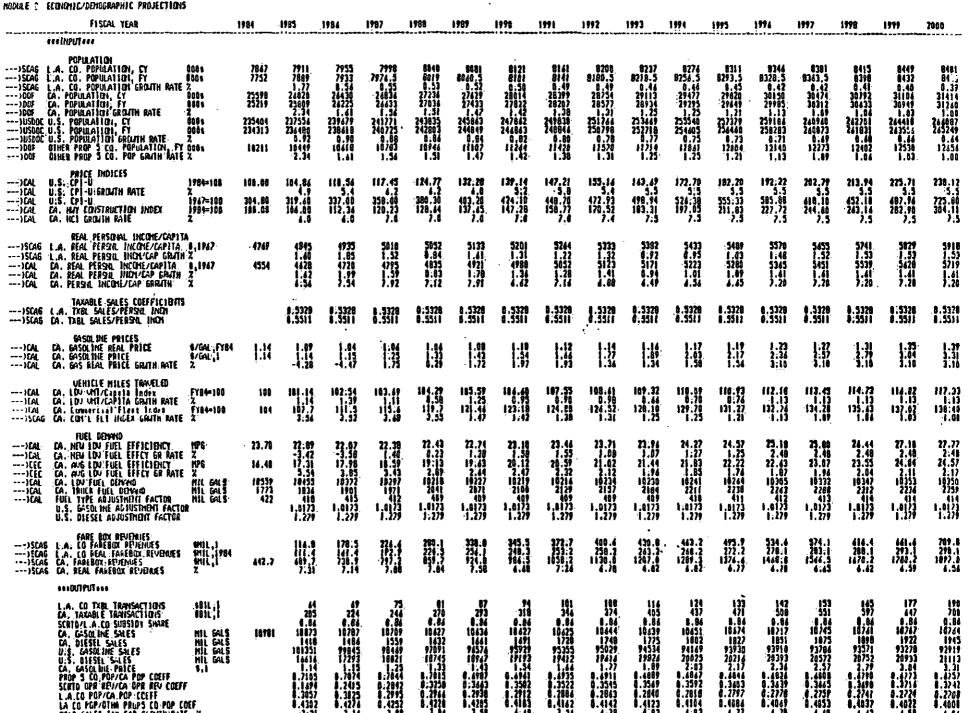
Capital costs for bus acquisition, buildings, office equipment, and land are input manually to the module. The information may come from the current five-year plan and estimates for the future made by SCRTD staff. The user may want to modify these inputs based on updated information or to test the implications of different scenarios for purchases in these categories.



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TPLD SALES TAX CAP GROWTHIRATE X



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8.4392

7:31

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4.82

8.4142

4.7

7.24

4:41

8.4164

1:87

0.1084

1.71

6.4041

1.7

4.45

4.42

1.59

1.51

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#### 4.4 CASH FLOW MANAGER

The Cash Flow Manager (Figure 11) provides a summary of all District revenues and costs. It compares costs and revenues on an annual basis and produces an annual and cumulative cash balance position.

This module and the Management Policy module are the two most likely areas for user modifications in LODESTAR. This module is the best place to test alternative revenue scenarios. Revenues are listed in the top two sections of the module. The year-by-year listings show the assumed annual revenues.

Assumptions are incorporated in the model for funds from discretionary sources. These amounts may vary substantially, so this module enables different scenarios to be evaluated quickly (a few seconds to a few minutes). Federal funding also is highly variable, and the impacts of alternative futures may be evaluated easily by manually changing the revenue inputs in the module. For example, the model currently assumes that UMTA Section 9 assistance will end in 1988 and that UMTA Section 3 funding will be distributed in the future on a population formula basis to urbanized areas greater than 1 million people. Other assumptions may be made and tested by entering alternative dollar values in appropriate locations. Other discretionary revenues that could be varied include the three categories of Proposition A funds.

															· · · · · · · · · · · · · · · · · · ·							
MOGULE	E FLOU NYMGER FISCAL YEAR 1984 1985 1984 1987 1988 1989 1990 1991 1992 1993 1994														1997	1778		•				
) ś ) ś	RTD OPERATING SUBSIDIES PROPA 402 DISC MIL, I TDA 952, REDUL FORMA (852) MIL, I STA BRM, INING ALLOCATION MIL, I SECTION 9:OPERATING MIL, I FARE BOX, REVERUES MIL, I ADX REV/LOCAL OPR CONTRIBUTIONS (MIL, I MOT TRANSIT REVENUES MIL, I		184.0 102.9 10.1 47.4 112.4 2:6 16.D	104.0 111.5 9;2 47.3 195.9 2.8 14.0	114.2 121.3 4.5 47.3 249.5 2.9 17.0	124.0 131.4 1.9 14:4 301.4 3.1 3.1	135.4 141.4 0.3 0.0 324.9 4.0 18:0	143.5 151.9 0:0 0:0 0:0 0:0 0:0 351.4 4.2 18.0	154.7 143.4 0.0 0.0 415.5 4.4 18.0	148.0 175.4 0.0 0.0 435.0 4.4 19.0	180.5 189.4 0.0 0.0 490.4 1.8 19.0	193:0 201:5 0:0 0:0 530:3 -5:8 19:6	1995 204.5 215.4 0.0 0.0 575.0 5.2 20.0	221.1 239.8 0.0 623.1 5.4 20.0	237.7 248.1 8.0 6.6 674.6 5.6 20:0	235.4 246.9 8.6 0:6 730:0 5.8 21.8	274.9 287.0 8.0 0.0 825.4 4.0 21.0	2000 -295.6 308.5 0.4 692.5 6.2 28.4				
) >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	CAPITAL FIRMITA TDA 952: REGIDIAL FORMULA (152.) WILL SIA METRORALL SET ASIDE WILL SECT 9 METRORALL SET ASIDE WILL SECT 9 REPAINING FOR CAPITAL WILL BENEFIT ASSESSMENT DISTRICT WILL PROPA 357: RAIL PROGRAM REMA 357: RAIL PROGRAM PROPA 357: RAIL PROGRAM SOL DISTRICT DISTRICT WILL GOAT 302: PDF, FORMULA LACTC DISCRMILL GOAT 302: CTC DISCR SECT 3 TO LA (SEC 9310 FORMULA) WILL SECT 3 TO LA (SEC 9310 FORMULA) WILL		10.2 4.0 20.0 38.0 58.0 0.8 29.4 21.4 21.4 50.3 122.0 44.9	19.7 0.0 38.0 25.0 114.4 31.9 21.4 56.0 132.8	21.4 0.0 20.0 124.5 34.7 21.2 48.8 138.1	23.2 0.0 20.0 - 0.0 135.0 37.6 21.0 47.4 137.3 48.5	25:8 0:0 0:0 145,3 10:4 20:6 49:5 137.6	24.0 0.0 0.0 155.0 43.4 20.7 49.4 136.5	28.9 0.0 0.0 0.6 147;9 46;0 20.5 49;3 136.1	31.8 0.0 0.0 180.0 50.1 20.4 49.4 135.9	33.2 0.0 0.0 4.4 193.3 20.3 20.3 135.4	35.6 0.0 0.8 204.7 57.6 20.2 47.3 135.4 47.8	38.0 0.0 0.0 8.0 221.2 61.4 20.2 49:3 135.3	40.7 0.0 8.0 236.7 64:0 28.1 49.4 135.5	43.8 0.0 0.0 0.0 0.0 254.5 70.7 20.1 49.5 135.4	47.1 0.0 0.6 0.6 74.3 29.6 47.5 135.5	50.4 0.0 0.0 0.0 0.0 0.0 274.4 62.0 17.9 49.5 135.4	54.5 0.0 0.0 314.4 66.2 39.8 49.5 135.2				
) 7 ) 7 ) 7 ) 1	OPERATING COSTS (BUS) I SMIL DPERATING COSTS (BUS) I SMIL DPERATING COSTS (HEAVY RAIL) I SMIL OPERATING COSTS (LIGHT RAIL) I SMIL CAPJIAL COSTS BUS ACQUI/REPL/BUSIAT CONSTR I SMIL		455.5 0:8 0:0 3.0	491.1 0:0 0:0 32.4	533.3 8.8 0.0	578.7 0.0 0.0 59.4	48.4 424.4 0.0 0.0 8.0	48;2 472;7 0;0 0;0 0;0 18,4	49.0 624.9 23.4 19.4 15.0	48.0 438.8 38.1 20.5	47.7 488.1 40.1 21.4	701 .5 57 :1 35 .9	47:8 755:0 40.2 37.9	47.8 812.2 43.5 40.0	47.9 873.5 47.0 42.2	<b>737.1</b> 78.7 44.5	47.8 946.8 94.0 46.9	47.7 1638.4 99.2 49.5				
) 9 ) 9 ) 9	NETRORAIL I MILL LIGHT RAIL TRANSIT I SHIL BUILDINGS/EQUIP/LAND I SHIL ASSUNTIONSI PROP A RAIL PROGRAM ; SET A	SIDE FOR MET	104.2 0:0 42:8	534.7 77.3 32.4	358,3 149,9 32,8	220.1 146.7 41.9	207.0 111.1 30.3	284.5 103.4 34.9	202.7 74.9 37.3	55.4 108.4 67.4 40.3	88;9 57:4 32:2 43.3	9512 146.7 -010 46.7	112:5 204:0 6.0 30.1	72.7 281.1 0.0 53.9	394.1 394.1 0.0 36.0	104.9 464.0 8.0 62.3	113.5 349.2 308:0 47:6	120.1 245.7 415.2 72.0				
	ASSUMPTICASI PROP A RAIL PROGRAM I GET ASIDE FOR METRORAIL (LACTC CONVITMENT) FEO GENERAL FIND PHASE DIA I CENT FED FDEL TAX TO SECT JULISTRIBUTED TO UZA'S 7 IM 100% DISCH GUIDEMAY FUND THRU FIB? A. OPERATING COSTS AND REVENUES I. OPERATING COSTS (COSTS)																					
	NETRO OPERATING COSTS LICHT RAIL OPERATING COSTS BUS DEEPATING COSTS TOTAL OPERATING COSTS		0,0 0,0 453,5 455,5	8,8 6,0 491,1 491,1	4:0 0:0 533.3 533.3	0.0 4.0 579.7 578.7	IG COSTS 0.0 424.6 424.4 NS REVENUE	8.0 472.7 472.7	23:4 19:4 424.9 447.9	38.1 20.5 438.9 477.4	40.1 21.4 488.1 749.9	57.1 35.9 701.5 794.5	48.2 37.9 755.8 853.1	43.5 40.0 012:2 715:0	47:0 42.2 873.5 982.7	78.7 44.5 939.1 1054.3	94.0 46.7 944.8 1107.8	99.2. 49.5 1938.4 1187.3				
	FARE BOX REVENUES AUX REVALOCAL OPE CONTIGUTIONS NON TRANSIT REVENUES TUTAL REVENUES		112.4 2.6 16.0 121.0	195.9 2:8 14.0 214.7	249.3 2.9 17.0 249.4	301.4 3.1 17.0 321.5	326.9 4.0 18.0 348.9	351.4 4.2 1810 373:8	415.5 -4.4 18.0 437.9	453.0 4.4 19.0 478.4	490,6 4.8 19.0 514.4	530,3 5.0 19.0 554.3	\$75.0 5.2 20.0 400.2	423.1 5.4 20.0 440.5	474.4 -5.4 20.0 780.2	730.0 5.8 21.0 756.0	825.4 6.0 21.0 852.4	892.4 4:2 21.0 919.0				
	OPERATING BALANCE FARE BOX KATIO LOCAL OPERATOR CONTRIBUTION		-324:4 0.29	-274.5 8.44	-263,9 9,51 I	-257.2 0.56 111. OPERAT	-277.7 0.54 ING GRANTS	-298.9 0,54	-230.4 5.64	-210.0 9.49	-235.5 0.49	-246,2 0,70	-252.9 0.70	-247,3 0,71	-202.5 4.71	-297.5 0.72	-295.4 0.77	- 247.5 0.77				
)#10	STA REMAINING LLOU TOA 85% SECTION & OPER PEGP & 40% DISCR TOTAL UPERATING GRANTS		10,1 102,7 42,4 184,6 345,2	9,2 111.5 47.3 106.8 274.9	4.5 121.3 47.3 114:2 207.3	1.7 131.4 14.4 124.0 274.2	0.3 141.4 0.0 135:4 277.2	6.6 131.7 0.9 145.3 297.4	0.0 143.4 0.0 134.7 320.4	8,8 175,4 5,0 148,6 343,4	0.0 168.4 0.0 160.5 368.9	8.0 261.5 193.0 394.5	8:8 215:4 0:0 206:3 922:1	0.8 230.8 0.5 221.1 451.0	0,0 248,1 8,0 237,7 465,0	010 244.9 0.8 253.4 522.5	8;8 287. <u>8</u> 274.9 341.9	0.0 308:6 0.0 293.6 684.3				
	OPER & REMAINING FOR CAP GRAFTS		20.0	-1.6	25.4 B. CAPITAL	18:9 COSTS AND IV. CAPITAL	-0:5 FUND (NG COSTS	-1.5	90.3	124.4	(33).4	154.4	149.2	184.4.	203.3	225.0	306.4	336.7				
	HERTO BAIL CP LIGHT PAIL CP BUS.ACONFETTON/PEPLACEMENT BUSLDINGS/OFFICE EQUIPMENT/LAND TOTAL CAPITAL COSTS		104.2 8.0 3:0 42:0 (50.1	534.7 8.0 32.4 32.4 5f9.4	358.3 9.9 35.2 32.8 426.3	220.1 8.0 50.4 41.9 312.6 J. Capital	COSTS 267.0 0.0 0.0 30.3 	244.5 0.0 48.4 34.9 348.0	202.7 4.0 15.0 37:5 255.3	108.4 0.8 55.4 40.3 204.2	57.4 0.8 88.7 43.3 189.4	146.7 6.0 95.2 46.7 288.5	284.0 0.0 112.5 50.1 444.4	281.1 6.6 72.7 53.9 407.7	394.1 0.0 110.7 58.0 544.8	444.8 8.8 184.9 42.3 433.2	-349.2 8.0 113:5 47.8 530,5	245.7 8.0 828.1 72.0 457.8				
)970	OPER 8 AEMAINING FOR CAP GRANTS PSOP A BAIL FORGEAN SET ASIDE STA NETROPILI SET ASIDE TCA 154 EDNEFT ASSESSMENT	18	20,8 54 4.0 19.2 40.0	8,8 55 0,0 19,7 25,0	25,4 56 0,0 21,4 25,0	18,9 78 8.0 23.2 20.3	8,8 70 8,0 23,0 40,0	0.8 42.4 0.0 26.8 0.0	90;3 21 0.0 28.9 0.0	\$24.4 0.0 31.0 0.0	.133.4 8.0 33.2 0.8	154.4 8.0 35.4 0.0	147.2 6 .0.0 38.0 .0.0	164:4 0 10:0 45.2 0.0	203.3 8.8 43.8 0.0	225.0 8.0 47.1	304.4 6 8.0 59.4 8.0	334.7 0 0.0 54:5				
)#70 )#10	30::LLTY OF L'A. PROPA GUIDELAY FIND SECTION P. CAPITAL SECTION P. CAPITAL SECTION P. CAPITAL SECTION P. CAPITAL GAPTS	117.2 155.2	8.8 43.2 18.0 132.0 421.7	9.4 72.0 58.0 (32.8 372.1	10.4 54.3 24:2 138.1 354.9	11.3 57.5 20.0 (37:3 358.5	12.). 57.0 6.0 137:0 341.5	13.6 20.7 0.4 124.3 239.4	14.6 20.5 4.0 134.1 310.8	15.0 20.4 0.0 125.9 327.0	14.2 26.3 8.0 135.4 330.7	17,3 20,2 0,0 135_4 342,6	18:5 20.2 0:0 135:3 381.3	19.0 26.1 0.8 135.5 400.7	21.3 26.1 0.0 135.4 424.0	22.9 20.0 0.0 135.5 450.5	24.6 17:7 0.0 135.4 537.1	0.0 24.5 19:0 0.0 135.2 572.7				
	Balance Contrative Balance	155.2 155.2	271.7 424.9	-227.8 199.1	-47.5 127.4	45.7	23.0 198.5	-188:4 98.4	\$5.5 145.4	122.8 248:4	(49.1 417.5	74:3 491.0	•45;4 424.4	-7.0 419.4	-140.8 278.5	-182.7 95.8	<i>å. å</i> 102:4	114.9 217.3				

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Other assumptions that have been made in the current version of LODESTAR are listed in the text under "ASSUMPTION." The text for these "ASSUMPTIONS" should be changed by the user when one of the revenue inputs is changed. The printout thus will contain a current list of key revenue assumptions.

4.5 SUMMARY

A few of the possible management uses of LODESTAR have been highlighted in this document. It is expected that, as the user gains familiarity with the system additional uses will be found, enhancing the value of LODESTAR as a planning and management tool.

#### HODULES: MANAGEMENT POLICY

THE FOLLOWING TRANSPORTATION IMPROVEMENTS HAVE BEEN IDENTIFIED FOR INCLUSION IN THE LONG RANGE PLAN

KEAVY RAIL DESC·	F785 Est cost	Construction	LIGHT RAIL DESC	EST COST	Rurr	BUSWAY DESC	EST C	nst	DURR	·
	491 9991						741 6		8.0114	
NOS-1	871	6	<b>L8-LA</b>	427.2	5.	HARBOR	.2	80	3	:
M05-2	336:5	5	CENTURY	133	4					
NOS-3	336:5	5	SF VALLEY	-311	3	•		•		- 13
KOS-4	462.35	5	COASTAL	170	3					<i>[</i>
NOS-S	462.35	5	SUSAT INSTOM	300	3		•			ľ
EAST LA NETRO	0	5	PASADEDIA +	296	4					
NORMALK HEIRO	• · ·	5	TORRANCE .	160	3					
SANTA NONTCA +	0	6		••••	-	•				

## LODESTAR 091285

THE FOLLOWING INPROVENENTS HAVE BEEN INCORPORATED INTO THE IDENTIFIED NETWORKS

								s coste			REVENUE							
SCHEDILED INPLEMENTATION	NETWORK DESIGNATION/DESCRIPTION	SINULATION (	DATES		BU	5	NET.	RD	LA	1	8U	\$	MET	RÚ	LR.	Ť		
		5 (H-1 51K-	-2		tillitä – E	5IH-2 I	SIN-1	SIN-2 :	sin-t	SIN-7 1	151K-1	S18-7	SIN-1	81 <b>m-</b> 2 - 11	SIN-1 1	510-2 1		
1984 FISCAL YEAR	NHI = ALL BUS SYSTEM	1985	1990		434.37	483.50	0.00	0.00	0.00	0:00	224.05	252:71	0.00	0.00	0.00	0.00		
1991 FISCAL YEAR	NWZ - NOSI LĐ-LĂ	1990	0005		.415.40	506.38	[6.00	16.00	13.20	13.20	253.75	304.01	8:65	10.59	14.28	.17.45		
 1992 FISCAL YEAR	KWJA= NWZ NQ62	1990 2	2000	•	394.44	480.04	24.53	24:53	13.20	13.20	250.65	300.30	11.16	22.35	18.4Z	22.51		
1993 FISCAL YEAR	NW3 - NW3A MOSJ CENT	1990	2000		373.48	455.29	33.05	33.05	20.BO	20.80	236.75	296.58	13.67	34:11	22.56	·21.51		
1997 FISCAL YEAR	KW4A= KW3 KOS4	E990	2000		337.81	436.19	41.65	41.65	20:B0	20.80	236.67	296.48	16.87	42.07	29.69	36.29		
2002 FISCAL YEAR	NH4'- NH3 NUSS OF VALLEY	2000 2	2010		. 342.13	417.06	50.25	50.25	29:00	29.00	-236.59	294.38	20.04	50.06	36.82	45.00		
2005 FISCAL YEAR	NWS = NW4 HARBOR COSTAL	2000	2010															
2010 FISCAL YEAR	KWG • NWS EAST LA HUNTENBTON .	2000	2010															

NETWORK 1.D.	1985	19	34 198	7 1	968	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	F İ S+C 1999	A L 2000	Y E: A R 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
KETKORK 1	· I	-		•.•.	•	**•	. 1	•																			
NETHORK 2						٠	1	鬣	š.	٠	•	٠	٠	•	٠	٠	X	٠			•						
NETWORK 3A						٠	t,	٠		•	. •	٠	٠	•	٠	٠	I	٠									
NETWORK - 3						٠	I	+	•	1.49 Jit) *** € 194		3 <b>%</b> at		3	•	٠	1	٠									
NETWORK 44						•	1	+	•	•	٠	•	•	<u>रत्</u> हा (		•		• 4	-								
NETWORK 4					•											٠	1	٠	;; + 	+	•		٠	ŧ	+	•	- 1
NETWORK 3													:	•		•	I	•	•	٠	•	•	+	+	+	+ +	- 1:
NEIWORK 6			-													٠	1	• .	+	+	•	•	٠	+	•	+	
					•																						

1 <b>4_</b>																		
NOOVLE: 2	LUNONIC/DENOGRAPHIC PROJECTIONS																	•
	FISCAL YEAR è++1KPUTéé+	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1797	1998	1999	2000
>SC46 >SC48 >D0F >D0F >D0F >US00C >US00C >US00C	POPULATION L.A. CO. POPULATION, CY 000s L.A. CO. POPULATION, FY 600s L.A. CO. POPULATION GROWTH RATE-Z CA. POPULATION, CY 000s CA. POPULATION, FY 000s CA. POPULATION, FY 000s U.S. POPULATION, FY 000s U.S. POPULATION, FY 000s U.S. POPULATION, FY 000s OTHER PROP 5 CD. POPULATION, FY 000s OTHER PROP 5 CD. POP GRWTH RATE Z	7867 7752 25599 25219 235404 234313 10211	7911 7889 1.77 26020 25809 2.34 237554 23480 0.92 60449 2.34	7955 7933 0.56 26430 26225 1.61 239679 238618 0.90 10618 1.61	7978 7974.5 0.55 26836 26633 1.56 244771 240725 0.88 10783 1.56	8040 8019 0.53 27236 27036 1.51 243835 242803 0.86 1.946 1.31	8081 8060.5 0.52 27629 27433 1;47 245863 245864 2458649 0;84 1107 1.47	B121 9101 0.50 20014 27822 1.42 247862 247863 0.82 11264 1.42	8161 8141 0.49 28399 28207 1.38 249930 249930 249846 0.80 11420 1.38	8200 8189.5 0.49 28554 28577 1:31 251746 250798 0.78 11570 1.31	8237 8218.5 0.46 29113 28934 1.25 253669 253718 0.77 11714 4.25	8276 8256.5 0.46 29477 29295 1.25 255540 255540 254605 0.75 11861 1.25	8311 8293.5 0.45 29820 29649 1.21 257379 256460 0.73 12004 1.21	8346 8328.5 0.42 30150 29985 1.13 259186 258283 0.71 12140 1.13	8381 8363.5 0.42 30474 30312 1.09 260960 260073 0.69 12273 1.09	8415 8398 0.41 30792 30633 1.06 262701 261831 0.68 12402 1.06	8447 8432 0.40 31106 30749 1.03 244410 263556 0.66 12530 1.03	8481 8465 0.59 31414 31260 1.00 266087 265249 0.64 12656 1.00
)CAL )CAL )CAL )CAL )CAL	PRICE         INDICES           U(S. CPI-U         1984=100           U(S. CPI-U         1984=100           U(S. CPI-U         1947=100           U(S. CPI-U         1947=100           CA. HWY CONSYRUCTION INDEX         1984=100           CA. HCI GROWTH RATE         X	100.00 304.80 100.00	104; 84 4.9 517:60 106:00 6.0	110.56 5.4 337.00 112.36 6.0	117:45 6.2 358:00 120:23 7.0	124.77 6.2 380.30 128.64 7.0	132,28 6.0 403,20 £37,65 7.0	139.14 5.2 424.10 147.28 7.0	147.21 5,8 449.70 658.77 7.8	155.16 5.4 472.93 170.52 7.4	163.69 5.5 498.94 183.31 7.5	172.70 5:5 526.38 197.05 7.5	182.20 5.5 555.33 211.83 7.5	192.22 5.5 585.00 227.72 7.5	202.79 5.5 618.10 244.80 7.5	213.94 5.5 652.10 263.16 7.5	225.71 5:5 487.96 292.90 7.5	238.12 5:5 725:80 304.11 7.5
)SCAG	REAL PERSONAL INCOME/CAPITA L.A. REAL PERSNL INCOME/CAPITA \$,1967 L.A. REAL PERSNL INCOME/CAPITA \$,1967 CA. REAL PERSNL INCOME/CAPITA \$,1967 CA. REAL PERSNL INCOME/CAPITA \$,1967 CA. PERSNL INCOME/CAPITA \$,1967 CA. PERSNL INCOME/CAPITA \$,1967	476 9 4554	4845 1:60 4628 1:62 6:56	4935 1.85 4720 1.99 7.54	5010 1.52 4795 1.59 7.92	5052 0.84 4835 0.83 7.12	5133 1.61 4921 1.78 7.91	5201 1.32 4988 1.36 6.62	5264 1,22 5052 1,28 7,16	5333 1,32 5123 1,41 6,89	5382 0.92 517L 0.94 6.49	5433 0,95 5223 1,01 6,56	5489 1,03 5280 1,09 6,65	5570 1248 5365 1.61 7.20	5655 1.52 5451 1.61 7.20	5741 1.53 5539 1.61 7:20	5829 1.53 5628 1.61 7.20	5918 1.53 5719 1.61 7.20
>Rt0	TATABLE SALES COEFFICIENTS L.A. TIBL SALES/PERSML INCM L.A. TS/PI ISAFE ESTIMATE) CA. TIBL SALES/PERSML INCM		0:5259 0.4994 0:5435	0, 5259 0, 4994 0, 5435	0.5259 0.5127 0.5435	0.5259 0.5127 0. <b>5435</b>	0.5259 0.5127 0.5435	0.5259 0.5127 0.5435	0.5259 0.5200 0.5435	0.5259 0.5200 0.5435	0.5259 0.5200 0.5435	0.5259 0.5200 0.5435	0.5259 0.5200 0.5435	0.5259 D.5200 0 <b>.54</b> 35	0.5259 0.5200 0.5435	0:5259 0:5200 0:5435	0.5259 0.5200 0.5435	0.5259 0.5200 0.5435
>CAL >CAL >CAL	GASOLINE PRICES CA. GASOLINE REAL PRICE \$/GAL;FYB CA. GASOLINE REAL PRICE \$/GAL;L CA. GAS REAL PRICE GRWTH RATE Z	1 1:14 1:14	1.09 1.14 -4.28	1.04 1.15 -4.47	1,06 1,25 1,75	1.06 1.33 0.29	1.08 1.43 1.72	1.10 1.54 1.97	1.12 1.66 1.93	1.14 1.77 1.36	L.16 L.07 L:34	1.17 2.03 1.58	1.19 2.17 1.56	1.23 2.36 3.10	1:27 2:57 3.10	1,31 2,79 3,10	1.35 3.04 3.10	1.39 3.31 3.10
)CAL )CAL )CAL )SCAG	VEHICLE MILES TRAVELED CA. LDV'VHI/CADITA Index CA. LDV'VHI/CADITA GRVH.RATE CA. Compercial Figet Index. FY84=100 CA. COM'L FLT INDEX GRWTH RATE X	100 104	101.14 1.14 107.7 3.56	102.54 1.39 111.5 3.53	103.69 1.11 115.6 3.68	104.29 0.58 119.7 3.55	105.59 1.25 121.46 1.47	106.60 0.95 123.18 1.42	107.55 0.90 124:88 1.38	108.61 0.98 126.52 1.31	109.32 0.66 128.10 1.25	110.09 0.70 129.70 1.25	110.93 0.76 131.27 1.21	112.18 1.13 132.76 1.13	113.45 1.13 134.20 1.09	114.73 1.13 135.63 1.06	116.02 1.13 137.02 1.03	117.33 1.13 138.40 1.00
)CAL >CAL >CAL >CAL >CAL >CAL	FUEL DEMAND CA. MEY LOY FUEL EFFCIENCY NPG CA. MEN LOY FUEL EFFCY SR RATE Z. CA. AVG. LOY FUEL EFFCY SR RATE Z CA. AVG. LOY FUEL EFFCY SR RATE Z CA. LOY FUEL DEMAND MIL GALS CA. TRUCK FUEL DEMAND MIL GALS CA. TRUCK FUEL DEMAND MIL GALS CA. TRUCK FUEL DEMAND MIL GALS U.S. GASOLINE ADJUSTMENT FACTOR U.S. GASOLINE ADJUSTMENT FACTOR	23.70 16.40 10559 1773 422	22.69 -3.42 17.31 5.54 10455 1036 4.18 0.99 2.3	22.07 -3,58 17,98 3,63 10372 1901 415 0.99 1.3	22.38 1.40 18.59 3.43 10297 1971 412 0.99 1.3	22.43 0.23 19.13 2.89 10218 2041 409 0.99 1.3	22.74 1.38 19.63 2.64 10227 2071 409 0.99 1.3	23.10 1.58 20.12 2.47 10219 2100 409 0.99 1.3	23.46 1.55 20.59 2.32 10216 2129 409 0.99 1.3	23.71 1.08 21.02 2.12 10234 2157 409 0.99 1.3	23,96 1,07 21,44 1,96 10230 2184 409 0,99 1,3	24.27 1.27 21.83 1.85 10241 2211 410 0,99 1.3	24.57 .1.25 22.22 3.76 10264 2238 411 0.99 1.3	25.18 2.48 22.63 1.87 10305 2263 412 0.99 1.3	25.80 2.48 23.07 1.96 10332 2288 413 0.99 1.3	26,44 2,48 23,55 2,04 10347 2312 414 0,99 1,3	27.10 2.48 24.04 2.11 10353 2335 414 0.99 1.3	27:77 2.48 24:57 2:17 10350 2359 414 0:99 1.3
>5CA8 >\$CA8	FARE BOX REVENUES       \$MIL,1         L.A. CD FAREBOX REVENUES       \$MIL,1         L.A. CD REAL FAREBOX REVENUES       \$MIL,1         CA. FAREBOX REVENUES       \$MIL,1         CA. FAREBOX REVENUES       \$MIL,1         CA. FAREBOX REVENUES       \$MIL,1         CA. FAREBOX REVENUES       \$MIL,1         SHIL,1       \$MIL,1         SHIL,2       \$MIL,1         SHIL,2       \$MIL,1         SHIL,2	642.7	114.8 111.4 689.7 7.31	178.5 161.4 738:9 7.14	226.6 192.9 797.2 7.88	280.1 224.5 659.7 7.84	338:8 256.1 924:8 7.58	345.5 248.3 986.5 6.68	372.7 253.2 1058.2 7.26	400.6 258.2 1130.0 6.78	430.8 243.2 1207.0 6.82	463.2 268.2 1289, 3 6.82	495.9 277.2 1376.6 6.77	534.6 278.1 1468.8 6.70	574.1 203.1 1566.5 6.65	616.4 208.1 1670.2 6.62	661.6 293.1 1780.2 6.59	707.8 278.1 1897.0 6.56
	L.A. CD TIGL TRANS (SAFE ESTI \$BIL,I CA. TATABLE TRANSACTIONS \$BIL,I SCRYD/L.A.CO. BUBSIDT SHARE CA. GASCIINE SALES MIL GALS U.S. GASCIINE SALES MIL GALS U.S. DIESEL SALES MIL GALS L.A. GASCIINE PRICE SCRID OPR REV/CA OPR REV COEFF LA.CD POP/CA.POP CDEFF LA CD POP/CINH PROPS CD POP COEF TPAD SALES TAI CAP GROWTH RATE Z	19981	60 202 0, 86 10973 1418 788432 16089 1, 14 0, 7105 0, 1694 0, 3057 0, 4302 7, 31	65 221 0.86 10787 1486 97165 17577 1.13 0.7074 0.2415 0.3025 0.4276 7.14	72 243 0.86 10709 1559 75826 18317 1.25 0.7044 0.2995 0.4252 7.88	78 266 0.86 10627 1632 74496 19053 1.33 0.7015 0.3258 D.2966 0.4228 7.84	84 289 0.86 1663 1939 19279 1.43 0.563 0.3663 0.2936 0.4205 7.58	90 313 0.66 10427 1691 19508 1.54 0.6961 0.3502 0.2912 0.4183 6.68	97 341 0.86 10625 1720 92796 1.66 0.6935 0.3522 0.2886 0.4162 7.26	106 369 0.86 10644 1748 92479 19938 1.77 0.6911 0.3545 0.2863 0.4142 6.78	113 399 0.86 10639 1775 91997 20151 1.89 0.8889 0.3569 0.2840 0.4123 6.82	121 431 0.86 10651 1802 91642 20354 2:03 0.6867 0.3592 0.2818 0.4104 6.82	130 465 0.86 10674 1827 91410 20548 2.17 0.6846 0.3603 0.2797 0.4086 6.77	139 501 0.94 10717 1951 20728 2.36 0.826 0.826 0.339 0.2778 0.4069 6.70	149 543 0.86 10745 1975 41269 2.97 2.97 2.6800 3.3645 5.2759 7.4053 6.45	141 589 0,86 10741 1898 91040 21093 2,79 0,3690 0,3690 0,2741 0,4037 6,62	173 638 0.86 10767 1922 90775 21276 3.04 0.6773 0.3716 0.2724 0.6022 6.59	186 691 0,86 1945 90425 21460 3,31 0,6757 0,3742 0,2708 6,4008 6,56

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TE;3	FARE BOX REVENUE PROJECTIONS		1984	1985	1986	1987	1988	1989	1990,	1991	1992	1993	1994	1995	1996	<b>1</b> 997	1998	1999	2000
	***INPUT FROM NOULE 2***												•						
CAL. Cal	U.S. CPI-U U.S. CPI-U GROWIN RATE	1984=100 I	100.00	LQ4.66. 4.86	110.56 5.44	117.45 6223	124:77 6:23	132.28 6.02	- 139.14 5.18	147.21 5.80	155.16 5.40	163.69 5.50	L72.70 :5.50	182.20 5.50	192.22 5.50	202.79 5.50	213.94 5.50	225.71 5.50	238 5
	***INPUT FROM UTPS REVINUE NODE	L+++		STRULATED			I BUS			RAIL I									
100 Å	KNI = ALL BUS SYSTEM	1984 #HEL	1	14-1 S 1985	1 <del>N-</del> 2 1990		SIN-1 1 224.85	518-2 : 252.71	S1N-1 0.00	51X-2 ( 0.00	51H-1 ( 0.00	1[#-2 0.00							
	NYZ = NOS1 LB-LA	1984 \$MIL		1990	2000		253.75	304.01	B.65	10.59	14.28	17.45							
	NNJA- NNZ NDS2	1984 \$NIL		3990	2000		250.65	300.30	11.16	22.35	18.42	22.51							
	NV3 = NV3A -HOS3 CENT	1984 SHIL		1990	2000		236.75	296.58	13.67	34.11	22.56	27.57							
1997	"KW4A= KW3 HOS4	1984 \$N1L		1990	2000		236.67	296.48	16.87	42.07	29.69	36.29							
	KN4 = KW3 HOSS SF VALLEY	1984 \$NIL		2000	2010		236.59	296.38	20.06	50.06	36.82	45,00							
	NNS = NNA HARBOR COSTAL	1984 \$HIL		2000	2010														
2010	NIG = NHS EAST LA HUNTINGTON	1984 \$11L		2000	2010	· .				•									
1984	KETWORK (BUS)	(984 \$KIL	219:29	1276.85	Ti 230:42	235.99	s=2241.57 <sup>±</sup>	247.14	252.71	258.28									
	NETWORK (BUSI	1984 SMIL						248.72	253.75	258.77	263.80	268.83	273.85	278.88	283.90	288.93	293.96	298.98	1
1992	KETWORK (BUS)	1984 <i>s</i> mil						245.60	250.65	255.61	260.58	265.54	270.5l	275.47	280.44	285.40	290.37	295.33	1
	KETWORK (BUS)	1984 \$ <b>MIL</b>						230.74	236.75	242.73	248.71	254.70	260.68	266.66	272.65	278.63	284.61	290.60	-
	NETWORK (BUS)	1984 #NIL						230.69	236.67	242.65	248.63	254.61	260:59	266.57	272:55	278.54	284.52	-290.50	
	NETHORK (BUS) i Nethork (BUS)	1984-\$411L 1984 \$411L																230.61 0.00	
	METNORK (BUS)	1984 \$MIL	•			• '												0.00	
	FARE BOI REVENUES (BUS)	1984 \$HIL		224.65	230.42	235.99	241.57	247.14	252.71	258.77	260, 58	254.70	260.68	264.66	272.65	278.54	284,52	290.50	1
1994	KETNORK (HEAVY RAILI	L984 \$11L	8.00	<b># 0</b> A0 3	1275 n na J	200 aa	<u>ान्द्रा २</u> ०.००	···· 0.00	- 17 0.00	0:00									
	RETWORK (REAVY RAIL)	1984, \$MIL						8.46	8.45	8.84	9:04	9.23	9:43	9:62	- 9:81	10.01	10.20	10.40	
	NETHORK (HEAVY RAIL)	1984, \$H1L						10.04	11.16	12.20	- 13.40	14,52	15.64	16.76	17.87	18.99	20.11	21.23	
	RETWORK (REAVY RAIL)	[984 \$MIL						11.63	13.67	15:71	17.76	19.80	21.85	23.89	25.93	27.98	39, 02	32.07	
1997	NETWORK (HEAVY RAIL)	1984 \$M1L					• . •	14.34	16.87	17.39	2(.9l	24.43	26.95	29.48	32.00	34.5Ż	37.04	39.56	
	NETWORK (HEAVY RAIL)	1984 \$H1L																17.96	
	I NETWORK (HEAVY RAIL)	L984 \$MIL	٩															0.00	
2010	PNETHORK (HEAVY RAIL) FARE BOX REVENUES (HEAVY RAIL)	1984 \$MIL 1984 \$MIL		0.00	0.00	0.00	0.00	0.00	0.00	8.84	13.40	19.80	21.85	23.89	25.93	34.52	37.04	0.00 39:56	
		TIDA AUT		0.00					-		10.10			23.07			•••••		
	NETWORK (LIGHT RAIL)	1984 \$MIL	0.00	0.00	X7: 0.00:	≈'+ <b>0.0</b> 0	27/27 0.00 T			0.00	1 A DI	18.33		15 03	11.18	11 84	14 03	17.13	
	NETWORK (LIGHT RAIL) NETWORK (LIGHT RAIL)	1984 \$61L		•	•			13.96 18.01	14:28 18.42	(4:60 (8.83	14 <b>.9</b> 1 19.24	15.23 19.65	15.55 20.06	15.87 20.47	16.19 20.87	21.29	16.82 21.69	22.10	
	KETWORK (LIGHT RAIL)	1984 \$M1L 1984 \$M1L						22.06	22.56	23.06	23.56	24.06	24.56	25.07	-25.57	26.07	26.57	27.07	
	NETWORK (LIGHT RALL)	1984 \$MIL						29.03	29.69	30.35	31.01	31.47	32.33	32.99	33.65	34.31	34.97	35.63	
2002	NETNORK (LIGHT RALL)	1984 \$MEL																36.00	
	KETWORK ILIGHT RAILI	1984 \$NIL																0.00	
2010	KETWORK (LIGHT RAIL)	1984 #KEL								14.14	18 74	74.04	74 54	75.47	-	74 31	74 07	0.00 35.63	
	FARE BOX REVENUES (LIGHT RAIL)	1984 SHEL		0.00	0.00	0.00	0.00	0.00	0.00	14.60	19.24	24.06	24.56	25.07	25.57	34. 31	34.97	29.83	
	FARE BOI REVENUE																		
	FARE BOL REVENUES (BUS)	I SHIL		112.43	195.86	249.47		326.92	351.62	380.94	404.31	418.92	450.19	485.85	524.07	564.84	608.70	655.68	
	FARE BOX REVENUES (HEAVY RAIL)			0.00	0.00	0.00		0,00	0.00	13.02	20.79	32.41	37.73	43.53	49.85	70.00 69.57	79.25 74.81	89.30 80.41	
	FARE BOI REVENUES (LIGHT RAILI FARE BOI REVENUES (ALL MODES)			0.00 . 112.43	0.00 195.84	0.00 249.47		0.00 326.92	0.00 351.62	21.49 415,45	29.85 454.95	39.39° 488.73	42.42. 530.34	45.67 575.04	49.14 623.96	704.41	762.75	825.39	
	THE BOR NETEROED THEE DUDED!			11£.1J	6 TH 6 17 1		4780 TV		441194	104614	141114								

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MODULE .	- CONVENTIONAL	FUXDING	PROJECTIONS

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FISCAL YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	£998	1997	2000
***INPUT FROM NOULES 2 8-3***										<del></del>							
>MOD 2 L.A. CO TIBL TRANS (SAFE EST) \$BIL,I >MOD 2 C.A. TATABLE TRANSACTIONS \$BIL,I >MOD 2: SCRTD/L.A.CO SUBSIDY SHARE >MOD 2: CA. GASOLINE SALES MIL GALS >MOD 2: U.S. GASOLINE SALES MIL GALS >MOD 2: U.S. GASOLINE SALES MIL GALS >MOD 2: U.S. BIESEL SALES MIL GALS >MOD 2: CA. GASOLINE PRICE \$, X >MOD 2: CA. GASOLINE PRICE \$, X >MOD 2: CA. GASOLINE PRICE \$, X >MOD 2: CA. CO POP/CA PP COEFF >MOD 2: LA. CO.POP/CA. POP COEFF >MOD 2: TPAD SALES TAX LA POP COEFF >MOD 2: TPAD SALES TAX LA POP COEF	10 <b>781</b>	60 202 0.86 10873 1418 78632 16897 1.14 0.7105 0.1694 0.3057 0.4302 7.31 132.4	65 221 0.86 10787 1486 97165 17577 1.15 0.7074 0:2415 0.2415 0.4276 7.14 195.9	72 243 0.86 107D9 75824 18317 1.25 0.7044 0.2842 0.2842 0.2995 0.4252 7.88 249.5	78 266 0.86 10627 1632 74486 19053 1.33 0.7015 0.3258 0.4228 7.84 301.4	84 289 0.84 16636 1661 73985 19279 1.43 0.6987 0.3663 0.4203 0.4203 7.58 326.9	90 313 0.86 10627 1691 93355 19508 1.54 0.4961 0.3502 0.4983 0.4883 6.68 351.6	99 341 0.86 10625 1720 92796 19731 1.66 0.6935 0.3522 0.2886 0.4162 7.26 415.3	104 369 0.86 10644 1748 92479 19938 1.77 0.6911 0.3345 0.4142 6.78 455:0	113 399 0.86 10639 1775 71997 20151 1.89 0.3569 0.3569 0.2840 0.423 6:82 438:7	121 431 0.66 1802 91642 20354 2.03 0.6867 0.3592 0.404 6.82 530.3	130 465 0.86 10674 1827 71410 20548 2.17 0.6846 0.3603 0.2797 0.4086 6.77 575.0	139 501 0.86 10717 1851 91390 20729 2.36 0.46826 0.3639 0.4069 6.70 6.23.1	149 543 0.86 10745 1875 1269 20910 2.57 0.6808 0.3665 0.2759 0.4053 6.65 704.4	161 589 0.86 10761 1898 91060 21093 21093 21093 2.79 0.6790 0.3690 0.3690 0.3690 0.4037 6.62 762:8	173 .638 0.86 10767 1922 90775 21276 3.04 0.8773 0.3714 0.2724 0.4022 4.59 825.4	186 691 0.86 10764 19765 21460 3.31 0.6737 0.3742 0.2708 6.408 6.56 892.6
CA. GASOLINE: SALES TAX SMIL, I CA. TOA FUMOS SMIL, I FUEL TAX GPILLOVER SMIL, TPAD SALES TAX REVENUE SMIL, TPAD SALES TAX REVENUE SMIL, IPAD SALES TAX REVENUE SMIL, CA. GENERAL FUND FUND SMIL, UTF TO TRANSP FUND SMIL, UTF TO TRANSP FUND SMIL, TPAD INCOME SMIL, TPAD TO CA TRANSP BUDGET SMIL, TPAD TO CA TRANSP BUDGET SMIL, SMA.FUEL TAXES MATICLE 19 FUNDS PROP.5 CMTSMIL, SATICLE 19 FUNDS PROP.5 CMTSMIL, STA FUNDS (SI,M) SMIL, STA ARTICLE 4 FUNDSLA SMIL, STA ARTICLE 4 FUNDSLA SMIL, STA ARTICLE 4 FUNDSLA SMIL, STA FUNDS SMIL, STA ALLOCATION BY PDP SMIL, STA ALLOC BY POP TO LACTC.OISCSMIL, STA ALLOC BY POP TO LACTC.OISCSMIL, SECTION 910B FORMALA SMIL, SECTION 910B FORMALA SMIL, S		625 505 121 174 121 121 0 0 0 121 40 367 403 282.8 70.7 212.1 132.0 138.9 72.3 14.5 14.5 14.5 12.8 14.5 14.5 12.8 14.5 14.5 14.5 12.0 12.8 14.5 14.5 14.5 14.5 14.5 14.5 14.5 14.5	622 551 70 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	644 607 38 201 38 0 0 0 0 34 15 398 342.2 85.6 130.0 149.8 169.1 159.7 82.6 21.2 49.5 53.0 101.4 20.0 25.6 1141.4	684 685 211 217 21 0 0 0 0 21 9 0 21 9 0 21 9 0 0 21 9 0 0 0 0 21 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	733 721 233 12 233 10 0 0 12 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	789 783 249 50 0 0 568 395 428.4 107.1 147.9 210.5 199.9 10.5 199.9 210.5 199.9 3.1 0.6 0.9 98.8 20.7 49.4 20.7 49.4 20.5 101.4 202.5 55.0 101.4 53.0 101.4 128.4 128.4	848 852 267 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	910 922 0 285 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	974 999 304 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1043 1077 0 325 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1119 1162 347 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1212 1253 370 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1323 1358 0 395 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1442 1472 421 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1570 1574 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1708 1724 0 478 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
***CUTPUT***																	
RID OPERATING SUBSIDIEG         (10       PROPA 407,015C       smil,1         (10       STA REEM, FORMULA (052)       smil,1         (10       STA REMAINING ALLOCATION       smil,1         (10       STA REVENUES       smil,1         (10       AUX REV/LOCAL OPR CONTRIBUTIONS SMIL,1       capital Fundus (conv.Fundos)         (10       TDA 952 REGIONAL FDEMULA (152) SMIL,1       capital Fundus (conv.Fundos)         (10       SECT 9: REMAINING FOR CAPITAL SMIL,1       smil,1         (10       FORPA 251 LOCAL RETURN 10 L:A. SMIL,1 <td< td=""><td>·</td><td>173.3 96.5 11.0 47.4 12.4 16.0 17.0 20.0 38.0 60.0 0.0 27.6 21.6 50.3 132.8 46.9</td><td>95.1 104.6 10.3 47.3 195.9 18.0 18.5 0.0 20.0 22.7 25.0 0.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 27.9 27.9 27.9 27.9 27.9 27.9 27</td><td>106.2 116.8 5.8 47.3 249.5 2.9 17:0 20.6 0.0 20.0 22.7 25.0 0.0 33.4 21.2 49.8 135.3 47.8</td><td>115.2 126.6 3.4 47.3 301.4 17.0 22.3 0.0 20.0 20.0 22.7 20.3 0.0 0.0 36.2 21.0 49.6 134.6 134.6</td><td>123.8 136.1 2.0 47.3 326.9 4.0 18.0 24.0 0.0 39.9 20.0 38.9 20.0 38.9 20.8 49.5 134.3 47.4</td><td>133.0 146.2 47.3 351.6 4.2 18.0 25.8 0.0 39.9 20.0 41.8 20.7 49.4 133.8 47.2</td><td>145:3 159:7 0.0 47.3 415:5 415:5 415:5 4.4 18:0 28.2 0.0 0.0 39:9 0.0 45:6 20.5 49:3 133.4 47.1</td><td>155.8 171.2 0.0 47.3 455.0 4.6 19.0 30.2 0.0 39.9 10.0 0.0 48.9 20.4 49.4 133.3 47.1</td><td>167:3 183.9 0.0 47.3 488.7 4.8 19.0 32.4 0.0 39.9 0.0 39.9 0.0 52.5 20.3 49.3 133.0 46.9</td><td>179.0 196.7 0.0 47.3 530.3 19.0 34.7 0.0 39.9 10.0 0.0 0 56.2 20.2 20.2 132.8 46.9</td><td>191:5 210:4 0:0 47:3 57:50 5.2 20:0 37:1 0:0 39:9 0:0 39:9 0:0 40:1 20:2 49:3 132:7 46:9</td><td>204.9 225.2 623.1 5.4 20.0 39.7 0.0 39.9 0.0 39.9 0.0 64.4 20.1 49.4 132.9 48.9</td><td>220.3 242;2 0:0 47.3 704;4 20:0 42.7 0:0 0:0 39:9 0.0 0.0 49.2 20:1 49:5 133.0 47.0</td><td>237.0 246.4 0.0 47.3 742.8 5.8 21.0 44.0 0.0 0.0 39.9 0.0 0.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4</td><td>254.9 280:1 0.0 47.3 8254 6.0 21:0 49;4 0.0 39;9 10:0 0.0 80:0 19;9 49:5 132,8 44:9</td><td>274.1 301.2 0.0 47.3 872.6 6.2 21.0 53:2 0.0 53:2 0.0 39:9 0.0 54.1 19.8 49:5 132.6 46.8</td></td<>	·	173.3 96.5 11.0 47.4 12.4 16.0 17.0 20.0 38.0 60.0 0.0 27.6 21.6 50.3 132.8 46.9	95.1 104.6 10.3 47.3 195.9 18.0 18.5 0.0 20.0 22.7 25.0 0.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 21.4 50.0 50.0 27.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 21.9 27.9 27.9 27.9 27.9 27.9 27.9 27.9 27	106.2 116.8 5.8 47.3 249.5 2.9 17:0 20.6 0.0 20.0 22.7 25.0 0.0 33.4 21.2 49.8 135.3 47.8	115.2 126.6 3.4 47.3 301.4 17.0 22.3 0.0 20.0 20.0 22.7 20.3 0.0 0.0 36.2 21.0 49.6 134.6 134.6	123.8 136.1 2.0 47.3 326.9 4.0 18.0 24.0 0.0 39.9 20.0 38.9 20.0 38.9 20.8 49.5 134.3 47.4	133.0 146.2 47.3 351.6 4.2 18.0 25.8 0.0 39.9 20.0 41.8 20.7 49.4 133.8 47.2	145:3 159:7 0.0 47.3 415:5 415:5 415:5 4.4 18:0 28.2 0.0 0.0 39:9 0.0 45:6 20.5 49:3 133.4 47.1	155.8 171.2 0.0 47.3 455.0 4.6 19.0 30.2 0.0 39.9 10.0 0.0 48.9 20.4 49.4 133.3 47.1	167:3 183.9 0.0 47.3 488.7 4.8 19.0 32.4 0.0 39.9 0.0 39.9 0.0 52.5 20.3 49.3 133.0 46.9	179.0 196.7 0.0 47.3 530.3 19.0 34.7 0.0 39.9 10.0 0.0 0 56.2 20.2 20.2 132.8 46.9	191:5 210:4 0:0 47:3 57:50 5.2 20:0 37:1 0:0 39:9 0:0 39:9 0:0 40:1 20:2 49:3 132:7 46:9	204.9 225.2 623.1 5.4 20.0 39.7 0.0 39.9 0.0 39.9 0.0 64.4 20.1 49.4 132.9 48.9	220.3 242;2 0:0 47.3 704;4 20:0 42.7 0:0 0:0 39:9 0.0 0.0 49.2 20:1 49:5 133.0 47.0	237.0 246.4 0.0 47.3 742.8 5.8 21.0 44.0 0.0 0.0 39.9 0.0 0.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4 20.0 74.4	254.9 280:1 0.0 47.3 8254 6.0 21:0 49;4 0.0 39;9 10:0 0.0 80:0 19;9 49:5 132,8 44:9	274.1 301.2 0.0 47.3 872.6 6.2 21.0 53:2 0.0 53:2 0.0 39:9 0.0 54.1 19.8 49:5 132.6 46.8

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#### NODULE:6 INNOVATIVE FINANCING TECHNIQUES (PROP A BONDING CAPACITY)

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(PROP A 401 DESCR FUNDS WILL BE USED FOR COVERAGE AGAINST THE 331 RAIL FUNDS WILLIZED FOR DEBT SETHEREFORE A BETTER THAN 2: I COVERAGE RATIO WILL BE ACHIEVED) (331 OF BONDING CAPACITY WILL BE UTILIZED IN FY86, 661 WILL BE UTILIZED IN FY87 AND LOOZ THEREAFTER)

	2.11	IT FROM N RAIL SET	DOULES+++ Aside fun	D		0.0	107.2	119.8	129.9	[39:6	149; 9	163.0	175.6	180.6	201.7	215.8	238.0	248.4	267.2	287.3	309.0
	-		ILIZATION DEBT SERV		<b>)</b> ,	0.0 0.0	0.3 35.4	0.7 80.2	1.0 129.9	1.0 139.6	1.0 .149.9	1.0 863 <b>.8</b>	1;0 175.6	1.0 188.4	1.0 201.7	1.0 215.8	1.0 231.0	1.0 240:4	1:0 247.2	1.0 287.3	1.0 1.0
D1F PRI		FISCAL YEAR	QURATEON (N)	INVEST RAFE(I)	DIVIDEND Ráteid)	FY 1985	FY 1986	FY 1987	FY 1988 -	FY 1989	FY 1990	FY 1991	FY 1972	1462 LA	F¥ 1994	F.Y 1995	FY 1996	F¥ 1997	FY 1998-	F¥ 1999	FY 2000
L	0.0	1985	30	6.0	10	0.0	0.0	.0.0	0.0	0,0	0.0	0.0	0.0	0.0	0.0	0.D	0.0	0.0	0.0	0.0	0.0
1	294.9	1986	30	6.0	EQ		35.4	33.5	33:5	33.5	33.5	33.5	33.5	11'2	33.5	33.5	33.5	33:2	33:2	33.5	33.5
L	309.6	1987	30	6.0	10			46.7	44.2	44;2	<b>44.</b> 2	44.2	<b>44.</b> 2	44.2	44.2	44.2	44.2	44.2	44;2	44.2	H12
1	434.3	1988	30	6.0	10		•		52.1	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3
2 <b>t</b>	104.2	1989	30	4.0 4.0	10					12.5	1110	11.6	11.8	11.0	11.8	11.8	<b>II.B</b>	11.8	11.0	11.0	11.0
1	91.9	1990	30		10						11.0	10.4	10.4	10.4	10.4	10:4	10.4	10.4	10.4	10,4	10.4
1	120.6	1991	30		-10							14:5	13.7	13.7	13.7	13.7	13.7	43.7	13.7	13:7	13.7
1	104.8	1992	30	6.0	10								12 <i>i</i> 6	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
1	113.9	1993	30	6.0	10							•		ļ <b>3.</b> 7	12.9	12:9	12.9	12.9	12.9	12.9	12.9
1	115.5	1994	30	6.0	10							•			13.9	13.1	13.1	13.1	13.1	13.1	13.1
1	123:6	1995	30	6.0	10											14:8	14:0	14.0	14.0	14.0	14.0
I.	133:3	1996	30	6.0	10												16:0	15.1	15.1	<b>15.</b> L	15.1
L	151.8	1997	30	6.0	10									7		•	•	lB.2	17.2	17.2	.17.2
1	\$64:4	1998	30	6.0	10			•						ć					19.7	18.7	18.7
L	176.8	1999	30	6.0	10					•										21.2	20.1
1	189.9	2000	30	6.0	10																22.0
	REMAIN	ING FUNDS				0.0	71.9	39.5	0.0	0.0	0.0	0.Q	0.0	0.0	0.0	0:0	0:0	0.0	010	0.0	0.0
	CASH FI	ROM PROP	A BONDS	10	D ZÍÐISCOUNT	0.0	265.4	350.6	390.9	93.8	82.7	108.5	94.3 <sup>.</sup>	102.5	104:0	111.3	120.0	136.7	148.0	159.1	170.9
<b>&lt;</b>	- LO PROP A	FUNDS AV	AIL FOR CA	P LNPROVI	ENENTS	0.0	337.3	390.1	390.9	93.8	82.7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148.0	159. (	170.9

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	ALCHISTING FROM LEADER TONS						•												
	FISCAL YEAR		1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	*** INPUT FROM NODULE <sup>3</sup> 2***			-															
>CAL >CAL	U.S. CPI-U U.S. CPI-U GROWTH RATE	1984=300 I	100.00	104.86 4.86	110.55 -5.44	417.45 6.23	124.77	132.28	137.14	147.21	155,16	163.69 5.50	172.70	182.20	192.22 -5.50	202.79 5.50	213:94 5:50	225.71	238. 12 5.50
	atalkput Fron Nobile 1444			SÌNULÀTIC	N GATES		: BUS		I METRO	atı	L 16HT	tail i							
			; ;		(#-2							111-2	•						
1984	NH1 = ALL BUS SYSTEM	1984 SHEL		1985	1990		434.37	483.50	0.00	0.00	0.00	0.00							
	NWZ = MOSL LB-LA	1984 \$M1L		1990	2000		415.40	506.38	16.00	Į6.00	13.20	13.20							
	NNJA= NN2 NOSZ	1984 \$NJL		1990	2000		-394.44	480.84	24.53	24.53	13.20	13.20		•					
	NN3 = NN3A HOS3 CENT	1984 ANSL		1990	2000		373.48	455.29	33.05	33.05	20.80	20.60							
	KN4A= NW3 MOS4	1984 \$M1L		1990	2000		357.81	436.18	41.65	41.65	20:00	20.80							
	NNA = NN3 MOSS' SF VALLEY NNS = NNA HARBOR COSTAL	1984 \$M\$L		2000 2000	2010 2010		342.13	417.06	50.25	\$9.25	29.00	29.00							
	NWS = NWS EAST LA HUNTINGTON	1984 \$411. 1984 \$411.		2000	2010														
		TIME VILLE		****	1414														
1984	NETWORK (BUS)	1984 \$H1L	424.54	434.37	444.20	454.02	463.85	473.67	¥83.50	493.33									
1991	NETHORK (BUS)	1984 \$MIL						406.30	415.40	424:50	433.60	442:69	451.79	460.89	469.99	479.09	488, 18	497.28	504.38
1992	NETHORIK (BUS)	1984 \$MIL						385.80	394.44	403.09	411.72	420.36	429:00	437.64	446.28	454.92	463.56	472.20	480.B4
1993	RETWORK (BUS)	1984 \$MIL						365.30	373.48	361.66	387:84	398.02	406.20	414:39	422:57	430.75	438.93	447.11	455.29
1997	NETWORK (BUS)	1984 \$M1L						349.97	357.81	365.64	373.48	381.32	389.15	396.99	404;83	412.66	420.50	428.34	436.18
	NETHORK (BUS)	1984 \$MIL																334.64	342.13
1	NETWORK (BUS)	1984 \$H1L										•						0.00	0.00
2010	NETWORK (BUS)	1984 \$MEL			<b>.</b> .													0.00	0.00
	OPERATING COSTS (BUS)	1984 #KIL		434,37	444.20	454.0Z	463.85	473.67	483.50	424.50	411.72	399.02	406.20	414;39	422:57	412.66	420.50	428.34	436,18
1984	NEINORK (HEAVY RAIL)	1984 SHIL	0.00	0.00	0.00	0.00	0:00	0.00	0:00	0.00									
	NETHDAK (HEAVY RAIL)	1984 #NIL						\$6.00	16.00	16.00	16.00	16.00	\$6.00	16.00	16.00	-16.00	16.00	16.00	16.00
1992	NETHORK (HEAVY RAIL)	1984 #M1L						24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24.53	24:53
1993	NETHORK (HEAVY RAIL)	1984 #HEL						33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05	33.05
1997	NETHORK (HEAVY RAIL)	1984 SKIL						41.65	41.65	41.65	41.65	41,65	41.65	41.65	41.65	41.65	41.65	41.65	4Ì . 65
	NETWORK (HEAVY RAIL)	1984 SHIL									,			•••				50.25	50.25
	NETWORK (HEAVY RAIL)	1984 \$KIL																0:00	0.00
2010	NETNORK (HEAVY RAIL)	1784 \$M1L																0.00	0:00
	OPERATING COSTS (HEAVY RAIL)	1984,\$K1L		0.00	0.00	0.00	0.00	0.00	0.00	16.00	24.53	33.05	33.05	33.05	33,05	41.65	.41.65	41.65	41.65
1984	KETNORK (LIGHT RAIL)	1984 SMEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
	NETWORK (LIGHT RALL)	1984 \$H1L						13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13:20
	"NETWORK (LIGHT RAIL)	1984 \$M1L						13.20	13.20	13.20	13.20	13,20	13.20	13.20	13.20	13.20	13.20	13.20	13.20
	METHORK (LIGHT RAIL)	1984 \$HIL						20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20:80	ŻÓ.BO
1997	NEINORK (LIGHT RAIL)	1984 \$HIL						20.80	20.80	20.60	20.80	20.80	20.80	20.00	20.80	20.80	20.80	20.80	20.80
2002	NETHORK ILIGHT RAILI	1984 #MIL		·														29.00	29.00
	NETNORK (LIGHT RAIL)	1984 \$NIL																0.00	0.00
2010	NETWORK (LIGHT RAIL)	1984 \$HIL		:														0.00	0.00
	OPERATING COSTS (LIGHT RAIL)	1984 \$XIL		0.00	0.00	0.00	0.00	0,00	0.00	13.20	13.20	20.BQ	20.80	20,80	20 "BO	20.80	20:80	20.00	20.80
	OPERATING: COS	TS								,									
< 10	OPERATING COSTS (BUS)	1 SHIL		455.46	491.12	533.27	578.74	626.59	672.75	624:91	638.83	651.54	701:50	754.99	812.24	836.84	899:63	966.80	1038.63
( 10	OPERATING COSTS THEAVY RAILT	t \$111		0.00	0.00	0.00	0.00	0.00	0:00	23.55	38:05	54.10	57.0B	60.22	63:53	B4.46	89.11	14,01	99.18
( 10	DPERATING COSTS (LÌGHT RAIL)	t shit		9.00	0.00	0.00	0.00	0.00	0;00	19.43	20.48	34:05	35.92	37.90	39.98	42.18	44.50	46.95	49,53
< 10	OPERATING COSTS (ALL MODES)	1 \$MÍL		455.46	491,12	533.27	578.74	626.59	672:75	667.B9	697.36	739.69	794.50	853.11	915.75	963.4B	1033.24	1107.75	(187.34

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#### CAPITAL COSTS

	CONTRACT DISTIBUTION DATA																		
1		3	4	5	6	7	8	9	10										
100	59:3	35.1	22.9	16.1	12	9.3	7.5	6.2	5.2										
	40.7	43.9	36.4	29	23.1	10.9	15.4	12.8	[0.9										
	_	21	27.5	26.7	24.2	21.1	18.5	16.1	14										
			13.2	18,9	19.7	19.1	17.9	16.4	15										
	***INPUT FROM NGRT HODULE***			9.3	14.2	15.1	15.2	15.1	14.2										
1984 ·	NUI = ALL BUS SYSTEM				6.6	11.1	12.3	12.4	12.5										
1991	KW2 = HOS1 LB-LA					5.4	ê, 9	10	10.4										
1992	NU3A= KU2 KOS2						4.3	7.4	8.5										
L993	NW3 = NW3A MOS3 CENT							3.6	6.3	•									
1997	NH4A= NH3: MOS4								3										
2002	NHA = NW3 NOSS SF VALLEY					•					•								
2005	NWS = KH4 HARBOR COSTAL																		
2010	NVA = KV3 EAST LA HUNTINGTON																		
		100.0				104.57		1.77.10	i				103 65						TAA 11
)CAL	CA. HWY CONSTRUCTION INDEL	1984=100	100	106	112.36	120:23	128.64	137:65	147.28	158:77	£70:52	103.31	197.05	2(1.83	227.72	244.60	263.16	282.90	304.11
)CAL	CA. HCL GROWTH RATE	1		6.00	6.00	7.00	7.00	7.00	7.00	7.80	7:40	7.50	7:50	7.50	7.50	7.50	7.50	7.50	7.50
				1.06	1.12	1.20	1.29	1.38	1.47	1.59	1.71	1.83	1.97	2.12	2:28	2.45	2.63	2.83	3.04
BASE EST	PROJECT DESCRIPTION	BEGIN	PROJECT	FY85	F186	FY 87	FY88	FY87	FY90	FY9t	FY92-	FY93	F¥94	FY95	£196	FY97	FY98	FY99	FY00
\$84.K	FRANCET RESERVED TON		URATION	1985	1986	1987	1988	1989	1990	1991	1992	1993	£994	1995	1996	1997	1996	1999	2000
									••••		••••			• • • •				••••	
671	NOS-1 (WILSIRE/AVARADO) TRACS	1991	6	r 98:3	475.9	243,9	73.5	65.1	18:4	6:6	-	-	-	-	-	-	-	-	-
336.5	NOS-2 (WILSHIRE/CRENSHAW)	1992	5	-	-	2 54.2	97.6	89.8	63.6	31,3	-	•	-	-	-	-	-	-	-
336.5	NOS-3 (FAIRFAI/BEVERLY: NOS)	1993	5	-	•		54.2	97.6	87.8	63.6	31.3	-	-	-	-	-	-	-	-
462.35	NOS-4 (HOLLYKOGO/CAHUENSA)	t997	.5	-	-	-	-	-	-	-	.74.4	<b>İ34.</b> 1	123.4	87.4	43:0	-	-	-	-
462.35	NOS-5 (REMAINING LPA)	2002	5	-	-		-	-	-	-	-	•	-	-	-	74.4	134.1	123.4	87:4
Ò	EAST LA METRO	2010	5	-	-	-	-	-	-	-	-	<b>-</b> '	-		-	-	-	-	-
ó	NORWALK METRO	120	-5	-	-	-	-	-	·-		-		-	-	-	-	-	-	-
0	SANTA NONICA NETRO	120	6	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
427.2	LB-LA LRT	1991	5	-	69.8	123.9	114.1	80.7	39.7	-	-	-	-	-	-	-	-	-	·-
133	CENTURY LRT	1993	4	-	-	-		30.5	48.4	36.6	17.6	-	-	-	-	-	-	-	-
311	<b>GF VALLEY LRT</b>	2002	3	-	- ·	-	-	·· -	-	-	-	-	-	-	-	-	-	109.2	136.5
170	COASTAL LRT	2005	3	-	·-	-	-	-	-	-	-	-	-		-	-	-	-	-
300	HUNTINGTON LAT	2010	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
296	PASADENÁ LRT	120	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	TORRANCE LRT	120	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	HARBOR BUSNAY	2005	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BUS ACQUI AND REFL			2.9	29.0	29.3	39.4	0.0	33.0	9.5	32.5	48.5	48; 3	53.1	31.9	45.2	39:9	40.1	39.5
	BUILDINGS			22.9	16.3	16.2	22.5	13.6	15.3	15.3	15.3	15.3	15:3	15.3	15.3	15.3	15.3	15.5	15.3
	OFFICE EQULP			17.5	12.7	11.1	10.0	8.3	8.4	8.3	8.3	8.3	8.4	8; 4	8:3	8:4	8:3	8.4	0.2
	LAND			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0:0	0:0	0.0	0.0	0.0	0.0
	CAPITAL COST	-									•								1-4 1
	BUS ACQUITREPL/BUSWAY CONSTR	I SKIL		3.0	32.6	35.2	50:6	0.0	48.6	15:0	55.4	88.9	95.2	117.5	72.7	110.7	104.9	113:5	120.1
	NETRORALL	I \$NIL		104.2	534.7	358.3	289.8	347:6	253:1	161.1	180.3	245.8	.243.3	185.1	97.9	192.2	352.8	349.2	265.7
	LIGHT RAIL TRANSIT	I \$KIL		0.0	77.3	148.9	146.7	153.1	129:0	58.1	29.9	0.0	0.0	0.0	0.0	0.0	0.0	308.0	415.2 72:0
	BULLDINSS/EQUIP/LAND	6 \$MIL		42.8	32.6	32.8	41.9	30.3	34;9	37.5	40.3	43.3	46.7	50.1	53.9	58.0	62.3	67.8	/2:0

HO CLALE	DW MANAGER																	1	
	FISCAL YEAH	1984	[985	1986	(987	1988	1989	1990	(191	1992	(993	1994	1995	1995	1997	1998	1977	2000	
> 5 > 5 > 5 > 5 > 5 > 5	RTD OPERATING SUBSIDIES PROPA 401 DISC #MIL. TDA 952 REAN. FORMULA (851) #MIL. STA REMAINING ALLOCATION #MIL. SECTION 910PERATING #MIL. FARE BOJ REVENUES #MIL. MUL REVILOCAL OPER CONTRIBUTIONS #MIL. MUL REVILOCAL DER CONTRIBUTIONS #MIL.		173.3 96.5 (1.0 47.4 112.4 2.6 16.0	95.1 104.6 10.3 47.3 195.9 2.8 16.0	106.2 116.8 5.8 47.3 249.5 2.9 17.0	115.2 126.6 3.4 47.3 301.4 3.1 17.0	123.8 134.1 2.0 47.3 326.9 4.0 18.0	133.0 146.2 0.8 47.3 351.6 4.2 18.0	145,3 159,7 0.0 47,3 415,5 4.4 (8.0	155.8 171.2 0.0 47.3 455.0 4.6 19.0	167,3 183,9 0.0 47,3 490,6 4,8 19,0	119.0 196.7 6.0 47.3 530.3 5.0 19.0	191.5 210.4 0.0 47.3 575.0 5:2 20.0	204.9 225.2 0:0 47.3 623.1 5.4 2010	220.3 242.2 0.0 47.3 674.6 5.6 20.0	237.0 260.4 6:0 47.3 730.0 5:8 21:0	254.9 280.1 0.0 47.3 825.4 6.0 21.0	274.1 301.2 0.0 47.3 892.6 6.2 21.0	
))))))))))))))))))))))))))))))))))))))	CAPITAL FUNDING (CONV.FUNDS) TDA 951 REGIONAL FORMULA (151) #NIL, SIA METRORALL SET ASIDE #NIL. SECT 9; METRORAIL SET ASIDE #NIL. SECT 9; METRORAIL SET ASIDE #NIL. PROPA 351 (DEVERTEO FOR 80NDS) #NIL, PROPA 251 LOCAL RETURN TO L.A. #NIL GDWY 502 FOF FORMULA LACTC DISCR#NIL. SECT 3 TO LA (UTA W/POP)IM CMLY)#NIL. SECT 3 TO LA (UTA W/POP)IM CMLY)#NIL. SECT 3 TO LA (SEC 9418 FORMULA #NIL; CAPITAL FUNDING (INNOV.FINANCE)		17.0 6.0 20:0 38.0 60.0 27.6 21.6 50.3 132.8 46.9	18.5 20.0 22.7 25.0 0.0 29.9 21.4 50.0 132.8 46.9	20.8 0.0 20.0 22.7 25.0 0.0 33.4 21.2 49.8 135.3 47.6	22:3 0.0 20.0 22.7 20.3 0.0 36.2 21.0 49.5 134.6 47.5	24:0 0.0 39.9 20.0 38.9 20.8 49.5 134.3 47.4	25.8 0.0 39.9 20.0 41.8 20.7 49.4 133.8 47.2	28.2 0.0 39.9 0.0 45.6 20.5 49.3 133.4 47.1	30.2 0.0 39.9 10:0 48.9 20:4 49:4 133.3 47.1	32.4 0.0 39.9 0.0 52.5 20.3 49.3 133.0 44.9	34.7 0.0 3919 10:0 56.2 20.2 49:3 132.8 46.9	37.1 0.0 39;9 0.0 0.0 60.1 20.2 49.3 132.7 48.9	39.7 0.0 39.9 0.0 64.4 20.1 49.4 132.9 46.9	42.7 0.0 39.9 0.0 49.2 20.1 49.5 133.0 47.0	45.0 0.0 39.9 0.0 74.4 49.5 133.0 46.9	49.4 0.0 39.9 10.0 4.0 19:9 49:5 132:8 44.5	53:2 0:0 39:9 0:0 86.1 19:8 49:5 132.6 46.8	Ĩ
) 6	PROPA RAIL PROGRAM INIL OPERATING COSTS	1	0.0	337.3	390 : L	390.9	93.8	82:7	108.5	94.3	102.5	104.0	111.3	120.0	136.7	148,0	157.1	170.9	
;;	OPERATING COSTS IBUS) I \$M OPERATING COSTS IMEAVY RAIL! I \$M OPERATING COSTS (LIGHT RAIL! I \$M CAPITAL COSTG	IL	455.5 0.0 0.0	471.1 0.0 0.0	533.3 0.0 0.0	578+7 0+0 0+0	626.6 0.0 0.0	672.7 0.0 0.0	624.9 23.6 19.4	638.8 38.1 20.5	651.5 54.1 34.0	701.5 -57.1 35.9	755.0 60.2 37.9	612.2 63.5 40.0	836.8 84.5 42.2	899.6 89.1 44.5	966,B 94,0 46,9	1038.6 99.2 49.5	
) 9 ) 9 ) 9 ) 9	BUS ACQUI/REPL/BUSNAY CONSTR I \$4 HETRORAIL I \$4 LIGHT RAIL TRANSIT I \$4 BUILDINGS/EQUIP/LANO I \$4	IL IL	3.0 104;2 0:0 42:8	32.6 534.7 77.3 32.6	35.2 358.3 148.9 32.8	50:6 289.8 [46.7 41.9	0.0 347.6 153.1 30.3	48:6 253.1 129.8 34.9	15.0 161.1 58.1 37.5	55.4 180.3 29.9 40.3	88.9 245.8 <i>0</i> .0 43.3	95.2 243.3 0.0 46.7	112.5 185.1 0.0 50.1	72.7 97.9 0.0 53.9	110.7 182.2 0.0 58.0	104.9 352.8 0.0 62.3	113.5 349.2 308.8 67.8	120.1 265.7 415.2 72.0	
•	ASSUMPTIONS: PROP A RAIL PROGRAM : 3 FED GENERAL FUND ISX REI I CENT FED FUEL TAT TO A SEPT FUEL TAT TO THE	DUCTION FIRST YE Sect 3; Required	AR THEN ST	ADY			IL AS <sup>®</sup> DEFINE	D'IN-REG	IONAL PLAN										
	LOOX DISCR GUIDEWAY FUN	V IAKU PTAT		(	A. DPERATI	NG COSTS AN 1. OPERATIO	(D. REVENUES	,											
	METRO OPERATING COSTS LIGHT RAIL OPERATING COSTS BUS OPERATING COSTS TOTAL OPERATING COSTS		0.0 0.0 453.5 455.5	0.0 D.0 491.1 491.1	0.0 0.0 533.3 533.3	0.0 0.0 578.7 578.7	0.0 0.0 676.6 626.6	0.0 0.0 672.7 672.7	23.6 19.4 624.9 667.9	38.1 20.5 638.0 697.4	54.1 34.0 651.5 739.7	57.1 35.9 701.5 794.5	60.2 37.9 755.0 853.1	63,5 40.0 812.2 915.8	84.5 42.2 836.8 963.5	89.1 44.5 899.6 1033:2	94.0 45.9 966.8 1107.8	99.2 49.5 1038.6 1187.3	
	FARE BOI; REVENUES Aux Rev/Local or contibutions Non transit revenues Total revenues		112.4 2.4 16.0 131.0	195.9 2.8 16.0 214.7	249.5 2.9 17.0 269.4	II. OPERATI 301.4 3.1 17.0 321.5	ING: REVENUES 326.9 4.0 18.0 348.9	351.4 4.2 18.0 373.8	415.5 4.4 18.0 437.9	455.0 4.6 19.0 478.4	490.6 4.8 19.0 514.4	530.3 5.0 19.0 554.3	575.0 5.2 20.0 600.2	623.1 5.4 20.0 648.5	674.6 5:6 20.0 700:2	730.0 5.8 21.0 756.8	825.4 4:0 21.0 852.4	892.6 6.2 21.0 919.0	
	OPERATING BALANCE Fare boy Ratid		-324;4 0.29	-276.5 0.44	-263.9 0.51	-257.2 0.56	-277.7 0.56 TING GRANTS	-298.9 0.56	-230.0 0.66	-218:8 0.69	-2 <b>25.3</b> 0.70	-240.2 0.70	-252;9 0.70	-267.3 0.71	-263.3 0:73	-276.5 0:73	- <b>255.4</b> 0.77	-267.5 0.77	
	LOCAL OPERATOR CONTRIBUTION STA REMAINING ALLOC		11.0	10.3	5.8	3.4	2.0	0.B	0.0	0.0	0.0	0.0	0.0	0.0	0;0	0:0	0.0	0:0	
)RTD	TDA 852 SECTION 9 OPER PROP A 401 DISCR TOTAL OPERATING GRANTS		96.5 47.4 £73.3 328.2	104.6 47:3 95.1 257.3	116.0 47.3 106.2 276.1	126.6 47.3 [[5.2 292.5	136.1 47.3 £23.8 309.2	146.2 47.3 133.0 327.3	159.7 47.3 (45.3 352.3	171.2 47.3 155.8 374.3	183.9 47.3 167.3 398.5	196.7 47.3 179.0 422.9	210;4 47;3 191,5 449;2	225.2 .47.3 .204.9 477.5	242.2 47.3 220.3 509.8	260.4 47.3 237.0 544.7	280.1 47.3 254.9 582.3	301.2 47.3 274.1 622.6	
	OPER \$ REMAINING FOR CAP GRAMTS		3.7	-19.2		35.3 Costs and (V. Capitai		28.3	122.3	155:5	17312	182.B	196.3	210.2	246.6	269.3	326.9	355, I	
	MERTO RAIL CP Light Rail CP Bus Acquisition/Replacement Buildings/Office Equipment/Land Total Capital Costs		104.2 0:0 3.0 42.8 150.1	534.7 77.3 32.6 32.6 477.1	358.3 148.9 35.2 32.8 575.3	289.8 146.7 50.6 41.9 529.1 V. CAPITAL	347.6 153.1 0.0 30:3 530.9 6RAMTS	253.1 129.8 48.6 34:9 466:4	161.1 58.1 15.0 37:5 271.7	180.3 29.9 55.4 40.3 304.0	245;8 0:0 88;9 43:3 378,0	243.3 0:0 95.2 46.7 385.1	185.1 0.0 112.5 50.1 347.7	97.9 0.0 72.7 53.9 224.5	182.2 0.0 110.7 58.0 350.9	352.8 0.0 104.9 62.3 520.1	349.2 308:8 113:5 67.8 839.3	265:7 415,2 120,1 .72:0 873:0	
)R10 )R10	OPER & RENAINING FOR CAP GRANTS PROP A RAIL PROGRAM STA METRBRAIL SET ASIDE TOA 152 BENEFIT'ASSESSMENT 301 CITY OF L.A. PROPA GUIDEWAY FUND SECTION 9 CAPITAL SECTION 9 OF ANTS 10TAL CAPITAL GRANTS	0.0	3.7 0.0 17.0 8.3 63.2 58.0 52.1 268.3	0.0 337.3 0:0 18,5 25:0 9:0 72:0 42.7 267:4 771.7	12:2 390.1 0:0 20.6 25.0 10.0 56.3 42.7 179.2 736.0	35.3 390.9 0.0 22.3 20.3 10.9 57.5 42.7 144.9 724.7	31.5 93.8 0.0 24;0 40.0 11.7 57;0 39.9 173.8 471.6	28.3 82.7 0.0 25.8 20:0 12.5 20.7 39.9 126.5 356.4	122,3 108,5 0.0 28,2 0.0 13,7 20,5 39,9 80,5 413,6	155.5 94.3 0.0 30.2 10.0 14.7 20.4 39.9 90.6	173.2 102.5 0.0 32.4 0.0 15.8 20.3 39.9 122.9 507.0	182.8 104.0 34.7 10.0 16.9 20.2 39.9 121.6 530.0	196.3 111.3 0.0 37.1 0.0 18.0 20.2 39.9 92.6 515.3	210.2 [20.0 39.7 0.0 19.3 20.1 39.9 49.0 498.2	245. á 135. 7 0.0 42. 7 0.0 20.8 20.1 39.9 91.1 597.8	268.3 148.0 0.0 46.0 22.3 20.0 39.9 176.4 720.9	326.9 159.1 0.0 49.4 10.0 24.0 19.9 39.9 174.6 803.9	355.1 170.9 0.0 53.2 0.0 25.8 19.8 39.9 132.9 797.6	
	BALANCE CUMULATIVE BALANCE	0.0 0.0	119.2 118.2	94.6 212.8	160.7 373.5	195.7 369.2	-59.3 509.9	-110.0 400.0	141.9 541.9	149.2 691.1	128.9 820.0	144.9 964.9	167.6 1132.5	273.7 1406.2	246.8 1653.0	200.8 1953.0	-35,4 1018,4	-75.4 1742.9	

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GENERAL PLANNING CONSULTANT: TECHNICAL MEMORANDUM 86.5.1 FY 86 CALIBRATION OF THE BUS OPERATING COST MODEL

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#### 1.1 BACKGROUND

Technical Memorandum 5.1.2 (June 1984) described the original specification of an SCRTD bus operating cost model. The purpose of this additional report is to document an update of the June, 1984 calibration of the model to FY 1986. This Technical Memorandum provides the detailed allocation of costs by category, as discussed below, and also describes those items that represent significant departures from the original FY 1984 calibration.

This bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e. a summation of the data for each specific route).

#### 1.2 OVERVIEW OF THE MODEL STRUCTURE

Historically, most bus operating cost models have used level-of-service variables as the basis of the model and have selected those variables primarily from vehicle hours, vehicle miles, passenger boardings, number of pullouts, peak vehicle requirements, and revenue. Statistical analyses of bus operating costs have generally shown high correlations of cost with most of these variables, and conceptual arguments can be made for why various elements of the operating costs should be expected to relate to one or more of these variables. This cost model is based on selecting a set of level-of-service variables that meet several criteria:

- 1) the variables can be output from or derived from standard urban transportation simulation procedures for long-range forecasting
- the variables are sufficient to forecast costs on <u>all line</u> items of the budget
- 3) the variables provide responsiveness to different types of service that may be offered, and to changes in service profile

Criterion 1 leads to a rejection of a variable such as pullouts, which is not readily derived from long-range forecasting techniques. Criterion 2 involves some application of judgment. It seems clear that vehicle hours and vehicle miles alone are unlikely to be adequate; for example, costs such as for bus cleaning are explained better by a fleet size measure than by miles and hours; while fare clerks, timetables, and transit police are explained best by numbers of passengers. Criterion 3 also suggests use of additional variables that would provide some differentiation between services offered throughout the day and peakperiod-only services.

Cost-allocation models of operating costs have invariably taken the relatively simple approach to modeling by assuming that any budget item

or expenditure line item can be set to vary with one level-of-service variable. While it could be argued that a number of line items are probably a function of more than one variable, decisions on how to split the effects on two or more variables and establishing a modeling mechanism that would ensure consistency in the use of such split allocations would lead to a very complex model. To date, it has not been established that an increase in model accuracy and realism would be achieved that would justify the added complexity.

Based on these criteria, it was the judgment of the developers of this model that the following four level-of-service measures be used for the model:

- 1) annual vehicle miles
- 2) annual service hours
- 3) average weekday p.m. peak vehicles
- 4) annual passenger boardings

The model is a fixed/variable cost allocation model, as described in Technical Memorandum 5.1.2, dated June 1984. The basic concept of this approach is to allocate the cost of each element of service to one of the level-of-service measures. The different elements of service are defined as the individual reported line items of expenditure, or groupings of these. It is possible to allocate costs only to the finest level of detail in expenditure or budget reports for District operations.

To calibrate the model, it is necessary first to review the allocations and determine if any service costs should be allocated differently from the original model. Allocation of each cost to one service measure requires judgment. There is always the potential need to reconsider the allocation of certain cost items, and there is the possibility that new line items may be introduced in a subsequent year's budget. Thus, it is advisable to reevaluate the individual line-item cost allocation.

Second, the budget lines and the amounts of service for the calibration year need to be determined. From these, the coefficients are recalculated and the step sizes for stepwise variables are also recalculated. The coefficients are determined by computing, for each line item in the budget or expenditure report, a unit cost equal to the amount of the budget or expenditure line divided by the value of the variable to which the line item is allocated. These individual unit costs are summed for each of the level-of-service variables and define the coefficients. Thus, if Body Shop Wages in Central Maintenance equal \$1,053,000 and these are allocated to Vehicle Miles, with a base value of 107,465,000, the unit cost of Body Shop Wages would be \$0.00980. The unit costs of all other line items allocated to Vehicle Miles.

These two activities comprise the calibration of the model. Once the costs are determined and allocated, the coefficients (unit costs) are computed to produce a model of the form:

\$COST = a1 VMT + a2 VHT + a3 PKBS + a4 PASS

where:

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VMT = Annual Vehicle Miles of Travel VHT = Annual Vehicle Hours of Travel PKBS = Average p.m. weekday Peak Bus Requirement PASS = Annual Passenger Boardings

For FY 1984, the cost allocation model was:

\$COST = 1.063\*VMT + 24.390\*VHT + 55969\*PKBS + 0.0744\*PASS

All unit costs are in dollars in this equation, and are based on FY 1984 dollars (i.e. dollars at about December 1984).

For FY 1986, the recalibrated model is:

\$COST = 0.97\*VMT + 25.82\*VHT + 68088\*PKBS + 0.1162\*PASS

In this case, unit costs are in calendar 1985 dollars.

#### 2. INPUT OATA BASE

#### 2.1 OPERATING COSTS

The bus operating costs in the recalibrated model are based on the current SCRTD organization, the SCRTD departments, and the projected account expenditures for Fiscal Year 1986. The Annual Budget for FY 1986 was used as the basic resource document. In addition, the June 1985 Revenue and Expense Statement and input from the appropriate departments were used to subdivide some items of labor into more detailed components, and to provide estimates of the labor resources and costs for these.

#### 2.2 OPERATING STATISTICS

The projected operating statistics were supplied by SCRTD for the FY 1986 operations. These statistics were used to calibrate the model for the FY 1986 base year. The specific statistics are:

Annual Vehicle Miles:		107,465,000
Annual Vehicle Hours:		7,585,000
Annual Unlinked Passenger	Trips:	424,400,000
Average Weekday P.M. Peak	Vehicles	: 1,987

The vehicle miles and vehicle hours are total miles and hours in this calibration, as compared to revenue miles and revenue hours used in the original FY 1984 calibration and reported in Technical Memorandum 5.2.1. Conversion can be made between the two by using the ratio for FY 1984 of each of revenue miles and hours to total miles and hours, respectively. Based on Section 15 Reports for FY 1984, these ratios are:

Vehicle Miles (Revenue:Total) = 0.8763 Vehicle Hours (Revenue:Total) = 0.9253

#### 2.3 STEP SIZES

Step sizes are defined for those expenditure categories where costs vary with the level-of-service variable by increments, rather than continuously. For example, wages and fringes for operators (drivers) are allocated to vehicle hours. However, each saving of a vehicle hour does not generate a saving of operator costs, given procedures of assigning operators to service and union and contract rules. In the model, it is assumed that a cost saving or an additional cost outlay is involved each time the change amounts to the equivalent of one half-time operator for the year. This change, in FY 1986, is estimated to occur when there is a saving of 853 vehicle hours. If a change in vehicle hours smaller than this amount takes place, no change in operator cost will be obtained. If a change larger than 853 hours annually is projected, a change in cost is assumed to occur. The change is determined by dividing the total projected change in vehicle hours by 853, and truncating the result to an integer value. This integer value represents the number of half-time operators saved by the change in vehicle hours. The cost savings are estimated by multiplying this number by 853 and then multiplying the

product by the unit cost of operator wages and fringes. Two numerical examples should serve to illustrate the process.

With Operator Wages determined to have a FY 1986 unit cost of \$18.40 per vehicle hour, and Operator Fringes of \$4.33:

1. Cost savings from a reduction of 500 vehicle hours annually:

This value falls below the step size of 853 hours and therefore is assumed to provide no savings in operator wages and fringes.

2. Cost savings from a reduction of 10,000 vehicle hours annually:

The value of 10,000 is divided by 853, yielding the result of 11.72. This is truncated to an integer value of 11, indicating that 11 half-time equivalent operators can be saved by this reduction. Further, 11 half-time operators work 9,383 vehicle hours annually, and this is the number of vehicle hours for which there will be a cost saving. Total cost savings from operator wages and fringes are obtained by multiplying \$18.40 and \$4.33 by 9,383, for a savings estimate of \$1,726,472 in wages and \$40,628.39 in fringes. Note that the further reduction of 617 (10,000 - 9,383) hours produces no additional cost savings on operators.

Step sizes are based on the primary categories of 1) an employee, 2) an operating division, and 3) a bus facility. Table 1 summarizes the stepsize differences between FY 1984 and FY 1986 for these primary categories.

Because the number of employees at the District varies from Department to Department and from category to category, the step size (in miles, hours, buses, or passengers) also varies from Department to Department and from category to category. It can be seen that the size of an operating division decreased from FY 1984 to FY 1986, with the average number of peak buses per operating division decreasing from 159 to 153. Similarly, the average size of a maintenance operating division decreased from 172 peak buses in FY 1984 to 153 in FY 1986.

Apart from these rather clear, recurrent step sizes, most of the remainder relate to employees in the Department or category, and show fluctuations between FY 1984 and FY 1986, in response to changes in the numbers of employees between FY 1984 actual employment and FY 1986 projected employment. In addition, there are changes in budgeting and organization that show up most strongly in Central Maintenance, where six line items from FY 1984 do not appear in the FY 1986 budget, while ten new line items appear in FY 1986. There is also a consistent change throughout the FY 1986 budgeting that Utilities are no longer separated from Miscellaneous Expenses, as they were in FY 1984.

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COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	F Y 86
Miles	Maintenance Oper. Div Inspe	ctors 1,251,605	2,149,300
	Maintenance Oper. Div Road	Failure N/I	17,910,833
	Maintenance Oper. Div Runni	ng Rep. 154,169	178,810
	Central Maintenance - Body S		3,358,281
		Frame 1,463,415	N/I
	· · · · · · · · · · · · · · · · · · ·	er Head N/I	5,656,053
	Central Maintenance - Engine		3,980,185
		Parts N/I	13,433,125
		Rebuild 2,439,026	N/I
	Central Maintenance - Engine	Teardown 9,512,200	13,433,125
		ical Units N/I	3,160,735
	Central Maintenance - Electr	ical Shop 2,972,563	N/I
	Central Maintenance - Frame	Shop N/I	8,266,538
	Central Maintenance - Machin	e Shop 7,317,077	7,676,071
		ical Units N/I	2,904,459
		Repair 31,707,333	N/I
		Shop 2,320,049	5,656,053
	Central Maintenance - Radiat	or Shop 11,890,250	Ň/Í
	Central Maintenance - Runnin	g Repairs 3,280,069	2,755,513
	Central Maintenance - Sheet	Metal Shop7,926,833	7,676,071
	Central Maintenance ~ Sign S		21,493,000
		Unit Shop 3,523,037	N/I
		s Shop N/I	9,769,545
		Unit Room N/I	26,866,250
		ission 3,280,069	3,582,167
		g Shop 6,794,429	4,477,708
		tery Shop 6,341,467	8,266,538
	central na meenance - ophors	cery shop 0,041,407	0,200,000
	Non-Departmental - Workma	n's Comp. 59,451	69,332
		ions for ) 39,634 @	
		red PD ) \$634	\$2,531
		es for PD 39,634 @	
	na seleta dun de la seleta de la seleta de la seleta de la seleta de la seleta de la seleta de la seleta de la	\$456	\$524
Hours	Transportation Oper. Div. ~ 0	perators 777	853
	Transportation Services - Str		421,400
	Transportation Instruction - I		474,000
	Maintenance Oper. Div Non-re	venūė Wages 264,889	216,714

## TABLE 1 (continued)

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## COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

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VARIABLE	STEP BASIS	FY84	FY86
Hours (con	tinued)		
	Transit Police - Transportation Service	420,706	446,176
	Scheduling Dept Schedule Maker Wages	5 <u>9</u> 6,000	329,783
	Accounting & Fiscal - Payroll Clerk	447,000	632,083
	Non-Departmentäl - Workman's Comp.	777	853
Peak Buses	Transportation Oper. Div Divisional	Wages 159	153
	Transportation Oper. Div Services	159	153
	Transportation Oper. Div Materials &	Supp. 159	153
	Transportation Oper. Div Utilities	159	N/I
	Transportation Oper. Div Misc. Expen		153
	Transportation Services - Radio Dispa	tchers 159	153
	Transportation Services - Utilities	159	N/I
	Transportation Instruction- Divisional	Wages 172	N/I
	Maintenance Oper. Div Service Deep C	lean 32	33
	Maintenance Oper. Div Servicing	5.6	5.8
	Maintenance Oper. Div Servicing Supe	rvisor 188 👘	153
	Maintenance Oper. Div Wheelchair Mai	nt. 34.4	33.1
	Maintenance Oper. Div Farebox Mainten	nance 206	60.2
	Maintenance Oper. Div Campaigns & Re	serve 60.7	N/I
	Maintenance Oper. Div Supervision &	Admin. 172	153
	Maintenance Oper. Div. ~ Special Projec	ts N/I	110
	Maintenance Oper. Div Training & Oth		153
	Maintenance Oner, Div Services for D	iv. 172	153
	Maintenance Oper. Div Tools & Exp. Ed	ouin. 172 Di	rect by Mile
	Maintenance Oper. Div Other Mat. & S	upp. 172	N/I
	Maintenance Oper. Div Utilities	172	N/I
	Maintenance Oper. Div Miscellaneous	Exp. 172	153
	Central Maintenance - Service Wages	121	117
	Central Maintenance - Central Shop Super		166
	Facilities Maintenance - Electrical Main	nt. 147	142
	Facilities Maintenance - Property Maint		1.42
	Facilities Maintenance - Electronic Main		47
	Facilities Maintenance - Materials & Su	pplies 147	142

## TABLE 1 (continued)

## COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FŸ86
Peak Buses	(continued) Maintenance General - Instruction	188	142
	Telecommunications - Electronic Main	itenance 56	N/I
	Scheduling - Checkers	40.	5 31.5
	Contract Procurement - Stores	159	153
Passengers	Transit Police - Passenger Security	13,688,235	12,482,353
	Marketing & Comm Ticket Clerks	21,154,545	19,290,909
	Customer Relations - Telephone Clerks	4,951,064	4,715,555
	Accounting & Fiscal - Cash Clerks	16,621,429	12,860,606
	Nondepartmental - Provisions for Uninsured PL Nondepartmental - Expenses for PL	101,174 @ \$4,916 101,174 @ \$456	@ \$14,481

#### 2.4 DIRECTLY-VARIABLE ITEMS

Directly-variable items are much simpler than stepwise variable items. These are expenditures that can be assumed to vary with every increment or decrement of the level-of-service variable to which they are allocated. For example, fuel is allocated to vehicle miles as a directly-variable item, with a unit cost of \$0.2521 in FY 1986. By allocating fuel as a directly-variable item, it is assumed that each change of a vehicle mile will produce a cost change of \$0.2521. Thus, a decrease of 1,000 vehicle miles will save \$252.10, and an increase of 10,000 vehicle miles will increase costs by \$2,521.

The model contains very few line items that are assumed to vary directly with one of the variables used in the model. Table 2 shows the line items that are assumed to vary directly for each of FY 1984 and FY 1986. The differences between FY 1984 and FY 1986 are minor: under Maintenance Operating Divisions, the Expendable Equipment for Revenue Vehicles is not split into component entries in FY 1986, but is in FY 1984; and Telecommunications equipment on revenue vehicles has moved from the Telecommunications Department to Facilities Maintenance between FY 1984 and FY 1986. Essentially, these changes have no net effect on the allocation of costs to direct variables.

TABLE 2	
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COMPARISON OF DIRECTLY VARIABLE ITEMS BETWEEN FY84 AND FY86

VARIAB	LÉ LINE ITEM	FY84	F Y86
 Miles	Maintenance Operating Div Expendable Equipment		
	for Revenue Vehicles	No	Yes
	Maintenance Operating Div Lubricants (Rev. Veh.)	Yes	No
	Maintenance Operating Div Tires & Tubes (Rev Veh)	Yes	No
	Maintenance Operating Div Bus Parts (Rev. Veh.)	Ŷes	Ňo
	Nondepartmental Expenses - Fuel	Yes	Yes
	Nondepartmental Expenses - Fuel & Lube Taxes (Rev.)	Yes	Yes
Hours		None	None
Peak B	uses Telecommunications - Mat.& Supp.(Revenue Equip.)	Yes	No
	Facilities Maint Mat. & Supplies (Radio)	No	Yes
Passen	gers Print Shop - Timetables	Ýes	Yes

2.5 FIXED ITEMS

All remaining budget line items are considered to be fixed costs, and these are allocated, for fully-allocated costing at the line level, to one of the four variables used by the model. Unit costs are computed, as for the other expenditure items, for each line item that is defined as a fixed cost. If a change in service is examined, by definition there will be no changes to total fixed costs. Therefore, the unit cost of each fixed-cost item is recomputed, to yield the same total fixed cost for before the change in service.

Thus, for example, Wages for the General Manager's office are assigned as a fixed cost to peak buses, with a FY 1986 unit cost of \$179.668. If a service change is examined that will reduce peak buses from the FY 1986 value of 1987 (buses for the average p.m. weekday peak) to 1968, the unit cost for Wages for the General Manager's office will increase to \$181.402.

Rather than provide a detailed listing of all fixed-cost items for each year, Table 3 documents the differences between FY 1984 and FY 1986 in the make-up of line items and their allocation for the purposes of line costing. The general change, mentioned in Section 2.3 above, of combining Utilities into Miscellaneous Expenses or charging them under Nondepartmental Expenses in FY 1986 instead of keeping as a separate line item by department as in FY 1984, is not included in this table, because it happens consistently in all departments and generally represents no net change in the amounts allocated.

Several of the entries in Table 3 represent minor budget changes between FY 1984 and FY 1986. For example, inclusion of a "Services" or a "Miscellaneous Expenses" line item in several departments in one year and not the other indicates merely a zero budget line on that item for the year where it is omitted.

Table 3 also shows evidence of some reorganization within the SCRTD, but without any change in the allocation variable for the fixed costs. For example, the Human Relations Department has changed to an Equal Employment Opportunity Department and a DBE/WBE Department. Telecommunications has been absorbed into Facilities Engineering, and new departments for Transit Systems Development, Risk Management, and Contract Compliance have been added.

There are also a few additional changes in detail in the allocations used that do not affect the underlying process. Several departments allocated to fixed costs have detailed itemized costs in the FY 1984 expenditures reports, using categories of Services, Materials and Supplies, and Miscellaneous Expenses. In the FY 1986 budget materials, treatment of these has been simplified to a category of "Non-Labor Expenses."

#### TABLE 3

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DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM	ALLOCATION Fy84	VARIABLE FY86
Stops & Zones - Miscellaneous Expenses	-	Peak Buses
Transportation Instruction - Services	Peak Buses	-
Maintenance Operating - Servicing Fringes Fixed	Peak Büses	*
Central Maintenance - Training and Other Fringes	Peak Buses	*
Central Maintenance - Services	Peak Buses	*
Central Maintenance - Miscellaneous Expenses	Peak Búses	*
Telecommunications - Administration Wages	Peak Buses	#
Telecommunications - Fringes	Peak Buses	# # #
Telecommunications - Services	Peak Buses	#
Telecommunications - Materials & Supplies	Peak Búses	
Telecommunications - Utilities & Misc. Exp.	Peak Buses	#
A.G.M. för Planning & Comm Services	Peak Buses	-
Human Relations - Wages	Peak Buses	-
Human Relations - Fringes	Peak Buses	-
Human Relations - Services	Peak Buses	-
Human Relations - Materials & Supplies	Peak Buses	-
luman Relations - Utilities & Misc. Exp.	Peak Buses	-
Equal Employment Opp Wages	-	Peak Buses
Equal Employment Opp Fringes	-	Peak Buses
Equal Employment Opp Materials and Supplies	-	Peak Buses
Equal Employment Opp Utilities & Misc. Exp.	-	Peak Buses
Contract Compliance - Wages	-	Peak Buses
Contract Compliance - Fringes	-	Peak Buses
Contract Compliance - Materials and Supplies	-	Peak Buses
Contract Compliance - Utilities & Misc. Exp.	-	Peak Buses
DBE/WBE ~ Wages	-	Peak Buses
DBE/WBE - Fringes	-	Peak Buses
DBE/WBE - Materials and Supplies	<b>÷</b>	Peak Buses
DBE/WBE - Utilities & Misc. Exp.	-	Peak Buses

\*

Not Separated from nondepartmental expenses in FY 1986. Department reassigned under Facilities Maintenance in FY 1986. #

### TABLE 3 (continued)

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DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM		LOCAT Fy84	ION VARI/	ABLE Fy86
	tem Dev Materials and Supplies tem Dev Utilities & Misc. Exp.			-
AGM for Management	- Services	-	Peak	Buses
Employee Activities	- Fringes	*	Peak	Buses
Transit System Dev. Transit System Dev. Transit System Dev. Transit System Dev.			Peak Peak	Buses Buses Buses Buses
Risk Management Risk Management Risk Management Risk Management	<ul> <li>Wages</li> <li>Fringes</li> <li>Materials and Supplies</li> <li>Utilities &amp; Misc. Exp.</li> </ul>		Peak Peak	Buses Buses Búses Buses

\*

Not Separated from nondepartmental expenses in FY 1986. Department reassigned under Facilities Maintenance in FY 1986. #

#### 3. FY 1986 CALIBRATION OF COST ALLOCATION

#### 3.1 ALLOCATION OF COSTS

Table 4 shows the complete itemization of the FY 1986 budget items and their allocation to the four variables and three types of allocation relationship. This table may be compared directly with Table 1 in Technical Memorandum 5.1.2 (June, 1984) to confirm the various differences pointed out in the foregoing sections. The Table shows the allocation of a Projected FY 1986 budget of \$484,174,000, compared to the earlier allocation of an Estimated FY 1984 budget of \$425,697,000.

It is important to note that the FY 1986 Cost Allocation is based on a projected (not actual) budget and for a slightly reorganized structure for SCRTD. The FY 1984 cost allocation was based on actual expenditures for three of the four quarters in FY 1984, plus estimates of the remaining expenditures in FY 1984. Similarly, the hours, miles, and passengers are annual totals for FY 1986 that are projected, while for FY 1984 they were actuals for three quarters and estimates for the last quarter. Peak buses are based on weekday p.m. peak actuals for the first 9 months of FY 1984 and are projected for FY 1986.

Applying the FY 1984 coefficients (adjusted from revenue hours and miles to total miles and hours), the projected FY 1986 cost in 1984 dollars would be \$414,137,000.

#### 3.2 INFLATION EFFECTS

The change in CPI for the Los Angeles-Long Beach area between mid FY 1984 (December 1983) and the end of FY 1986 (which is the time for which the budget is assumed to be correct) in June 1986 is 11.285%. Applying this change to the annual expenditure for FY 1984 would project FY 1986 costs of \$460,873,000. This percentage change provides a budget figure that requires an additional adjustment of 5.0558% to match the projections made for FY 1986. Applying the total of these two adjustments to the unit costs from the FY 1984 model produces the estimates shown in Table 5. As expected, the annual costs would then be projected as \$484,152,000, which is (within rounding error) the result that should be achieved.

Of much more interest is to observe that the inflation adjustment provides coefficients for miles and hours that are marginally higher than the calibrated values for FY 1986, while the other two coefficients are underestimated for FY 1986. No correction has been made in this process for changes to the miles, hours, buses, and passengers variables that would require spreading fixed costs over a smaller base and would also adjust step sizes. The results of such adjustments are reported in a second Technical Memorandum, number 86.5.2 (November, 1985).

#### Table 4 BUS COST ALLOCATION

Ì

<b>.</b>	Estimated	Re	aource A	llocated				
Department and Expense Item	Estimated FY 84 Cost (\$000)	Hours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
<b>_</b>								
Board of Directors			·					
Wages	0			x		X		
Fringes	0 73			X X	,	X		
Services Materials and Supplies	,, 5			â		х Х		
Miscellaneous Expenses	67			x		X X		
General Manager								
Wages	357			x		x		
Fringes	0			X		X		
Services Materials and Supplies	211 1			X		× X		
Miscellaneoùs Expenses	41			_X _X		, X		
Office of District Secrets	<u>IX</u>	•						
Wages	274			X		x		
Pringes	,O			X		X		
Services	55			X		x		
Materials and Supplies Miscellaneous Expenses	9 49			X X		x x		
Legal								
Wages	392			x		x		
Fringes	4			X		X		
Services	330			X		X.		
Materials and Supplies Miscellaneous Expenses	5 11			X X		X X		
Assistant General Manager for Operations	·							
	317			x		~		
Wages Fringes	2			x		X X	•	
Services	õ			x		x		
Materials and Supplies	7			X X		X		
Miscellaneous Expenses	7			×		x		
Transportation Operating Divisions								
Wages	7,899			x			x	By 153 Peak Vehicles
Fringes	1,731			x			X	By 153 Peak Vehicles
Operator Wages	139,552	X X					x	By 853 Revenue Hours
Operator Fringes Services	32,806 1	•		x			X X	By 853 Revenue Hours By 153 Peak Vehicles
Materials and Supplies	97			X			X	By 153 Peak Vehicles
Miscellaneous Expenses	14			X			X	By 153 Peak Vehicles
Stops and Zones								
Wages	738			x		X		
Fringes Services	3			X X		X	-	
Materials and Supplies	103			x		x		
Miscellaneous Expenses	1			x		x		
Operations Control					•			
and Services								
Wages	1,864			x		x		
Wages	2,523	XX				x	x	By 421,400 Hours of
Wages								Service
Fringes	143	x					x	By 421,400 Hours of Service
Wages	938			x		x		
Wages	469			X			x	By 153 Peak Vehicles
Fringes	104 25			X X		~	. X	By 153 Peak Vehicles
Pringes	<u> </u>			X		X		

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Table 4 BUS COST ALLOCATION (continued)

Expanse Tem(\$600)Bours HileBasesgenFixedVariableIf VariableFirstCorrections Control and Service Coart O1XXXXService Coart O2XXXMascel Lancens Expense1XXXPrimoportation InstructionXXXDept14.00 Bours of ServiceWages768XXXDept14.00 Bours of ServicePrimoportation Instruction3XXXPrimoportation Common5XXXPrimoportation Common5XXXWaterials and Supplies5XXXPrimoportation Common5XXXWaterials and Supplies509XXXPrimoportation Common100XXXWaterials and Supplies509XXXPrimoportation Common150XXXServicing Nege Class Finges2,155XXY 5,8 New VehiclesServicing Supprise2,155XXY 5,16 New VehiclesServicing Supprise2,165XXY 9,17 New VehiclesServicing Supprise2,165XXY 9,17 New VehiclesServicing Supprise2,165XXY 9,17 New VehiclesServicing Supprise2,165XXY 9,17 New VehiclesServicing Supprise2,165XXY 9,17 New	Press atmosf.	Estimated	<u> </u>	esoúrce l	llocated				
Bart/con         Control           Services         1         X         X           Miscalineous Begenses         3         X         X           Transportation Instruction         X         X         X           Wages         768         X         X         X           Pringes         128         X         X         By 474,000 Hours of Service           Pringes         128         X         X         By 474,000 Hours of Service           Pringes         128         X         X         By 474,000 Hours of Service           Pringes         128         X         X         Bervice           Vision         Service         Service         Service           Vision         Service         X         X           Vision         Service         Service         Service           Servicing Deep Clean Names         1,538         X         X         By 31 Peak Vehicles           Servicing Service         Servicing Service         Servicing Service         Servicing Service         Servicing Service           Servicing Service         Service         X         Service         Service         Service           Servicing Service         Service	Bepartment Bepense Item	FY 84 Cost (\$000)	Болов	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
Neterials and Supples 2 X X X Transportation Instruction Nages 746 X X Supples 746 X X Nages 746 X X Pringes 128 X X By 474,000 Hours of Service 84 X X Hisollaneous Expenses 6 X X Hisollaneous Expenses 6 X X Hisollaneous Expenses 6 X X Service 84 X X Nages 9575 X X X Service 9575 X X X Service 9575 X X X Materials and Supples 100 X X Materials and Supples 975 X X X Materials and Supples 975 X X X Materials and Supples 975 X X X Materials and Supples 975 X X X Materials and Supples 975 X X X Materials and Supples 975 X X X Y Materials and Supples 976 X X Y Materials and Supples 977 X X Y Materials and Supples 977 X X Y Materials and Supples 977 X X Y Materials and Supples 977 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials and Supples 1,578 X X Y Materials A X Y					•	-		-	
Transportation Instruction Nages 748 X X S By 474,000 Hours of Service Survey Service Servic									
Nages         746         X         X         X         By 474,00 Hours of Barvice           Pringes         128         X         X         By 474,00 Hours of Barvice           Pringes         34         X         X         By 474,00 Hours of Barvice           Meterials and Supplies         34         X         X           Traingoristics General         X         X         X           Meses         575         X         X         X           Pringes         11         X         X         X           Mages         575         X         X         X           Mages         11         X         X         X           Mages         121         X         X         X           Matriance Operating         133         X         X         By 33 Feak Vehicles           Servicing Deep Clean Pringes         135         X         X         By 131 Feak Vehicles           Servicing Supervisor Wages         1,838         X         X         By 131 Feak Vehicles           Servicing Supervisor Wages         1,864         X         By 131 Feak Vehicles           Servicing Supervisor Wages         1,864         X         By 131 Feak Vehicles	Miscellaneous Expenses	3			x		x		
VagesSecXXBy 474,000 Hours of ServicePringes128XXBy 474,000 Hours of ServiceMaterials and Supples34XXMacellaneous Expanses5XXTransportation GreenXXXWages575XXPringes11XXMaterials and Supples11XXMaterials and Supples11XXMaterials and Supples100XXMaterials and Supples100XXServicing Deep Clean Finges100XXServicing Servicing S					÷		2.		
Pringes     8     X     X       Materials and Supplies     34     X     X       Miscellences. Expenses     6     X     X       Transportation General     ************************************		14.5.5	x		x		×	x	
<pre>Metariais and Supplies 34 X X Miscellences Expenses 6 X X Transportation General Wear Lineous Expenses 6 X X Transport time General Wear Lineous Expenses 11 X X X Berrices and Supplies 509 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X Miscellences Expenses 180 X X By 33 Peak Vehicles Servicing Mages 509 X X X By 5.8 Peak Vehicles Servicing Supplies 775 X X By 5.8 Peak Vehicles Servicing Supprises 775 X X By 5.8 Peak Vehicles Servicing Supprises 775 X X By 5.8 Peak Vehicles Servicing Supprises 775 X X By 5.8 Peak Vehicles Servicing Supprises 775 X X By 5.8 Peak Vehicles Servicing Supprises 775 X X By 5.8 Peak Vehicles Servicing Supervisor Finges 100 X X By 153 Peak Vehicles Servicing Supervisor Finges 100 X X By 153 Peak Vehicles Servicing Supervisor Finges 100 X X By 153 Peak Vehicles Misclentar Maintenance Mages 1,674 X By 151 Peak Vehicles Misclentar Maintenance Finges 100 X X By 151 Peak Vehicles Misclentar Maintenance Finges 100 X X By 151 Peak Vehicles Misclentar Maintenance Finges 100 X X By 216.714 Hours How Finges 100 X X By 216.714 Hours How Finges 100 X X By 216.714 Hours How Finges 100 X X By 153 Peak Vehicles Misclentar Mages 1,665 X By 153 Peak Vehicles Misclentar Mages 1,665 X By 153 Peak Vehicles Misclentar Mages 1,665 X By 153 Peak Vehicles Misclentar Mages 1,665 X By 153 Peak Vehicles Description of Adminis- tracion Finges 1,316 X By 153 Peak Vehicles Servicing Mages 1,223 X By 153 Peak Vehicles Servicing Mages 1,223 X By 153 Peak Vehicles Servicing Mages 1,223 X By 153 Peak Vehicles Central Maintenance Services for Divisions 225 X By 133 Peak Vehicles Servicing Mages 1,223 X By 133 Peak Vehicles Central Maintenance Expended Serves 23 X By 133 Peak Vehicles Central Maintenance Expended Serves 23 X By 133 Peak Vehicles Divisions Expense 123 X By 133 Peak Vehicles Central Maintenance Expended Serves 24 X By 133 Peak Vehicles Divisions By 153 Peak Vehicles</pre>	Fringes		x					x	
Hiscellaneous Expenses 6 x X Transportation General Weges 575 X X X Pringes 11 X X X Meaning Expenses 110 X X Miscellaneous Expenses 180 X X Servicing Deep Clean Pringes 1750 X X By 33 Peak Vehicles Servicing Deep Clean Pringes 1750 X X By 33 Peak Vehicles Servicing Supervise 0, 1553 X X By 33 Peak Vehicles Servicing Supervise 0, 1553 X X By 33 Peak Vehicles Servicing Supervise 0, 1553 X X By 33 Peak Vehicles Servicing Supervise 0, 1573 X X By 33 Peak Vehicles Servicing Supervise 0, 1573 X X By 33 Peak Vehicles Servicing Supervise 0, 1573 X X By 33 Peak Vehicles Servicing Supervise 0, 1574 X X By 33 Peak Vehicles Servicing Supervise 0, 1574 X X By 33 Peak Vehicles Servicing Supervise 0, 1574 X X By 33 Peak Vehicles Servicing Supervise 0, 1564 X By 216,714 Boars Non-Revenue Fringes 2,24 X By 216,714 Boars Non-Revenue Fringes 1,916 X By 26,714 Boars Non-Revenue Fringes 1,9173 X By 26,714 Boars Non-Revenue Fringes 1,916 X By 90,7190 Hiles Supervision and Adminia- tration Meges 6,587 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,917 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,917 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,917 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,927 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,927 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,927 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 1,927 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 2,33 X By 133 Peak Vehicles Supervision and Adminia- tration Meges 2,275,513 Miles Supervision and Adminia- tration Meges 1,223 X By 133 Peak Vehicles Supervision By 135 Peak Vehicles Supervision By 135 Peak Vehicles Supervision By 135 Peak Vehicles Supervision By 135 Peak Vehicles Supervision By 145 Pil	•								
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Tringes       11       X       X         Services       11       X       X         Materials and Supples       569       X       X         Materials and Supples       160       X       X         Maintenance Operating       Intrinstance       X       X         Servicing Deep Clean Wages       1,538       X       X       By 31 Peak Vehicles         Servicing Deep Clean Fringes       775       X       X       By 53 Peak Vehicles         Servicing Tington Wages       2,755       X       X       By 53 Peak Vehicles         Servicing Tington Wages       2,765       X       X       By 53 Peak Vehicles         Servicing Supervision Fringes       100       X       X       By 153 Peak Vehicles         Servicing Negres       970       X       X       By 31 Peak Vehicles         Servicing Negres       970       X       X       By 216/14 Hours         Servicing Neges       1,066       X       X       By 216/14 Hours         Servicing Neges       1,066       X       X       By 216/14 Hours         Servicing Neges       1,651       X       X       By 17.9.00 Mile         Non-Revenue Wages       1,665       X </td <td>Transportation General</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Transportation General								
Services     11     X     X       Mitscellareous Expenses     180     X     X       Mitscellareous Expenses     180     X     X       Mitscellareous Expenses     180     X     X       Servicing Deep Clean Fringes     175     X     X       Servicing Mages     8,789     X     X       Servicing Mages     2,155     X     X       Servicing Supervisor Fringes     2,155     X     X       Servicing Supervisor Fringes     100     X     X       Servicing Supervisor Fringes     100     X     X       Servicing Supervisor Fringes     100     X     X       Mbeelchair Maintenance Mages     1,974     X     X       Mori-Revenue Fringes     120     X     X       Parabox Maintenance Mages     1,966     X     X       Parabox Maintenance Pringes     1,464     X     X       Parabox Maintenance Pringes     1,464     X     X       Parabox Maintenance Pringes     1,364     X     Y       Parabox Maintenance Pringes     1,316     X     Y       Parabox Maintenance Pringes     1,316     X     Y       Supprivision and Adminis-     X     Y     Y       tration Mage	Wages	575	x				x		
Materials and Supplies     509     X     X       Mainternance Operating Intriations     180     X     X       Servicing Deep Clean Wages     1,538     X     X       Servicing Deep Clean Fringes     375     X     By 33 Feak Vehicles       Servicing Deep Clean Fringes     775     X     By 35 Feak Vehicles       Servicing Tinges or Wages     2,755     X     X       Servicing Tinges or Wages     2,765     X     X       Servicing Tinges or Wages     1,74     X     By 153 Feak Vehicles       Servicing Tinges or Wages     100     X     X       Servicing Supervisor Fringes     100     X     X       Non-Revenue Wages     970     X     X     By 31 Feak Vehicles       Non-Revenue Wages     970     X     X     By 216/14 Bours       Parebox Maintenance Wages     1,066     X     X     By 216/14 Bours       Parebox Maintenance Pringes     240     X     X     By 216/14 Bours       Parebox Maintenance Pringes     1,665     X     X     By 178/10 Miles       Summing Repair Neges     19,77     X     X     By 178/10 Miles       Suming Repair Neges     19,77     X     X     By 110 Peak Vehicles       Supervision and Adminis- <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>									
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Divisions           Servicing Deep Clean Wages         1,538         X         X         By 33 Peak Vehicles           Servicing Wages         8,789         X         X         By 58 Peak Vehicles           Servicing Supervisor Wages         2,155         X         X         By 58 Peak Vehicles           Servicing Supervisor Finges         10         X         X         By 53 Peak Vehicles           Servicing Supervisor Finges         10         X         X         By 33 Peak Vehicles           Meelchair Maintenance Finges         1,974         X         X         By 33.1 Peak Vehicles           Non-Revenue Wages         970         X         X         By 216,714 Hours           Non-Revenue Wages         1,966         X         X         By 216,714 Hours           Farebox Maintenance Wages         1,066         X         X         By 216,714 Hours           Farebox Maintenance Wages         1,645         X         X         By 2149,300 Miles           Running Repair Fringes         1,44         X         By 179,810 Miles           Supervision and Adminis-         X         By 179,810 Miles         X           Supervision and Adminis-         X         By 17,910,931 Miles           Supervision and Adminis- <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td>									•
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Service Wages 436 X Service Fringes 108 X Central Shop Supervision Wages 471 X Central Shop Supervision Fringes 103 X Central Shop Administration Wages 601 X X Maintenance General Department Instruction Wages 580 X Instruction Fringes 122 X Wages 1,715 X X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Wages 1,546 X Property Maintenance Wages 1,546 X Property Maintenance Wages 342 X	X By 117 Peak Vehic X By 117 Peak Vehic X By 166 Peak Vehic X By 166 Peak Vehic	cles cles cles cles
Service Fringes 108 X Central Shop Supervision Wages 471 X Central Shop Supervision Fringes 103 X Central Shop Administration X Wages 601 X X X Maintenance General Department Instruction Wages 580 X Instruction Fringes 122 X Wages 1,715 X X X Non-Labor Expenses 371 X X Regulament Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Pacilities Maintenance Department Electrical Maintenance Rages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Wages 1,546 X Property Maintenance Wages 342 X	X By 117 Peak Vehic X By 166 Peak Vehic X By 166 Peak Vehic	cles cles cles
Central Shop Supervision Wages 471 X Central Shop Supervision Fringes 103 X Central Shop Administration 601 X X Wages 601 X X Maintenance General Department Instruction Wages 580 X Instruction Fringes 122 X Wages 1,715 X X X Wages 1,715 X X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Wages 799 X Electrical Maintenance Wages 794 X Property Maintenance Fringes 174 X Property Maintenance Fringes 342 X	X By 166 Peak Vehic X By 166 Peak Vehic	cles cles
Central Shop Administration     601     X     X       Maintenance General Department     Instruction Wages     580     X       Instruction Fringes     122     X       Wages     1,715     X     X       Wages     1,715     X     X       Non-Labor Expenses     371     X     X       Equipment Engineering Department     X     X       Wages     618     X     X       Pacilities Maintenance Department     X     X       Electrical Maintenance Wages     799     X       Electrical Maintenance Wages     1,546     X       Property Maintenance Fringes     1,546     X       Property Maintenance Fringes     342     X	X By 166 Peak Vehic	<u>,</u> cleș
Wages     601     X     X       Maintenance General Department     Instruction Wages     580     X       Instruction Wages     580     X       Instruction Fringes     122     X       Wages     1,715     X     X       Wages     1,715     X     X       Non-Labor Expenses     371     X     X       Equipment Engineering Department     X     X       Wages     618     X     X       Pacilities Maintenance Department     X     X       Electrical Maintenance Wages     799     X       Electrical Maintenance Wages     1,546     X       Property Maintenance Wages     1,546     X       Property Maintenance Fringes     342     X	X By 142 Dask Union	
Maintenance General Department Instruction Wages 580 X Instruction Fringes 122 X Wages 1,715 X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Rop-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Fringes 1,546 X Property Maintenance Fringes 342 X	X By 142 Dask United	
Instruction Wages 580 X Instruction Fringes 122 X Wages 1,715 X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Fringes 1,546 X Property Maintenance Fringes 342 X	X By 147 Bask Vahin	
Instruction Fringes 122 X Wages 1,715 X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Fringes 174 X Property Maintenance Fringes 1,546 X Property Maintenance Fringes 342 X	X By 142 Pask Vehici	- • -
Instruction Fringes 122 X Wages 1,715 X X Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Rages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Fringes 1,546 X Property Maintenance Fringes 342 X	X By 147 Post Vohia	
Wages     1,715     X     X       Non-Labor Expenses     371     X     X       Equipment Engineering Department     X     X       Wages     618     X     X       Non-Labor Expenses     89     X     X       Pacilities Maintenance Department     X     X       Electrical Maintenance Wages     799     X       Electrical Maintenance Wages     1,546     X       Property Maintenance Fringes     342     X		
Non-Labor Expenses 371 X X Equipment Engineering Department Wages 618 X X Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Wages 1,546 X Property Maintenance Wages 1,546 X Property Maintenance Fringes 342 X	X By 142 Peak Vehci:	iles
Wages     618     X     X       Non-Labor Expenses     89     X     X       Facilities Maintenance Department     X     X       Electrical Maintenance Wages     799     X       Froperty Maintenance Wages     1,546     X       Property Maintenance Fringes     342     X		
Non-Labor Expenses 89 X X Facilities Maintenance Department Electrical Maintenance Wages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Wages 1,546 X Property Maintenance Fringes 342 X		
Facilities Maintenance Department         Electrical Maintenance Wages       799       X         Electrical Maintenance Fringes       174       X         Property Maintenance Wages       1,546       X         Property Maintenance Fringes       342       X		
Electrical Maintenance Wages 799 X Electrical Maintenance Fringes 174 X Property Maintenance Wages 1,546 X Property Maintenance Fringes 342 X		
Electrical Maintenance Fringes 174 X Property Maintenance Wages 1,546 X Property Maintenance Fringes 342 X		
Property Maintenance Wages 1,546 X Property Maintenance Fringes 342 X	X By 142 Peak Vehic	cles
Property Maintenance Fringes 342 X	X By 142 Peak Vehic	
	X By 142 Peak Vehic:	cles
LIECTIONIC MAINTENANCE WAGES 1,302 X	X By 142 Peak Vehic:	
	X By 47 Peak Vehicle	
Electronic Maintenance Fringes 306 X	X By 47 Peak Vehicle	les
Administration and Super- vision Wages 3,056 X X X		
Training and Fringe Benefits     74     X     X       Services     58     X     X		
Materials and Supplies - Radio 150 X	X Directly By Peak V	Reality - 1
Materials and Supplies -	X Directly By Peak	venic
Facilities 1,000 X	X By 142 Peak Vehic	-1
Materials and Supplies 730 X X	X By 142 Peak Vehic	cres
Miscellaneous Expenses 61 X X		
Transit Police Department		
Police Wages 941 X	X By 12,482,353 Pas	ssengei
Police Fringes 231 X	X By 12,482,353 Pass	
Police Wages 471 X	X By 446,176 Hours	
Police Fringes 115 X		
Administrative Wages 2,740 X X	X By 446, 176 Hours	
Fringes 71 X X	• • • • • • • • • • • • • • • • • • • •	
Services 228 X X	• • • • • • • • • • • • • • • • • • • •	
Materials and Supplies 52 X X Miscellaneous Expenses 36 X X	• • • • • • • • • • • • • • • • • • • •	

**16** .

	Estimated	Do		llocated	to			
Department	FY 84 Cost	-		Peak	- Passen-	-		
Expense Item	(\$000)	Bours	Miles	Buses	gers	Pixed	Variable	If Variable How?
Scheduling Department								
Schedule Maker Wages	786	x					x	By 329,783 Hours
Schedule Maker Fringes	181	x					X	By 329,783 Hours
Checker Wages Checker Fringes	2,207			X X			X	By 31.5 Peak Vehicles
Wages	483 1,129			Ŷ		x	~	By 31.5 Peak Vehicles
Fringes	3			x		x		
Services	45			x		X X		-
Materials and Supplies Miscellaneous Expenses	43 61			X X		X X		
Assistant General Manager								
for Planning and Commu- nications								
Wages	111			x		X		
Fringes	1			x		Ŷ		
Materials and Supplies Miscellaneous Expenses	1 2			X		X		
Planning						·		•
Wages	2,400			x		x		
Fringes	6			X	•	X X		
Services	322			X		X		
Materials and Supplies Miscellaneous Expenses	68			x x		X X		
	35			Χ.		x		
Marketing and Communication	_							
Ticket Clerk Wages	556				X		X	By 19,290,909 Passenge
Ticket Clerk Fringes Wages	125 1,468				Ť.	x	x	By 19,290,909 Passenge
Fringes	16				X X X	x		
Services	484				x	x		
Materials and Supplies Miscellaneous Expenses	887 128				X X X	XX		
Customer Relations	140				^	^		,
Telephone Clerks Wages	2,170				x		x	By 4,715,555 Passenger
Telephone Clerks Fringes	501				ŝ		Ŷ	By 4,715,555 Passenger
Wages	1,157				x	X	-	
Fringes	15				X	X		
Services	21 28				X X X	X		
Materials and Supplies Miscellaneous Expenses	14				X.	X X		-
Assistant General Manager for Government and								
Community Affairs								
Wages Materials and Supplies	.107 1			x x		x		
Miscellaneous Expenses	5	•		ż		X X		
Government Affairs								
Wages	.277			x		x		
Fringes	3 86			x x		X X X		
Services Materials and Supplies	.7			x		X Ý		
Miscellaneous Expenses	38			x		x		
Community Relations								
Wages	189 7			X. X		X		
Fringes Services	21			X		X X X		
Materials and Supplies	38			Â.		x		
Miscellaneous Expenses	. 26			x		x		



	Estimated	Re	source A	llocated (	ю		• •	
Department Expense Item	FY 84 Cost (\$000)	Hours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
Assistant General Manager	· ·							· •
for Equal Opportunity							•	
Wages	83			x		x		
Services Materials and Supplies	4			x x		X		
liscellaneous Expenses	n j			â		X X		
Rqual Employment Opportunit	Y							
Wages	140			x		x		
Fringes	2. 5			x		x	•	
Materials and Supplies Miscellaneous Expenses	-3			x x		X		
Contract Compliance								
Wages	71			X		x		
Pringes Materials and Supplies	1 2			x x		X X		
Aiscellaneous Expenses	3			x		x		
Employee Education, Trainin and Development	a							
Wages	1,166			x		x		• • •
Fringes Services	. 342 33			X X X X	•	X		
Materials and Supplies	5			x		x		
Miscellaneous Expenses	n			X		x		
DEE/WEE					•			
Wages Fringes	74 1			X X		X X		
Materials and Supplies	2					x		
Miscellaneous Expenses	3			X X		×,	•	
Controller-Treasurer-Audito	<u>r</u>							
Wages	275			x		x		
Fringes Services	6 1	•		x x		X X		
Materials and Supplies	3			x		x		
Miscellaneous Expenses	13			X		X		
Accounting and Fiscal								
Payroll Clerk Wages	305 68	x x					X X	By 632,083 Hours By 632,083 Hours
Payroll Clerk Fringes Cash Clerk Wages	873	~			х		x	By 12,860,606 Passenge
Cash Clerk Fringes	192				.X	á	x	By 12,860,606 Passenge
Wages Fringes	1,767			X X		Ý X		
Services	277			x		x		
Materials and Supplies	34			x		x		
Miscellaneous Expenses	11			x		Ř		
Data Processing	•							
Wages Fringes	3,515 43			X X		x x		
Services	1,332			x		x		
Materials and Supplies	251			х х		X X		
Miscellaneous Expenses	148			X		Χ.		
Assistant General Manager for Transit System Development						·		
	25			×		v		
Wages	26			X		x		



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	Wat in	Re	source A	llocated	to			
Department and Expense Item	Estimated FY 84 Cost (\$000)	Hours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
Transit Systems Development					2		-	
TIGOT JACOB Development								
Wages	1,064			x		X		۰.
Services Materials and Supplies	155 <u>.</u> 1			X X		XX		,
Miscellaneous Expenses	3			x		x		
Bus Pacilities Engineering								
Wages	353		· ·	x		x		
Fringes Services	9 262			X X		X		
Materials and Supplies	40			ŝ		ŝ		
Miscellaneous Expenses	- 39			x		x		
Assistant General Manager for Management								
Wages	112			x		x		
Services	2 2			x		x		
Materials and Supplies Miscellaneous Expenses	2 4			X		X X		
Safety Department								• • •
Wages	198			x	•	x	•	
Fringes	4			X		x		
Services	172			x X		x		
Materials and Supplies Miscellaneous Expenses	67 34			X		X X		
Insurance								
Wages	230			x		. <b>X</b>		
Fringes	2	•		X		X		
Services Materials and Supplies	37 2			X X		X X		
Miscellaneous Expenses	6			x		x		
Risk Management								
Wages	79			x		Ŷ		
Fringes Materials and Expedies	1			x		X		
Materials and Supplies Miscellaneous Expenses	2			X		X X		
Contract Procurement & Mate	<u>cial</u>							
Stores Wages	1,035			x			Ŷ	By 153 Peak Vehicles
Stores Fringes	223			X			x	By 153 Peak Vehicles
Wages Fringes	3,612 40			X		x		
Services	37			ŝ		, X		
Materials and Supplies Miscellaneous Expenses	113 64			X		x		
Personnel Department	ŲŦ			~		~		·
Wages	1,581			x		x		
Fringes	8			x		X		
Services	711			. <u>X</u>		x		
Materials and Supplies Miscellaneous Expenses	112 65			₹ ₹		X X		
General Services								
Wages	2,143			x		x		
Fringes	4			X		x		
Services	24			X		X		
Materials and Supplies	290			x		x		

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Expense(\$000)HoursHilesBusespersPixedVariableIf Variable Hor?Print_Sing779XXXXXXXXXPeriops6XXXXXDirectly by PasserWages76XXXXXDirectly by PasserWages76XXXXXDirectly by PasserWages6XXXXXManagement and Badget3XXXXWages566XXXXPringes6XXXRiscollancous Expenses3XXXMages261XXXPringes10XXXMiscollancous Expenses8XXServices10XXXMiscollancous Expenses1XXMages1,214XXXPringes124XXXMages1,214XXXPringes15,000XXXNorther Lies7,000XXXPrecisions for Uningued7,000XXXPrecisions for Uningued7,000XXXPrecisions for Uningued7,000XXXPrecisions for Uningued7,000XXX		Estimated	Re	Source A	llocated	to			
Notice Excisions         779 5 cs x         x <th>Department and Expense</th> <th>FY 84 Cost. (\$000)</th> <th>Hours</th> <th>Miles</th> <th>Peak Buses</th> <th></th> <th>Fixed</th> <th>Variable</th> <th>If Variable How?</th>	Department and Expense	FY 84 Cost. (\$000)	Hours	Miles	Peak Buses		Fixed	Variable	If Variable How?
Fringes       6       X       X       X         Services       76       X       X       Directly by Passer         Management and Backgett       X       X       X       Directly by Passer         Wages       3       X       X       X       Directly by Passer         Wages       565       X       X       X       X         Management and Backgett       3       X       X       X         Maconian and Backgett       6       X       X       X         Maconian and Backgett       3       X       X       X         Maconian and Backgett       10       X       X       X         Maconian and Backgett       10       X       X       X         Maconian and Backgett       1       X       X       X         Mages       124       X       X       X         Maconian and Backgett       1       X       X       X         Maconian a	Print Shop								
Fringes       6       X       X       X         Services       76       X       X       Directly by Passer         Management and Backgett       X       X       X       Directly by Passer         Wages       3       X       X       X       Directly by Passer         Wages       565       X       X       X       X         Management and Backgett       3       X       X       X         Maconian and Backgett       6       X       X       X         Maconian and Backgett       3       X       X       X         Maconian and Backgett       10       X       X       X         Maconian and Backgett       10       X       X       X         Maconian and Backgett       1       X       X       X         Mages       124       X       X       X         Maconian and Backgett       1       X       X       X         Maconian a	Warner	779			Y		Y		
Services     76     X     X     X       Materials and Supplies     24     X     X     X       Management and Budget     X     X     X       Wayes     556     X     X       Materials and Supplies     3     X     X       Materials and Supplies     10     X     X       Macor Belations     3     X     X       Mages     21     X     X       Fringes     13     X     X       Materials and Supplies     10     X     X       Materials and Supplies     1     X     X       Pringes     1,214     X									•
Timitebilies 476 X X X Directly by Passen X X X X X X X X X X X X X X X X X X X									
bit core line couse Sequences     24     x     x     x       Management and Budget     x     x     x       Wages     566     x     x       Paragement and Budget     x     x       Wages     566     x     x       Paragement and Budget     x     x       Wages     566     x     x       Paragement and Budget     x     x       Wages     261     x     x       Wages     261     x     x       Paragement and Supplies     3     x     x       Wages     261     x     x       Paragement and Supplies     3     x     x       Wages     124     x     x       Paragement and Supplies     1     x     x       Wages     124     x     x       Paragement and Supplies     1     x     x       Wages     1.214     x     x       Paragementation     1.4500     x     x       Wages     1.214     x     x       Paragementation     27.060     x     x       Wages     1.216     x     x       Provision's Compensation     5.750     x     x					~	Ŷ	~	Y	Directly by Passenners
Mincellaneous Expanses 3 x x x Management and Excloret Were 5 566 x x x Pringes 5 x x x Meterials and Supplies 9 x x x Miscollaneous Expanses 5 x x x Autor Relations Mages 261 x x x Eabor Relations Mages 261 x x x Bacor Relations Mages 124 x x Mages 124 x x Pringes 2 x x Mages 124 x x Mages 124 x x Mages 124 x x Mages 124 x x Mages 124 x x Mandputreental Expanses Mages 2 x x Mandputreental Expanses Mages 2 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Pringes 1,214 x x Mandputreental Expanses Mages 1,214 x x Pringes 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x Mandputreental Expanses Mages 1,214 x x x Mandputreental Expanses Mages 1,214 x x x Pringes 1,214 x x x Mandputreental Expanses Mages 1,214 x x x Mandputreental Expanses Mages 1,214 x x x Mandputreental Expanses Mages 1,214 x x x Manages 1,214 x x x Mages 1,214 x x x Manages 1,214 x x x Mages 1,214 x x x x Mages 1,214 x x x x Mages 1,214 x x x x Mages 1,214 x x x x Mages 1,214 x x x x x Mages 1,214 x x x x x x x x x x x x x x x x x x x					x	<u>n</u>	·x	~	priced by russelgers
Wages Pringes         566 6         X         X           Services         3         X         X           Maching Services         3         X         X           Maching Services         3         X         X           Labor Relations         X         X         X           Mages         261         X         X           Services         3         X         X           Services         3         X         X           Services         3         X         X           Pringes         10         X         X           Mages         124         X         X           Pringes         2         X         X           Mages         1,214         X         X           Pringes         15,500         X         X           Workparthental Expenses         27,980         X         X           Workpartis         Compensation         14,950         X         X           Workpartis         Compensation         27,980         X         X           Pression         578         X         X           Prestis and Supplies         578 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Pringes       6       X       X         Services       3       X       X         Macellancous Expenses       5       X       X         Macellancous Expenses       5       X       X         Macellancous Expenses       5       X       X         Macellancous Expenses       3       X       X         Services       43       X       X         Patterials and Supplies       0       X       X         Mages       124       X       X         Services       1       X       X         Mages       124       X       X         Pringes       12       X       X         Mages       1,214       X       X         Pringes       12,214       X       X         Pringes       1,214       X       X         Wordnam's Compensation       1,950       X       X         Wordnam's Compensation       2,100       X       X         Services       7,850       X       X       Directly by Miles         Mordnam's Compensation       2,100       X       X       Directly by Miles         Services       7,850 <td>Management and Budget</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Management and Budget								
Services       3       X       X         Material and Supplies       9       X       X         Wages       261       X       X         Pringes       3       X       X         Services       43       X       X         Marcella and Supplies       10       X       X         Mages       124       X       X         Mapped       124       X       X         Mappe       124       X       X         Mapped       124       X       X         Mapped innous Expenses       32       X       X         Matcollamous Expenses       32       X       X         Mapped innous Expenses       1,214       X       X         Precinges       1,214       X       X         Services       7,896       X       X       By 653 Hours         Northouris Compensation <td></td> <td>÷</td> <td></td> <td></td> <td>x</td> <td></td> <td></td> <td></td> <td></td>		÷			x				
Miscollaneous Expenses       9       X       X         Miscollaneous Expenses       5       X       X         Mages       261       X       X         Pringes       3       X       X         Services       43       X       X         Mages       10       X       X         Miscollaneous Expenses       8       X       X         Mages       124       X       X         Mages       124       X       X         Services       1       X       X         Marcellaneous Expenses       32       X       X         Marcellaneous Expenses       1       X       X         Marcellaneous Expenses       1       X       X         Miscollaneous Expenses       1       X       X         Marcellaneous Expenses       1       X       X         Marcellaneous Expenses       124       X       X       X         Marcellaneous Expenses       124       X       X       X         Marcellaneous Expenses       127       X       X       By 653 Hours         Mortegerthantial and Supplies       7,760       X       X       By 69					X				
Hiscollaneous Expenses 5 X X X Labor Relations Wages 261 X X X Bervices 3 X X X Meterials and Supplies 10 X X X Miscollaneous Expenses 8 X X Employee Activities Wages 124 X X X Pringes 2 X X X Materials and Supplies 7 X X X Materials and Supplies 7 X X X Materials and Supplies 7 X X X Materials and Supplies 7 X X X Materials and Supplies 7 X X X Meterials and Supplies 7 X X X Montensi's Compensation 14,950 X Worthan's Compensation 5,750 X X X By 653 Hours Worthan's Compensation 5,750 X X X By 653 Hours Worthan's Compensation 5,750 X X X By 69,332 Miles Worthan's Compensation 5,750 X X X By 69,332 Miles Worthan's Compensation 5,750 X X X Directly by Miles Provisions for Prise 700 X X X X Pression 50 Prise 7,896 X X X Pression 50 Prise 7,896 X X X Pression 50 Prise 7,896 X X X Pression 50 Prise 7,896 X X X Pression 50 Prise 7,896 X X X Pression 50 Prise 7,896 X X X Pressions for Prise 7,896 X X X Pressions for Prise 7,765 X X X By 107,465 Miles Provisions for Uninsured PL 37,650 X X X By 103,231 Passen Prise 7,896 X X X By 103,231 Passen Prise 7,896 X X X By 103,231 Passen Prise 7,896 X X X By 103,231 Passen Prise 7,896 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 1,300 X X X By 103,231 Passen Prise 2,531 X X By 103,231 Passen Prise 2,531 X X By 103,231 Passen Prise 2,531 X X By 103,231 Passen Prise 2,531 X X By 103,231 Passen Prise 2,531 X X By 103,231 Passen Prise 2,531 X X X By 103,231 Passen Prise 2,531 X X X By 103,231 Passen Prise 2,531 X X X By 103,231 Passen Prise 2,531 X X X By 103,231 Passen Prise 2,531 X X X By 103,24 Passen Prise 2,531 Passen Prise 2,531 X X X By 103,24 Passen Prise 2,531 Passen Prise 2,531 Passen Prise 2,531 Passen Prise 2,531 Passen Prise 2,531 Passen Pri									
Lakor Relations     Xages     261     X     X       Wages     3     X     X       Services     43     X     X       Materials and Supplies     10     X     X       Marces     8     X     X       Princes     43     X     X       Marces     8     X     X       Marces     10     X     X       Marces     124     X     X       Services     1     X     X       Services     1     X     X       Marces     1,214     X     X       Princes     12,500     X     X       Workean's Compensation     16,500     X     X       Workean's Compensation     16,500     X     X       Workean's Compensation     14,950     X     X       Services     7,986     X     X       Public     27,980     X     X       Presides     5,206     X     X       Presides									
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Premiums for Physical     22     X     X       Damage     22     X     X       Premiums for PL & PD     Insurance     190     X     X       Premiums for Corporate     190     X     X       Ynsurance     578     X     X       Previsions for Uninsured PL 37,650     X     X     By 163,231 Passem       Provisions for Uninsured PL 37,650     X     X     By 163,231 Passem       Provisions for Uninsured PL 37,650     X     X     By 107,465 Miles       Provisions for Uninsured PD     2,531     X     X     By 107,465 Miles       PD     2,531     X     X     By 107,465 Miles       expenses for PL     1,362     X     X     By 107,465 Miles       PL     1,362     X     X     By 107,465 Miles       Expenses for PD     524     X     X     By 107,465 Miles       PD     524     X     X     By 107,465 Miles       PD     524     X     X     By 107,465 Miles       PD     524     X     X     By 107,465 Miles       PD     524     X     X     By 107,465 Miles       PD     524     X     X     By 107,465 Miles       Puel and Lube Taxees     X	Materials and Supplies	850			x		x		
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PL     at \$14,481 Each       Provisions for Uninsured     Z,531     X     By 107,465 Miles       PD     2,531     X     By 107,465 Miles       Expenses for PL     1,362     X     By 163,231 Passen       PL     X     By 163,231 Passen       PL     X     By 163,231 Passen       PL     X     By 107,465 Miles       PL     X     By 107,465 Miles       PL     X     By 107,465 Miles       PD     524     X     By 107,465 Miles       PD     Fuel and Lube Taxes Non-     X     By 107,465 Miles       Revenue Equipment     60     X     X       Fuel and Lube Taxes     X     Directly By Miles       Revenue Equipment     1,957     X     X       Directly By Miles     X     X					X		x		· · · · ·
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Expenses for PD     524     X     X     By 107,465 Miles       PD     PD     at \$524 per Step       Fuel and Lube Taxes     60     X     X       Fuel and Lube Taxes     60     X     X       Fuel and Lube Taxes     60     X     X       Fuel and Lube Taxes     1,957     X     X       Revenue Equipment     1,957     X     X       Leases and Rentals     7,106     X     X		1-362				x		X	By 163,231 Passengers
Fuel and Lube Taxes Non- Revenue Equipment     60     X     X       Fuel and Lube Taxes     60     X     X       Fuel and Lube Taxes     7,957     X     X       Revenue Equipment     1,957     X     X       Leases and Rentals     7,106     X     X		524		x				x	By 107, 465 Miles
Revenue Equipment     60     X     X.       Fuel and Lube Taxes									at \$524 per Step
Fuel and Lube Taxes Revenue Equipment 1,957 X X Directly By Miles Leases and Rentals 7,106 X X X		i.							
Revenue Equipment     1,957     X     X     Directly By Miles       Leases and Rentals     7,106     X     X		60	x				Х.		
Leases and RentalsX X				<b></b>				~	
				X			<b>.</b> -	X	DIRECTLY BY MILES
<b>TOTAL \$484,174</b>	Leases and Kentals	/,106			X		X		
10 <b>11AL \$489,1/9</b>		A404 154							
	TUIAL	\$409,1/4							

TABLE 5

COMPARISON OF COEFFICIENTS BETWEEN FY84 AND FY86, ADJUSTED FOR INFLATION

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COEFFICIENT	FY84 Calibration	ADJUSTED FOR INFLATION	ADJUSTED FOR REAL INCREASE	FY86 CALIBRATION
Revenue Miles	1.063	1.1830	1.243	*
Total Miles1	0.932	1.037	1.089	0.97
Revenue Hours	24.39	27.14	28.52	*
Total Hours2	22.57	25.12	26.39	25.82
Peak Buses	55,969	62,285	65,441	68,088
Passengers	0.0744	0.0828	0.0870	0.1162

\* In FY 1986, no values are projected for revenue miles and revenue hours.

1. <u>Coefficients are factored by the ratio of revenue miles to total miles in</u> FY 1984 (93,031,164/106,163,110).

2. Coefficients are factored by the ratio of revenue hours to total hours in FY 1984 (7,062,585/7,632,855).

## $(B_{1}, A_{2}, A_{3}, 

GENERAL PLANNING CONSULTANT: TECHNICAL MEMORANDUM 86.5.3 SUMMARY STATISTICS FOR THE FY 1984 AND FY 1986 BUS OPERATING COST MODELS

Prepared for:

Southern California Rapid Transit District

:

Prepared by:

Schimpeler Corradino Associates

in association with

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#### <u>Table</u>

1	UNIT	COST	'S F0	)R THE	FY	1984	BUS	OPERATIN	G COST	MODEL			3
2	UŇIT	COST	IS FO	)R THE	FΎ	1986	BUS	OPERATIN	G COST	MODEL			5
.7	CCDU					. coe.	TC Er		225/22	4 200	A N 15	203	20

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#### <u>Figure</u>

#### 1. INTRODUCTION

Technical Memorandum 86.5.1 (November 1985) described the specification of a SCRTD bus operating cost model, based on projected FY 1986 budget figures and expected service levels for FY 1986. An earlier Technical Memorandum 5.1.2 (June 1984) described a FY 1984 calibration of the same basic model. In this Technical Memorandum, a summary is provided of the unit costs produced by each of those two calibrations. These unit costs can be used to obtain estimates of the operating costs for alternative service-level scenarios and for individual bus lines of the SCRTD system, subject to certain constraints discussed below and within broader error bounds than would apply to a fully-programmed model embodying these calibrations.

This Technical Memorandum also provides guidance on how to use the unit costs in the calculation of operating costs. In particular, the procedure for applying the step-function unit costs is somewhat less straightforward than may at first be appreciated. A step-by-step procedure for making cost calculations is therefore provided in this document. It should also be noted that the existence in the model of step functions makes it desirable, for maximum accuracy, for service changes to be allocated to operating divisions, with changes in each of peak buses, miles, hours, and passengers being assigned to divisions.

#### 2. SUMMARY OF UNIT COSTS

Table 1 provides a summary of the unit costs on average daily p.m. peak buses, annual revenue vehicle hours, annual revenue vehicle miles, and annual passenger boardings. The costs are provided in mid-FY 1984 dollars. All unit costs in this table are based on the organizational structure and productivity of the District during FY 1984. Thus, average operating division size in FY 1984 was 159 peak buses, while average maintenance division size was 172 peak buses. It should be noted particularly that the miles and hours variables in this table refer to revenue hours and miles and do not include deadhead and layover. These two measures are defined in the same way as Section 15 Reports on revenue hours and miles.

Table 2 provides the same information for the projected FY 1986 budget, and is based on average daily p.m. peak buses, annual scheduled vehicle hours, annual scheduled vehicle miles, and annual passenger boardings. Unit costs in Table 2 are in end-of-FY 1986 dollars, based on an assumption of 4 percent inflation from July 1985 through June 1986. Among differences between Table 1 and Table 2 are that average operating division size has dropped to 153 peak buses from 159 in FY 1984, and that average maintenance division size is now equal to operating division size at 153 peak buses. The definition of annual scheduled vehicle hours and annual scheduled vehicle miles is consistent with the definitions used by SCRID in preparing Section 15 Reports.

## TABLE 1

## UNIT COSTS FOR THE FY 1984 BUS OPERATING COST MODEL

TO	CATION By		S COST	INÁL		SOURCE
 Buses						Telecomm. Supplies
Buses	Fixed	1.0	\$33,392.6321	No	System	Most HQ Departments
Buses	Step	5.6	\$27,886	Yes	Diý.	Maint.Oper.Div. Servicir
Buses	Step	32	\$28,122	Yes	Div.	Mt.Op.Div. Serv. Deep Cl
Buses	Step	34.4	\$39,335	Yes	Div.	Mt.Op.Div. Wheelchair Sr
Buses	Step	40.5	\$30,095	Yes	System	Scheduling Checkers
Buses	Step	56	\$39,495	Yes	-	Telecomm. Elect. Maint.
Buses	Step	60.7	\$40,457	Yes	Ďiv.	
Buses	Step	121	\$27,919	Yes	System	Central Maint. Service
Buses	Step	138	\$70,238	Yes	-	Cent. Mnt. Cent.Shop Sup
Buses	Step	147	\$365,754	Yes		Fac. Maint. All Unfixed
Buses	Step	159	\$490,488	Yes	Div.	Transp. Oper. Div.
Buses	Step	159	\$44,085	Yes	System	Transp. Services All
Buses	Step	159	\$88,402	Yes	Div.	Cont.& Purch. Storekeeps
Buses	Step	172	\$693,087	Yes	Div.	Mt.Op.Div. Misc.,Supp.,/
Buses	Step	172	\$261,210	Ýes		Transp.Instr. Instructor
Buses	Step	188	\$50,394	Yes		Maint. Gen. Instruction
Búses	Step	188	\$42,739	Yes		Mt.Oper.Div. Serv. Super
Büses	Step	206	\$39,343	Yes		Mt.Op.Div. Farebox Maint
lours		1.0	\$0.2321	No	System	Transp. General All
	Fixed			No		Transp. Services Wage
lours	Fixed	1.0	\$0 <b>.</b> 016B	No	System	Non-dep. Fuel/Lube,Nonre
lours	Step		\$17,150	Yes		Transp.Op.Div Oper.
lours	Step			Yes	Div.	Non-dep. Wkmn.Comp.,Oper
	Step 26			Yes		Mt.Op.Div. Non-rev.Maint
	Step 42	•	\$36,588	Yes		Police - Trans.Serv.Insp
lours	Step 44	7,000	\$44,250	Yes	System	Trn.Instr. Oper. Trainin
lours	Step 44	7,000	\$28,313	Ýes	System	Acc.& Fiscal - Payroll (
lours	Step 47		\$44,267	Yes		Transp.Serv. Strt Superv
lours	Step 59	6,000	\$30,083	Yes	Sýstem	Scheduling Sched. Maker
liles	Direct	1.0	\$0.2814	Yes	System	Mnt.Op.Div. Parts, lube,.
liles	Direct	1.0	\$0.2915	Ýes		Non-Dep. Fuel & Taxes

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## TABLE 1 (continued)

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## UNIT COSTS FOR THE FY 1984 BUS OPERATING COST MODEL

ALLOCAT			P UNIT/STEP		LEVEL	SOURCE
TO 	BY		-			
liles	Step	39,364	\$456	Yes		Non-dep. Exp. Exp.for Pl
liles	Step	39,364	\$634	Yes		Non-dep. Exp. Prov.for (
tiles	Step	59,451	\$2,034	Yes	System	Non-dep. Wkmns Comp.Mair
liles	Step	154,169	\$39,321	Yes	Div.	Mt.Op.Div. Running Repa
liles	Step			Yes	Div.	Maint.Op.Div. Inspector
liles	Step	1,463,415	\$39,323	Yes	System	Cent.Maint. Body & Fram
liles	Step	2,320,049	\$39,317	Ýes	System	Cent.Maint. Paint & Tri
liles	Step	2,439,026	\$39,308	Yes	System	Cent.Maint. Engine Rebl
liles	Step	2,972,563	\$37,312	Yes	System	Cent. Maint. Electrical
liles	Step	3,280,069	\$39,344	Yes	System	Cent.Maint.Running Repa
liles	Step	3,280,069	\$37,344	Yes	System	Cent.Maint, Transmissi
liles	Step	3,523,037	\$39,296	Yes	System	Cent. Maint. Small Unit
liles	Step	6,341,467	\$39,266	Yes	System	Cent. Maint. Upholstery
liles	Step	6,794,429	\$39,286	Yes	System	Cent. Maint. Welding
files	Step	7,317,077	\$37,308	Yes	Sÿstem	Cent. Maint. Machine Sh
liles	Step	7,926,833		Yes	System	Cent. Maint. Sht.Metal
liles	Step	9,512,200	\$37,400	Yes	System	Cent. Maint.Engine Tear
liles	Step	11,890,250	\$39,250	Yes	System	Cent. Maint. Radiator
liles	Step	31,707,333	\$131,333	Yes	System	Cent. Maint. Misc. Repa
assenger	Direc	:ť 1.0	<b>\$0.001</b> 1	Ýes	System	Print Shop - Timetables
assenger	Fixed	1.0	\$0.0063	No		Marketing & Communication
assenger	Fixed	1 1.0	\$0.0025	No	System	Customer Rel. (Fixed)
		101,174	\$456	Yes		Expenses for PL -
-	•	101,174		Ýes		Prov. for Uninsured PL
-	•	4,951,064	\$28,106	Yes		Customer Rel. Tel. Cler
-		13,688,235	\$36,588	Yes		Transit Police Pass.Sec
		16,621,429	\$29,322	Yes		Accounting Cash Clerks
'assenger	Step	21,154,545	\$29,318	Yes	System	Mktg & Comm. Ticket Cle

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## TABLE 2

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## UNIT COSTS FOR THE FY 1986 BUS OPERATING COST MODEL

ALLOC To	ATION By	STEF Basis		MARG- Inal	LEVEL	SOURCE
Buses	Direct	10	\$75.4907	Yes	Sÿstem	Fac.Maint. Supplies-Radi
Buses	Fixed	1.0	\$43,640.6643	No	System	Most HQ Departments
Buses	Step	5.8	\$31,945	Yes	Div.	Maint.Oper.Div. Servicir
Buses	Step	31.5	\$42,645	Yes	System	Scheduling Checkers
Buses	Step	33	\$31,771	Yes	Div.	
Buses	Step	33.1	\$40,179	Ýes	Div.	Mt.Op.Div. Wheelchair Sr
Buses	Step	47	\$39,927	Yes	System	Fac. Maint. Elect. Maint
Buses	Step	60.2	\$40,173	Yes	Div.	Mt.Op.Div. Farebox Maint
Buses	Step	110	\$40,025	Yes	Div.	Mt.Op.Div. Spec. Project
Buses	Step	117	\$32,032	Yes		Central Maint. Service
Buses	Step	142	\$275,925	Ýes	System	Fac.Maint.Elec.,Prop.,Su
Buses	Step	142	\$50,168	Yes	System	Maint. Gen. Instruction
}uses	Step	153	\$750,139	Yes	Div.	Tra <u>n</u> sp. Oper. Div.
Buses	Step	153	\$44,121	Yes	System	Transp. Serv. Radio Dis
Bušes	Step	153	\$96,867	Yes	Div.	Cont.& Purch. Storekeepe
Buses	Step	153	\$729,656	Yes	Div.	Mt.Op.Div. Misc., Supp.,/
<u>auses</u>	Step	166	\$47,954	Yes	System	Cent.Maint. Cent.Shop Su
lours	Fixed	1.0	\$0.1696	No		Transp. General All
lours	Fixed	1.0	\$0.3326	No	•	Transp. Services Wage
iours	Fixed	1.0	\$0.0079	No	System	Non-dep: Fuel/Lube;Nonre
lours	Step		\$19,383	Ýes	Div.	Transp.Op.Div Oper.
lours	Step		\$1,681	Yes	Div.	· · · · · ·
lours	Step 21		\$34,400	Yes		Mt.Op.Div. Non-rev.Maint
lours	Step 32		\$42,044	Yes		Scheduling Sched. Maker
lours	Step 42		\$44,002	Yes		Transp.Serv. Strt Superv
lours	Step 44		\$34,471	Yes		Police - Trans.Serv.Insp
lours	Step 47	-	\$44,244	Yes		Trn.Instr. Oper. Trainin
lours	Step 63	2,083	\$31,084	Yes	System	Acc.& Fiscal - Payroll (
liles	Direct	1.0	\$0.2366			Mnt.Op.Div. Parts, lube,
liles	Direct	1.0	\$0.2703	Yes	Svstem	Non-Dep. Fuel & Taxes

## TABLE 2 (continued)

UNIT COSTS FOR THE FY 1986 BUS OPERATING COST MODEL

.

ALLOCAT		STEP			LEVEL	SOURCE
T <u>0</u> 	BY		COST	INAL		
files	Step	107,465	\$524	Yes	System	Non-dep. Exp. Exp.for Pl
tiles	Step	107,465	\$2.531	Yes	System	Non-dep. Exp. Prov.for I
files	Step	69,332	\$3,710	Yes	System	Non-dep. Wkmns Comp.Mair
files	Step	178,810	\$40,186	Yes	Ďiv.	Mt.Op.Div. Running Repai
files	Step	2,149,300	\$40,180	Yes	Div.	Maint.Op.Div. Inspectors
files	Step	2,755,513	\$40,179	Ýes	System	Cent.Maint.Running Repai
files	Step		\$40,189	Yés		Cent.Maint. Mechanical
files	Step	3,160,735	\$40,206	Yes	System	Cent. Maint. Electrical
liles	Step	3,358,281	\$40,187	Yes	System	Cent.Maint. Body Shop
files	Step	3,582,167	\$40,200	Yes	System	Cent.Maint. Transmissio
files	Step	3,960,185	\$39,984	Yes	System	Cent.Maint. Engine Line
files	Step	4,477,708	\$40,209	Yes	System	Cent. Maint. Welding
liles	Step	5,656,053	\$40,158	Yes	System	Cent. Maint. Cylinder Ho
files	Step	5,656,053	\$40,158	Ýes		Cent.Maint. Paint Shop
liles	Step	7,676,071	\$40,215	Yes		Cent. Maint. Machine Sho
tiles	Step	7,676,071	\$40,215	Yes	System	Cent. Maint. Sht.Metal !
iles	Step	8,266,538	\$40,231	Yes	System	Cent. Maint. Frame Shop
liles	Step	8,266,538	\$40,231	Yes	System	Cent. Maint. Upholstery
liles	Step	9,769,545	\$40,182	Yes		Cent. Maint. Systems
liles	Step	13,433,125	\$40,125	Yes	System	Cent.Maint. Engine Parts
iles	Step	13,433,125	\$40,125	Yes	System	Cent. Maint.Engine Teard
liles	Step	17,910,833	\$40,166	Yes		Mnt.Oper.Dv.Road Failure
iles	Step	21,493,000	\$40,033	Yes		Cent. Maint. Sign Shop
iles	Step	26,866,250	\$40,250	Yes		Cent. Maint. Tool & Unit
assenger	Direc	:t 1.0	\$0.0011	Yès	Şýstem	Print Shop - Timetables
assenger	Fixed		\$0.0070	No	System	Marketing & Communicatio
assenger	Fixed	1.0	\$0.0027	No	System	Customer Rel. (Fixed)
		163,231	\$524	Yes		Expenses for PL
assenger	•	•	\$14,481	Yes		Prov. for Uninsured PL
		4,715,555	\$29,678	Ýes		Customer Rel. Tel. Clerk
		12,482,353	\$34,470	Yes		Transit Police Pass.Sec.
		12,860,606	\$32,273	Yes		Accounting Cash Clerks
assenger	Step	19,290,909	\$30,955	Yeş	System	Mktg & Comm, Ticket Cler

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#### 3. USING THE UNIT COSTS TO COMPUTE ANNUAL OPERATING COSTS

#### 3.1 CALCULATION PROCEDURE FOR LINE-BY-LINE COSTS

The following general procedure should be used to determine the costs of operation of a single line or group of lines within the District. The procedure is fairly complex because of the different ways in which costs must be accounted for. However, the attached worksheets are designed to simplify the procedure, as far as possible for manual application.

- Initiate Sheet 1 for each line for which service is to be STEP 1. costed.
  - a. If weekday service is to be costed, complete column A.
  - b. If Saturday service is to be costed, complete column C.
  - c. If Sünday service is to be costed, complete column E.
  - d. Calculate corresponding annual statistics for hours, miles, passengers, and revenue for applicable columns (column B for weekday period, column D for Saturday, and column F for Sunday

e. Split miles, hours, passengers, revenue, and buses between divisions if the line operates out of more than incorrect one division, and complete a separate sheet 1 for each division component.

- f. Add weekday, Saturday, and Sunday annual figures, if multiple periods will be costed, and enter data in Annual Total column. NOTE: Annual Total for Peak Buses should be the same number as is entered in column A.
- STEP 2. <u>**REAK BUSES:</u>** (Weekday service only)</u>
  - a, Transfer peak buses (PB) from sheet 1 to sheet 2, entry G for each line or part line to be costed.
  - b. Calculate column I and Column K for each entry until step size exceeds value G. Note that the entries in column I are the integer result of the calculation only (without rounding), and that calculations continue only for steps where the value of G exceeds the value in colúmn H.
  - c. Calculate sheet totals.

#### STEP 3. VEHICLE HOURS:

- a. Start a sheet 3 for each day for which service is to be costed on the line, i.e. for weekday, Saturday, and Sunday.
- b. Transfer AWVH, ASVH, and AXVH from sheet 1 to entry L on the correct sheet 3.
- c. Calculate column N and column P for each entry until step size exceeds value L. As in Step 2, the entries in column N are the truncated integers from the division, and continue only until the step size in column M exceeds the value of L.
- d. Calculate sheet totals.

### STEP 4. VEHICLE MILES:

- a. As for Step 3, start a sheet 4 for each day for which service is to be costed on the line.
- b. Transfer AWVM, ASVM, and AXVM from sheet 1 to entry Q on the correct sheet 4.
- c. Calculate column S and column U for each entry until step size exceeds value Q. Column S entries are again truncated integers, and continue until the value in column R exceeds the value of Q.
- d. Calculate sheet totals.

#### STEP 5. PASSENGER BOARDINGS:

- a. As for Step 4, start a sheet 5 for each day for which service is to be costed on the line.
- b. Transfer AWP, ASP, and AXP from sheet 1 to entry V on the correct sheet 5.
- c. Calculate column X and column Z for each entry until step size exceeds value V. Again, column X entries are truncated integers from the division of V by W, and continue only until the step size in column W exceeds the value of V.
- d. Calculate sheet totals.

#### STEP 6. TOTAL PERIOD COSTS:

- a. Start a sheet 6 for each line and period.
- b. Enter totals from sheets 2, 3, 4, and 5 as shown on sheet 6 (Rows AA, BB, CC, and DD).
  - c. Sum for total cost for period for line; enter in TOTAL COSTS row (Row EE). This is the total cost for this line and period.
  - d. Enter total passenger revenue from Sheet 1 for the applicable period in the next row (Row FF).
  - e. Subtract passenger revenue (Row FF) from TOTAL COSTS (Row EE). This is the TOTAL NET COST for this line and period.

#### STEP 7. <u>TOTAL LINE COSTS</u>:

- a. Repeat Steps 3, 4, and 5 for any service to be costed for more than one period (e.g., weekday and Saturday; weekday, Saturday, and Sunday; etc.) using the sum of the annual statistics for the appropriate periods, i.e., the Annual Totals column on Sheet 1. (Note that peak buses is a weekday only figure, and the same figure should be used for the annual total.)
- b. Repeat Step 6 with the Sheets 1, 3, 4, and 5 prepared for service over all relevant periods, plus Sheet 2 from weekday service (if any). This is the total costs and total net costs for the line.

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#### STEP 8. TOTAL DIVISION COSTS:

- a. Start Sheet 1 for each division in which service changes are to be costed. Enter totals for all lines in the division on Sheet 1. (Use annual figures from individual lines, and leave daily columns blank.)
- b. Start Sheets 2, 3, 4, and 5 for each division. Enter peak buses, total annual hours, total annual miles, and total annual passengers for all lines in the division in entries G, L, Q, and V.
- c. Calculate values in columns I, N, S, and X for all entries until the step size exceeds the entries in G, L, Q, or V, as appropriate. Compute values in columns K, P, U, and Z.
- d. Calculate totals of columns K, P, U, and Z and transfer to a Sheet 6 for the Division.
- e. On Sheet 6, sum the four entries and enter in the TOTAL COSTS row. This is the total Division costs. Enter the total passenger revenue and subtract from TOTAL COSTS. This is the TOTAL NET COSTS for the Division.
- NOTE: An internal check of computations should be made. The TOTAL COSTS and NET TOTAL COSTS figures obtained in this process should be at least as large as the sum of the individual lines calculated from Steps 1 through 7 (within the limits of rounding errors). They may be larger, but should never be smaller. If they are smaller, then checks should be made of the arithmetic used in compiling costs, because this result is indicative of an error.

### STEP 9. TOTAL DISTRICT COSTS:

- a. Repeat Step 8a and 8b, but for all divisions together.
- b. On Sheets 2, 3, 4, and 5, calculate columns I, N, S, and X using entries in G, L, Q, and V only for "Step S" rows. Compute columns K, P, U, and Z for the same rows.
- c. On Sheets 2, 3, 4, and 5, enter the sum over all divisions of the entries in columns K, P, U, and Z for rows labeled "Step D." DO NOT calculate these entries from the totals of buses, hours, miles, and passengers.
- d. Calculate totals of columns K, P, Ü, and Z and transfer to a Sheet 6 for the District.
- e. On Sheet 6 for the District, sum the four entries and enter in the TOTAL COSTS row. This is the total District costs. Enter the total passenger revenue and subtract from TOTAL COSTS. This is the TOTAL NET COSTS for the District.
- NOTE: An internal check of computations should be made. The TOTAL COSTS and NET TOTAL COSTS figures obtained in this process should be at least as large as the sum of the individual divisions calculated from Steps 1 through 8 (Within the limits of rounding errors). They may be larger, but should never be smaller. If they

are smaller, then checks should be made of the arithmetic used in compiling costs, because this result is indicative of an error.

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## FIGURE 1

COMPUTATION SHEETS FOR BUS OPERATING COST CALCULATIONS -- MARGINAL COSTS

## SHEET 1 OF 6

)IVISION	NO						
SOURCE	I DAILY	EKDAY   ANNUAL   STATISTIC   B= (A) *255	STATISTIC	I ANNUAL	SUN   DAILY  STATISTIC   (E)	ANNUAL Total	
Peak Buses	   PB 	 	       	'     +	     +	,     	
Vehicle Hours	   WVH 	. A₩VH	SVH	   A <u>s</u> vh 	   XVH 	   AXVH   	
Vehicle Miles	L L WVM L	AWVM	SVM	I ASVM I	XVM 	   AXŸM   	<b></b>
Pass. Boarding	₩P	AWP	ŜP	ASP	XP	AXP	
Pass. Revenue	WPR	AWPR	SPR	ASPR	XPR	AXPR I	- <b>-</b> .

DIVISION NO.

LINÊ ŃO.

PEAK BUSES \_\_\_\_\_\_(6) <u>USE FOR WEEKDAY SERVICE ONLY</u> (enter number from Sheet 1) <u>DO NOT USE FOR SATURDAY OR SUNDAY</u>

<u></u>	+	+	+ <u>~,-,- ~,-</u>	-+-,-,,-,-,	• +
TYPE	I I STEP SIZE I (H)	: NUMBER OF : STEPS !(I= INT[G/H])	l STEP l COST l (J.)	: ANNUAL : Cost :(K= I+J )	COMMENTS/SOURCE.
Direct	+     1.0	+ ! !	+ 1 175.4907	-+	Facilities Maint. Radio Supplies
Step D	   5.8 +	   	   31,945		Maint. Oper. Div. { Servicing
Step S	; ; 31.5		42,645		Scheduling Sched. Checkers
Step D	   33 +	   + <u>`~`</u>	31,771	·     	Maint. Oper. Div.   Service Deep Clean
Step D	33.1	: : +	40,179		Maint. Oper. Div.   Wheelchair Lift Se
Step S	47	   +	39,927	    -+	Facilities Maint. Electronics Maint.
Step D	60.2		40,173	1	Maint. Oper. Div. Farebox Maint.
Step D	110	1	40,025	1	Maint. Oper. Div. Special Projects
Step S	117		32,032	-+	Central Maintenance   Service
Step S	142		275,925	   	<pre></pre>
Step S	142		50,168	   	IMaintenance General
Step D :	153	1	750,139	   	Transportation Oper Division
Step S	153	·	44,121	     	Transportation Serv Radio Dispatchers
Step D :	153		729,656	   	lMaint. Oper. Div. l Misc., Supp., Admi
Step D	153		96,867	1 1	¦Contracts & Purch. ¦ Storekeepers
Step S	166		47,954	   	Central Maintenance Cent. Shop Superv.
TOTAL :	<u></u>	i		*   	   
+		k		+	- * - *'





SHEET 3 OF 6

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DIVISION NO.	LINE	NO	
VEHICLE HOURS		WEEKDAŸ	
(enter number from Sheet	1)	SATURDAY	[]
		SUNDAY	[]

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TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP Cost (0)	! ANNUAL ! COST !(P= N*O )	I COMMENTS/SOURCE I I
Step D	853		19,383	+ ; ;	Transp.Oper.Div.   Operators
Step D	853		1,681	*	Non-Departmental Exp   Wkmn's CompOper.
Step S	216,714	1	34,400	+   	Maint.Oper.Divisions   Non-revenue Maint.
Step S	329,783	++ 1 1	42,044	+	Scheduling Dept.
Step S	421,400	+       	44,002	<b>* -</b> ,	Transportation Serv Street Supervisors
Step S	446,176	+	34,471	+ ! !	lTransit Police   Transp. Serv. Insp.
Step S	474,000	+	44,244	+   	Transportation Inst.   Operator Training
Step S	632,083	**********************************	31,084	+	Account. & Fiscal Payroll Clerks
TOTAL		+   		+ ; ;	

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SHEET 4 OF 6

LINE NO.

VEHICLE MILES (Q) WEEKDAY [] (enter number from Sheet 1) SATURDAY [] SUNDAY []

DIVISION NO.

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TYPE	1 1 STEP SIZE 1 (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	: ANNUAL : Cost :(u= s*t )	: COMMENTS/SOURCE
Direct		•	0.2366	+	<pre>!Maint.Oper.Divisions ! Parts, lube, etc.</pre>
Direct	1	   	0.2703	*   	Non-Departmental Ex; Fuel and Taxes
Step S	   69,332	   	3,710	   	Non-Departmental Exp   Wkmn's Comp. Maint
Step S	1 1 107,465	{ 	3,055	   	Non-Departmental Ex 1 Exp.& Prov for PD
Step D	   178,810		40,186	1 1 1	Maint. Oper. Div.   Running Repairs
Step D	1 12,149,300		40,180	{ { }	{Maint. Oper. Div.   Inspectors
Step S	  2,755,513		40,179	*     	Central Maintenance Running Repairs
Step S	; ; ;2,904,459		40,189	   	Central Maintenance   Mechanical
Step S	¦  3,160,735		40,206	+	Central Maintenance
Step S	1 1 3,358,281		40,187	★==,,     	Central Maintenance Body Shop
Step S	1  3,582,167	**	40,200	+	Central Maintenance
Step S	+    3,960,1 <b>8</b> 5	t <u>-</u> 1 	39,984	+ <i></i>	Central Maintenance   Engine Line
Step S	+ ! ! 4,477,708	•• 	40,209	+	Central Maintenance
Step S	+    5,656,053		80,316	+ ¦ ¦	Central Maintenance
Step S	+    7,676,071	••	80,430	+ <b>-</b> -     	Central Maintenance
Step S	+    8,266,538	++++   	80,462	+∸≖' ¦ {	Central Maintenance Frame Shp & Uphols
TOTAL	+   	⊦+ ¦' [		+ ¦	1

STATISTICS IN CONTRACTOR

DIVISION NO. \_\_\_\_\_ LINE NO. \_\_\_\_

VEHICLE MILES(cont.) (Q) WEEKDAY [ ] (enter number from Sheet 1) SATURDAY [ ] SUNDAY [ ]

	+	*	<u> </u>	• _ <u>• • · · · </u>	<b>.</b>
TYPE	I I STEP SIZE ( (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL   COST  {U= S*T }	COMMENTS/SOURCE
TOTAL Bt.Fwd.	   -,- <u>,</u> ,-, <u>-</u>	   	   	*	
Step S	; ; 9,769,545	   	40,182	: :	Central Maintenance
Step S	1 13,433,125	)   	80,250	   	Central Maintenance   Engine Pts & Teardo
Step D	  17,910,833	<b>,</b>	40,166	     	Maint. Oper. Div.   Road Failure
Step S	1 121,493,000		40,033	• <u>-</u>	Central Maintenance Sign Shop
Step D	   26,866,250 +	   	40,250		Central Maintenance   Tool & Unit
TOTAL	   _ <del></del>	   <u></u>	<b>*</b>	 	 

SHEET 5 OF 6

DIVISION NO. LINE NO. LINE NO. (V) WEEKDAY [ ] (enter number from Sheet 1) SATURDAY [ ] SUNDAY [ ]

TYPE	I I STEP SIZE I (W)	NUMBER OF Steps (X= Int[v/W])	STEP COST (Ÿ)	L ANNUAL L COST L(Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	• •	0.0011	   	Print Shop   Timetables
Step S	163,231	•	524	+	Non-Departmental Exp Expenses for PL
Stép S	+ ! ! 163,231	•	14,481	•+   	Non-Departmental Exp Provisions for PL
Step S	+ ; ; 4,715,555	• • •	29,678	+	Customer Relations Telephone Clerks
Step S	+; ; ;12,482,353	*		+_ <b>-</b>	Transit Police Passenger Security
Step S	+    12,860,606	+4   	32,273	+	-+Accounting & Fiscal   Cash Clerks
Step S	+ ! !19,290,909	+     	30,955	+- <u></u>	Marketing & Commun   Ticket Clerks
TOTAL	+ ; ; <u>-</u>			+## ! !	   





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LINE NO. DIVISION NO. TOTAL LINE AND PERIOD COSTS PERIOD: WEEKDAY [] SATURDAY [ ] SUNDAY [ ] 1 VALUE SOURCE 1 | TOTAL, Sheet 2, Column I - Buses | 1 1 (AA) 1 TOTAL, Sheet 3, Column 0 - Hours 1 (BB) | | | (BB) | TOTAL, Sheet 4, Column U - Miles | 1 (22) ! TOTAL, Sheet 5, Column AA- Pass. | (00) 1 | TOTAL COSTS (Sum 4 rows above) | I (AA+BB+CC+DD≈ EE) I ------\_\_\_\_\_ ! PASSENGER REVENUE - Sheet 1 1 1 { (FF) ; TOTAL NET COSTS (EE-FF) 1 1 +\_\_\_\_\_+\_\_\_\_\_\_\_\_\_\_\_

FY 1986 COST BASIS

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### 3.2 EXAMPLES OF THE USE OF THE WORK SHEETS

The use of values from either Tables 1 or 2 in the worksheets is the same, apart from the values of unit costs and step sizes, and apart from the difference between revenue miles and hours and scheduled miles and hours. Therefore, the worksheets shown in the preceding section, based on FY 1986 values and on total miles and hours are used as the basis for example calculations. The principals and procedures are identical for either table.

### 3.2.1 Example 1 -- Cancellation of a Single Line

In the first example, consider the marginal costs associated with canceling a single line. The line to be cancelled is the line 203, with cancellation of weekday, Saturday, and Sunday service. Statistics for the line provide information for a typical weekday, Saturday, and Sunday, as follows:

<u>Weekday</u> :	P.M. Peak Scheduled Scheduled Passenger	Hours	Ξ	1 10.4 83.2 33
<u>Saturday</u>	Scheduled Scheduled Passenger		=	10.4 83.2 57
<u>Sunday</u>	Scheduled Scheduled Passenger		=	10.4 83.2 57

These values are entered in columns A, C, and E respectively of Sheet 1. (All worksheets for this example are provided in Appendix A.) Because the line operates on Tuesday through Sunday only, the factors to compile annual data from these statistics are 205 weekdays, 52 Saturdays, and 56 Sundays. (Memorial Day and Labor Day are always Mondays on which Sunday service is offered -- hence 50 Mondays are deducted from the weekdays and 2 from Sundays.) The multipliers are therefore adjusted on columns B, D, and F to reflect this. Annual statistics are calculated by multiplication of column A figures by 205, column C figures by 52, and column E figures by 56.

First, consider weekday marginal cost savings (meaning that fixed costs are not included). Sheet 2 for peak buses is shown for the weekday service, and indicates that only the directly-varying cost component provides a contribution to the cost of operating this line. The value of this is shown in column K as \$75.49, which is also the total for sheet 2. Sheet 3 for vehicle hours is shown for weekday service, and shows total savings from vehicle hours of \$42,128, based on 2,132 annual vehicle hours. These savings come entirely from savings in operators and workman's compensation paid for operators. Sheet 4 shows the weekday computations for vehicle miles, and indicates that the 17,056 annual vehicle miles costs \$8,645.69, derived from parts, lube, fuel, taxes, etc. Sheet 5 for weekday service shows the costs attributable to the 6,765 annual passenger boardings, which total \$7.44. These total costs are assembled on sheet 6 for weekday service, and show a total annual cost (Row EE) of \$50,856.62, from which annual revenues of \$2,460 should be subtracted for an estimate of \$48,396.62 for the met annual cost of weekday service on line 203.

The same calculations can be made for each of Saturday and Sunday service and are shown on Sheets 3 through 6 for each of Saturday and Sunday. Sheet 6 for Saturday shows total annual costs of \$2,196.11, and annual net costs of \$996.11. Similarly, Sheet 6 for Sunday shows total annual costs of \$2,365.16 and net annual costs of \$1,065.16. Based on these three sheets, one might expect that total costs of all service on line 203 is the sum of the values on sheet 6 for the three periods, i.e. \$48,396.62 + \$996.11 + \$1,065.16, or \$50,457.89. However, the total line costs should be estimated from the totals of the vehicle hours, vehicle miles, and passenger boardings. This is shown on the next set of Sheets 3 through 6, which show a net annual cost of \$71,521.88. This cost is higher than the sum of the three periods, because an additional step is triggered in vehicle hours when the total vehicle hours of all three periods are summed.

#### 3.2.2 Example 2 -- Cancellation of 3 Lines from 2 Divisions

In this example, consider the cancellation of the following three lines:

- 1) Line 203 from Division 3 all service
- 2) Line 225/226 from Division 18 Saturday service only
- 3) Line 208 from Division 3 Sunday service only

The calculations of savings for line 203 are as shown in Example 1, above. For lines 225/226 and 208, Appendix B provides the work sheets for Saturday service on lines 225/226 and Sunday service on line 208. Table 3 shows a summary of the statistics and costs for all three lines, costed individually.

Because lines 203 and 208 are both out of Division 3, it is necessary to determine whether additional cost savings will arise if both lines are cancelled. To do this, Step 8, as outlined in Section 3.1 is used. The results of this are shown on the work sheets in Appendix C. In this case, the sum of the individual line savings (from Table 3 and the work sheets for lines 203 and 208) are \$96,500. Appendix C shows that the savings on the two lines counted from the Division are the same as the sum of the two lines, indicating that no additional savings from scale effects of combining the lines is achievable.

Finally, Step 9 should be followed to determine the total net savings to be obtained from cancellation of all of these lines together. The work sheets for this are shown in Appendix D. The addition of savings from the three lines taken individually amounts to \$230,920. The work sheets in Appendix D show that a small amount of additional savings are obtained District-wide, with the total savings for cancellation of the three lines being \$233,970. The additional savings are derived from the category of Non-Departmental Expenses, in the Provisions for and Expenses for PD insurance and claims. In total, the potential net savings from canceling these three lines are approximately \$234,000, representing the sum of the individual line savings and the District-wide savings. There are no additional divisionlevel savings that are obtained from these cancellations.

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## TABLE 3

## SERVICE STATISTICS AND COSTS FOR LINES 225/226, 208 AND 203

SOURCE	STATISTIC/COST					
	225/226	208	203			
Boardings/day	638	146	33/57/57			
Vehicle Hours/day	87.4	17.3	10.4			
Vehicle Miles/day	1587.1	241.2	83.2			
P.M. Peak Buses	7	1	1			
Daily Revenue	. \$317	. \$47	\$12/\$23/\$2			
Annual Boardings	33,176	7,592	12,921			
Annual Veh. Hrs.	4,545	900	3,255			
Annual Veh. Mls.	82,529	12,542	26,041			
P.M. Peak Buses	7	1	1			
Annual Revenue	\$16,484	\$2,444	\$4,960			
<u>Costs</u> :						
Passenger Boardings	\$36	\$8	\$14.21			
Vehicle Hours	\$105,320	\$21,064	\$63,192			
/eḥicle Miles	\$45,544	\$6y357	\$13,200.18			
Peak Buses	<u>0</u>	0	\$75.49			
otal Cost Savings	\$150,900	\$27,429	\$76,481.88			
let Cost Savings by Line	\$134,416	\$24,982	\$71,521.88			

#### 4. LIMITATIONS ON THE MODEL APPLICATION

#### 4.1 IMPACTS OF CHANGING SERVICE LEVELS AND ORGANIZATION

The primary limitation on the use of the model for estimating costs is that the step costs and unit costs are based on the projection of labor and District organization that were provided in mid-1985 for the FY 1986 calibration. As a result, the model does not currently account for the closing of Division 2 and the consequent reduction in the total number of operating divisions. Also, if significant changes are proposed in service levels, the model should be recalibrated to adjust step sizes for all stepwise variables, and also adjust the unit costs in Tables 1 and 2 for the distribution of "fixed" costs. This recalibration takes into account the changes in the base over which the various costs are spread. If service levels are increased, the bases of peak buses, vehicle hours, vehicle miles, and passenger boardings are all likely to increase. If service levels are decreased, each of these bases are also likely to decrease. In the former case, unit costs of fixed budget items will decrease, and step sizes of stepwise variables will increase, until a reorganization of the District takes place. In the latter case, unit costs of fixed budget items will increase, and step sizes of stepwise variables will decrease, again, until a reorganization takes place. When service changes are small, these concerns are unlikely to have a significant effect on the estimation of costs, although subsequent sensitivity tests will be undertaken to determine the extent of these effects. It is clear that major system changes, on the order of +10 percent or more of current service will have significant effects on the accuracy of the estimated costs.

TOTAL

SHEET 4 OF 6

الريار الارتياس ومرسوم مرد مدرد الم

\$45,543

DIVISION	NO. 18	· · · · ·	LINE	NO. 225/22	<u></u>
TEHICLE M		2,529 úmber from Shei	et 1) Š	EEKDAY [] ATURDAY [] UNDAY []	
Түре	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	82,529	0.2366	\$19,526	Maint.Oper.Divisions   Parts, lube, etc.
Dirëct	1.0	82,529	0.2703	\$22,307	Non-Departmental Exp Fuel and Taxes
Step S	69,332	1	3,710	\$3,710	Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	_	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810		40,186	+	Maint. Oper. Div. Running Repairs
Step D	2,149,300		40,180		Maint. Oper. Div.   Inspectors
Step S	2,755,513	_	40,179		Central Maintenance     Running Repairs
Step S	2,904,459		40,189	1	Central Maintenance Mechanical
Step S	3,160,735	_	40,206	+	Central Maintenance Electrical
	3,358,281		40,187	di en en vel kal la la la va vel val de la la la la la la la la la la la la la	Central Maintenance Body Shop
Step S	3,582,167		40,200		Central Maintenance Transmission
Step S	3,960,185	_	39,984		Central Maintenance Engine Line
Step S	4,477,708		40,209	+	Central Maintenance Welding
Step S	5,656,053	ار می نور بر نور بر این می اور ای اور این می نور این می این می این می این می این می این می این می این می این می این می این می این می این می این م این می این می	بريا ميمايينين 80 <b>,3</b> 16	۲	Central Maintenance   Cyl. Hd. & Paint Sh
Step S	7,676,071		80,430	**************************************	Central Maintenance   Mach.Shp & Sht.Met.
Step S	8,266,538		80,462		Central Maintenance   Frame Shp & Uphols.
	ا وم مدينة من عليه معاهد عد عد عد عومه •	ل كاريام هذية يتركز المعرب سريار . -	- and and the first first star part of	ter an an an an an an an an an an an an an	an an an an an an an an an an an an an a

EHICLE M	ILÈS(cont.) (enter n	82,529 umber from Shee	(Q) W et 1) S S	EEKDAY [] ATURDAY [] UNDAY []	
TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.		الم الم الم الم الم الم الم الم الم الم	ار از این می در در مرجوع این اور این این این این این این این این این این	\$45, \$43	و محمد بند مربق الروان و الترجيم محمد مربق محمد محمد محمد محمد محمد محمد محمد محم
Step S	9,769,545	-	40,182		Central Maintenance   Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833		40,166	ار مرجوع بی مرکز بر این مرکز بر مرکز مرکز می مرکز مرکز بر مرکز مرکز می مرکز مرکز م	Maint. Oper. Div.   Road Failure
Step S	21,493,000		40,033	الم الم الم من من الأر مراجع بين عليه الم من من المراجع بين عليه من عليه المراجع بين عليه من عليه من من عليه م من مسالحة الم من من المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع الم	Central Maintenance   Sign Shop
	26,866,250	+	40 <b>,</b> 250		Central Maintenance   Tool & Unit
TOTAL	+ = === = = = = = = = = = = = = = = = =			\$45,543	ان با این این از با این سر بین می این این می این می این می این می این می این می این می این می این می این می ای این این این این می این می این می این می این می این می این می این می این می این می این می این می این می این می ای

SHEET 5 OF 6

FY 1986 COST BASIS

# LINE NO. \_225/226 DIVISION NO. 18 WEEKDAY Saturday Sunday

PASSENGER BOARDINGS 33,176 (V) (enter number from Sheet 1)

TOTAL	منبوب بوند:			\$36.49	
Step S	19,290,909		30,955		Marketing & Commun Ticket Clerks
Step S	12,860,606		32,273		Accounting & Fiscal Cash Clerks
Step S	12,482,353	_	34,470		Transit Police Passenger Security
Step S	4,715,555		29,678		Customer Relations
Step S	163,231	-	14,481		Non-Departmental Ex Provisions for PL
Step S	163,231		524		Non-Departmental Ex Expenses for PL
Direct	1.0	33, 176	0.0011	\$36.49	Print Shop   Timetables
ТҮРЕ	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE

DIVISION NO. 18

LINE NO. 225/226

PERIOD:

TOTAL LINE AND PERIOD COSTS

SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	
TOTAL, Sheet 3, Column 0 - Hours (BB)	\$105,320
TOTAL, Sheet 4, Column U - Miles (CC)	\$45,543
TOTAL, Sheet 5, Column AA- Pass. (DD)	\$ 36.49
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	\$150,899.49
PASSENGER REVENUE - Sheet 1 (FF)	\$16,484
TOTAL NET COSTS (EE-FF)	\$134,415.49

### APPENDIX C

## WORK SHEETS FOR DIVISION 3

SHEET 1 OF 6

# DIVISION NO. 3

LINE NO. (203 + 208)

SOURCE	WEI DAILY STATISTIC (A)	KDAY   ANNUAL   STATISTIC   B=(A)*255	SATURI DAILY STATISTIC (C)	DAY ANNUAL STATISTIC D=(C)*52	SUNE DAILY Statistic (E)	AY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL (B+D+F)
Peak Buses	1			in a star in a star par par par par par par par par par p			{ 
Vehicle Hours		2,132		541		1,481	4,154
Vehicle Miles		17,056	a da ing ing ing ing ing ing ing ing ing ing	4,326		17,201	38,583
Pass. Boarding		6,765		2,964	hyna na na siy na siy na siy na siy	3,338	13,067
Pass. Revenue		\$2,460		\$1,196		\$3,732	\$7,388

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	FY 1986 CO	OST BASIS				SHEET 2 OF 6
	DIVISION N	10. 3	<u> </u>	LINE	NO. 203 &	208
	PEAK BÜSES	(enter num	1 Der from Sheet	(G) <u>U</u> 1) <u>D</u>	ISE FOR WEEKD	AY SERVICE ONLY R SATURDAY OR SUNDAY
	ТΫРЕ	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J )	COMMENTS/SOURCE
	Direct	1.0	1	75.4907	\$75.49	Facilities Maint.   Radio Supplies
	Step D	5.8	_	31,945		Maint. Oper. Div. Servicing
	Step S	31.5	-	42,645		Scheduling Sched. Checkers
	Step D	33		31,771		Maint. Oper. Div.   Service Deep Clean
	Step D	33.1		40,179		Maint. Oper. Div. Wheelchair Lift Ser
	Step S	47	_	39,927		Facilities Maint.   Electronics Maint.
	Step D	60.2	_	40,173		Maint. Oper. Div.   Farebox Maint.
	Step D	110		40,025		Maint. Oper. Div.   Special Projects
	Step S	117		32,032		Central Maintenance   Service
•	Step S	142	-	275,925		Facilities Maint.   Elec.,Prop.,Supp.
	Step S	142	_	50,168		Maintenance General Instruction
	Step D	153		750,139		Transportation Oper.    Division
	Step S	153	_	44,121		Transportation Serv. Radio Dispatchers
	Step D	153	~	729,656		Maint. Oper. Div. Misc., Supp., Admin
Ì	Step D	153	ا من من من هذه من من من من من من من من من من من من من	96,867		Contracts & Purch.
	Step S	166		47,954		Central Maintenance
	TOTAL		ار بار بار از این این این این این این این این این این	و به رو و رو و رو و و رو و و و و و و و و و	\$75.49	به مانه منها به به به به به به به به به به به به به
	- Praya na managing di A			فيرابغ ليوا مياها هي جا ها بلك ال		ى يېزى بىلۇر بىرى يېغىنىڭ ئۆلۈكۈنى بىلىغانىيە بىرى يەر يەر يەر يەر يەر يەر يەر يەر يەر يەر

SHEET 3 OF 6

DIVISION NO.	3	-	LINE	NO. 203	3 \$ 208
VEHICLE HOURS (	4,15 enter number		(L) )	WEEKDAY Saturday Sunday	

ТҮРЕ	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUAL COST (P= N*O )	COMMENTS/SOURCE
Step D	853	4	19,383	\$77, 532	Transp.Oper.Div. Operators
Step D	853	4	1,681	\$6,724	Non-Departmental Exp Wkmn's CompOper.
Step S	216,714	erre Frank in antini in in in in in in in in in in in in	34,400	مراجع سر آمر اس مراجع کر روز مرز مرز مرز مرز مرز مرز مرز مرز مرز مر	Maint.Oper.Divisions    Non-revenue Maint.
Step S	329,783	en Le al minimization de la constant de la	42,044	and the second second second second second second second second second second second second second second secon	Scheduling Dept.
Step S	421,400		44,002	المالك (لي المحالية المالية المالية المالية المالية المحالية المالية المالية المالية المالية المالية المالية ال المالك (لي المحالية المالية المالية المالية المالية المحالية المحالية المالية المالية المالية المحالية المحالية	Transportation Serv.
Step S	446,176	ب معر بنا هو هو بنا الله الله الله معر بنا الله الله الله الله الله الله الله ال	34,471	+	Transit Police Transp. Serv. Insp.
Step S	474,000		44,244	frank har bergen en fak som og for en fak 	Transportation Inst.    Operator Training
Step S	632,083	┝╺╾╺╗╼╷╾ <sup>┲</sup> ┍ —	31,084	ŧ,-j:;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	Account. & Fiscal Payroll Clerks
TOTAL	ابدر ه نیر سربر بی نم می می سرب نه نه نه به موجود ان می سربر و مربو و موجود	الي مير ميارين ميري مي مي مي مي خو خو هم الله مي مي مي مي مي ميري ميري ميري مي br>ميري مي	د هر هر مراحد مراحد کرد. اور آهار هر مراحد آمار مراحد - مراحد امراحد امراحد مراحد ارد ارد ارد.	\$84,256	+ en al an an an an an an an an an an an an an

01110101 110+ ~ ETHE HOL HOS ١. 

 VEHICLE MILES
 38,583
 (Q)
 WEEKDAY
 [~]

 (enter number from Sheet 1)
 SATURDAY
 [~]

 SUNDAY
 [~]

e se in si se e se ini	+	∲~~,•,•,•,•,•, <u>~</u>	بير بيريد وريد هو مديد		ومرجوعة كرمانها كرك مترقدتها كالكرك مرجا
ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
Direct	1.0	38,583	0.2366	\$9,128	Maint.Oper.Division   Parts, lube, etc
Direct	1.0	38,583	0.2703	\$10,428	Non-Departmental Ex Fuel and Taxes
Step S	69,332		3,710		Non-Departmental Ex Wkmn's Comp. Maint
Step S	107,465	-	3,055		Non-Departmental Ex Exp.& Prov for PD
Step D	178,810	an an an an an an an an an an an an an a	40,186		Maint. Oper. Div.   Running Repairs
Step D	2,149,300	يوني نوري هو اين الفريقي الفريقي الفريقي الفريقي المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع 	40,180	↓	Maint. Oper. Div.
Step S	2,755,513		40,179	]	Central Maintenance   Running Repairs
Step S	2,904,459	- مربع نام مربع بين مربع من مان مربع من مان مربع مربع مربع من مان من	40,189	# «تواکیند» منابقیتی» به معرود 	Central Maintenance   Mechanical
Step S	3,160,735		40,206	+ (	Central Maintenance
Step S	3,358,281		40,187	+	Central Maintenance Body Shop
Step S	3,582,167		40 <b>,</b> 200	∯¢e;es;es ⊕ æ,es,es,es =; ⊕ = = = }   	Central Maintenance
Step S	3,960,185	<del>ا سرحی</del> ت دا که حج په رغ ج جر سر سر مراجع ا 	39,984	tristi film formation di sono   	Central Maintenance
Step S	4,477,708		40,209	+	Central Maintenance  Welding
Step S	5,656,053	به <u>فرنج من ون</u> اخر و به نم هان مرو م 	80,316	∲	Central Maintenance Cyl. Hd. & Paint S
Step S	7,676,071	·	80,430	franker ander er selfer forstaller   	Central Maintenance Mach.Shp & Sht.Met
Step S	8,266,538	+	80,462	4- da, juli, han, da, 488 (da, 100, 100 juli, juli, juli, juli, juli, juli, juli, juli, juli, juli, juli, juli 	Central Maintenance Frame Shp & Uphols
TOTAL	نېزىنىيە بەرمىرمىت سىي مەخۋەزىرىرىرىي	الى ئەرىمىدىنى ئەركەر بىلىپى مەركەرىپ 1 - ھارىغان ئەركەر بىلەر بى	- سېلىرچەك ھەلىيې ب قەرچە ، ھەرھە ھەرمۇ ھەرت مەر	\$19,556	اً اين که مدر به ۱۸ زیریترایت مدرمهاسرطوط کم رسیدی میرون مدر میز شو سرمتر سر برای کر گذرگ هد مد هار نوع کوروس



SHEET 4B OF 6

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DIVISION NO.	3	<u> </u>	LINE	NO. 2	03 \$ 208
VEHICLE MILES	(cont.) (enter num	<u>38,583</u> ber from Shee	(Q) k t-1) S S	VEEKDAY Saturda Sunday	[/] Y [/] [/]

	اها ها بدر غار بير بير بير مار ها ها باز ب	والمداغة فترغذ أشرعنا فأرحدهم ساحر سرج			ويبدعوه بحرجا بعرجة فمعر بلارهم محج مريور عربته مترغه تواد
ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	7	ا می می می می با بی می		\$19,556	
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teardr
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
-	21,493,000	-	40,033		Central Maintenance   Sign Shop
Step D	26,866,250		40,250		Central Maintenance   Tool & Unit
TOTAL				\$19,556	ين من شيخ التركيم من من من شركة من من من من من من من من من من من من من

SHEET 5 OF 6

FY 1986 COST BASIS

DIVISION NO. 3 LINE NO. 203 \$ 208

PASSENGER BOARDINGS 13,067 (V) WEEKDAY [-] (enter number from Sheet 1) SATURDAY [-] SUNDAY [-]

TYPE.	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	13,067	0.0011	\$14.37	Print Shop   Timetables
Step S	163,231		524		Non-Departmental Ex Expenses for PL
Step S	163,231	-	14,481		Non=Departmental Ex   Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	+	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	+#~~~	30,955	***************************************	Marketing & Commun Ticket Clerks
TOTAL			in a in in in a na an an	\$14.37	

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FY 1986 COST BASIS	
DIVISION NO. 3	ENO. 203 € 208
TOTAL LINE AND PERIOD COSTS PERIOD:	SATURDAY [1] SUNDAY [1]
نايه، در بين مي هو هو يع بين المركز بين بين من من يو يو يو بين من من يو يو يو يو يو يو يو يو يو يو يو يو يو	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	+10.47
TOTAL, Sheet 3, Column 0 - Hours (BB)	\$84,256
TOTAL, Sheet 4, Column U - Miles (CC)	\$19,556
TOTAL, Sheet 5, Column AA⇒ Pass. (DD)	\$14.37
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	\$103,901.86
PASSENGER REVENUE - Sheet 1 (FF)	\$ 7,388
TOTAL NET COSTS (EE-FF)	\$96, 513.86

والمرجع فليما وتراجع تشركة للترجع فيرجع أحجامه

## APPENDIX D

## WORK SHEETS FOR DISTRICT-WIDE COSTS/SAVINGS

SHEET 1 OF 6

## DIVISION NO. SCRTD

## LINE NO. 203,208,225/226

ويعرهو بعرجه بعريه معرهو وا	•		والمراجع فالمتحافظ والمراجع	مر بر بر بر بر بر بر بر مر بر	+	يحر عادر مدرعة بشرحه بعد عدر ع	+
SOURCE	WEI DAILY STATISTIC (A)	EKDAY ANNUAL STATISTIC B=(A)*255	SATURI DAILY STATISTIC (C)	DAY   ANNUAL   STATISTIC   D=(C)*52	SUN DAILY STATISTIC (E)	ANNUAL	ANNUAL TOTAL (B+D+F)
Peak Buses	1			هر می به به به به به به به به به به به به به		· · · · · · · · · · · · · · · · · · ·	
Vehicle Hours		2,132		5,085	-	1,481	8,698
Vehicle Miles		17,056	و مر مو هر منو بند بند و م	86,855	h na, na na na na na na na na na na na na na	17,201	121,112
Pass. Boarding	14 gas, etc. jung jung jung jung dan men	6,765		36,140	المترجع معتزم بغريت فيكف	3,338	46,243
Pass. Revenue		\$2,460		\$17,680		\$3,732	\$23,872

	FY 1986 C	OST BASIS				SHEET 2 OF 6
	DIVISION	NO. <u>5 CR</u>	TD	LINE	NO	
	PEAK BUSE	S <u>l</u> (enter num	ber from Sheet	(G) (G) (	USE FOR WEEKD DO NOT USE FO	AY SERVICE ONLY R SATURDAY OR SUNDAY
	TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J )	COMMENTS/SOURCE
	Direct	1.0	1	75.4907	\$75.49	Facilities Maint. Radio Supplies
	Step D	5.8	_	31,945		Maint. Oper. Div. Servicing
	Step S	31.5	-	42,645		Scheduling Sched. Checkers
	Step D	33		31,771		Maint. Oper. Oiv. Service Deep Clean
	   Step D	33.1		40,179		Maint. Oper. Div.   Wheelchair Lift Ser
	Step S	47	_	39,927		Facilities Maint.   Electronics Maint.
	Step D	60.2	-	40,173		Maint. Oper. Div.   Farebox Maint.
	Step D	110		40,025		Maint. Oper. Div.   Special Projects
	Step S	117		32,032		Central Maintenance Service
•	Step S	142	_	275,925		Facilities Maint. Elec.,Prop.,Supp.
	Step S	142	_	50,168		Maintenance General   Instruction
•	Step D	153	-	750,139		Transportation Oper. Division
	Step S	153	-	44,121		Transportation Serv. Radio Dispatchers
	Step D	153		729,656		Maint. Oper. Div. Misc., Supp., Admin
	Step D	153		96,867	) - The set of the set of set of set of set of set of set of set of set of set of set of set of set of set of s 	Contracts & Purch. Storekeepers
-	Step S	166		47,954	n an	Central Maintenance   Cent. Shop Superv.
	TOTAL		ال المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع الم المراجع المراجع br>10 م مراجع المراجع المر		\$75.49	
•	والفرافية يتواهرها مرحاما ك		ور هو هو هو هو هو هو هو هو هو مراجع مراجع مراجع . ور هو هو هو هو هو هو هو هو هو هو مراجع مراجع .	نيونيۇلىرى بەركە مەكەرىكە. ئىرىكى	, a 614 - 12 20 20 20 20 20 20 20 20 20 20 20 20 20	ى. 1. يەرىپەرلىرىيەت يىغى ئىلغۇللارتىغتارىت بىغىلىتى بىرىغى د

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SHEET 3 OF 6

DIVISION NO.	SCETD	_ LINE	NO	
VEHICLE HOURS	8,698 (enter number	(L) from Sheet 1)	WEEKDAY Saturday Sunday	

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	ТҮРЕ	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUAL COST (P≕ N*O )	COMMENTS/SOURCE
+:	Step D	853	4+5 ≠ 9	19,383	\$174,447	Transp.Oper.Div. Operators
	Step D	853	4+5 <i>-</i> 9	1,681	\$15,129	Non-Departmental Exp Wkmn's CompOper.
	Step S	216,714	-	34,400		Maint.Oper.Divisions   Non-revenue Maint.
	Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
	Step S	421,400	-	44,002		Transportation Serv. Street Supervisors
+-   	Step S	446,176		34,471	     	Transit Police   Transp. Serv. Insp.
╉╺ ╎ ╎	Step S	474,000		44,244	ار هم هم بسرا بین از با می بین از با دارد. هم گس بسرا بین از با می بین از با دارد.	Transportation Inst.
<b>∔</b>   	Step S	632,083		31,084	₩₩ <u>₩₩₩₩₩₩₩₩₩</u>   	Account. & Fiscal Payroll Clerks
+- 	TOTAL		ال این پس سر اندازی بر سه ۲۵ ساره این سر مان ماه این ماه به ماه به سر مه مدرسیسز		\$189,576	

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SHEET 4 OF 6

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DIVISION NO. SC	RTD	LIŃ	E NO	
VEHICLE MILES	121,112 number from Sheet	_(Q) 1)	WEEKDAY Saturday Sunday	
د مربع و مربع المربع المربع و مربع و مربع المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع				

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-	ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
-	Direct	1.0	121,112	0.2366	\$28,655.10	Maint.Oper.Divisions Parts, lube, etc.
-	Direct	1.0	121,112	0.2703	\$32,73657	Non-Departmental Exp Fuel and Taxes
	Step 3	69,332	1	3,710	\$ 3,710	Non-Departmental Exp Wkmn's Comp. Maint.
	Step S	107,465	1	3,055	\$ 3,055	Non-Departmental Exp Exp.& Prov for PD
-	Step D	178,810	ame 1	40,186	- il v in a la constant a la constant a la constant a la constant a la constant a la constant a la constant a	Maint. Oper. Div. Running Repairs
4	Step D	2,149,300	ا چې نو وې کې د وې کې کې کې د و د و و و و و و و و و و و و و و و و	40,180		Maint. Oper. Div. Inspectors
-	Step S	2,755,513	ه د د و و رو به می می می می می می می می او د د د و و رو به می می می می می	40,179		Central Maintenance Running Repairs
+	Step S	2,904,459	}- = + = + + = + + = + + = + + + = + + + + = +	40,189	۹- نو کو این می بند (میریو رسی سر کو کر 	Central Maintenance Mechanical
+	Step S	3,160,735		40,206	   	Central Maintenance Electrical
•	Step S	3,358,281		40,187	╊╒╾╾╾╕╬╬╬╼╺╾┶┉┤ │ │	Central Maintenance Body Shop
-	Step S	3,582,167	ان هنه می خرد و در معرم به در معرم 	40 <b>,</b> 200	∱ (i=, == =="a"; ==, ==, ==, ==     	Central Maintenance Transmission
	Step S	3,960,185	•	39,984	tritii (territori den misses f 	Central Maintenance Engine Line
+	Step S	4,477,708		40,209	<u>لەر مەھەر مەرىپى مەرىپى بەرىپى بە</u>	Central Maintenance Welding
•	Step S	5,656,053	د به الای سر می نود به موجد می از می می می از می اور اور اور اور اور اور اور اور اور اور	80,316	)	Central Maintenance Cyl. Hd. & Paint Sh
1	ا جرب می در در در مرابع ا	7,676,071	     	80,430	!~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Central Maintenance   Mach.Shp & Sht.Met.
		8,266,538	ایت شده بر مربع به مواجه شور هوی بود. 	80,462	<u>ۇ. ئىدۇرىشە بىدە 100 يىلەر 100 يىلەر 100 يىلەر 100 يىلەر 100 يىلەر 100 يىلەر 100 يىلەر 100 يىلەر 100 يەلەر 100</u>	Central Maintenance   Frame Shp & Uphols.
	TOTAL	ار بر شرید بارد مار هوید هد مد مد مد	لو نو امر ها شار نام کار شار در بد ساله من او بو امر ها شار نام کار شار در ساله من او با ما ما ما کار مار در ما	. سالما مر مر مرام به هم - سالما مر مر مر مرام به هم	\$68, 156 67	ا با با بازی این م به مرید مروم مروم به هرم مروم به در م هر می می به افاد با به باره کاره فا با مرید سرم مرابق می می ا

DIVISION NO. SCRITD	LIN	E NO	
VEHICLE MILES(cont.) (enter numbe	$\frac{121,112}{12}$ (Q) or from Sheet 1)	WEEKDAY Saturday Sunday	

والاستريب سرمد ف		والمحافظ فلارتك فكالتك تشاعدهم والمرجو	يور ور بعر مار ما در در بور مر م	هادها بنارية فترتج تدريني سرسر سرسيه	در در این در باری بر بار به در به هر در در به <mark>مربور بر د</mark> ر شرک کرد. ا
TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
TOTAL Bt.Fwd.		ار می این با بین می وی بین بین بین بین بین بین بین بین بین می ورد این می ورد این می می می می می می می می می م می می  به به به به به به به به به به به به به ب	\$68,156.67		
Step S	9,769,545	_	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance   Engine Pts & Teardr
Step D	17,910,833		40,166		Maint. Oper. Div.   Road Failure
Step S	21,493,000		40,033		Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance   Tool & Unit
TOTAL				\$68, 156.67	مەتىماتىڭ يېڭىغ بىرىيە بىرىيە بىرىيە يېزىچىنى بىرىيە سىرىيە بىرىيە. مەرىماتىڭ يېڭىغ بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىيە بىرىي يېلىيە يېرىيە بىرىيە

SHEET 5 OF 6

FY 1986 COST BASIS

DIVISION NO. <u>SCETD</u>	<u>)                                    </u>	LINE NO	•	
PASSENGER BOARDINGS (enter	46,243 number from	(V) Sheet 1)	WEEKDAY Saturday Sunday	

ТҮРЕ	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	46,243	0.0011	\$50.87	Print Shop   Timetables
Step S	163,231		524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353		34,470		Transit Police Passenger Security
Step S	12,860,606		32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	م به به به به به به به به به به به به به	30,955	+4,≈46,≈,≈≈≈≈≈≈     +	Marketing & Commun. Ticket Clerks
TOTAL		***		\$50.87	الم مرجوع مرجوع هو من مركز المرجوع مرجوع مرجوع المرجوع المرجوع المرجوع المرجوع المرجوع المرجوع المرجوع المرجوع منه المرجوع مرجوع المرجوع المرج

DIVISION NO. SCRTD

TOTAL LINE AND PERIOD COSTS

LINE NO. 203,208,225/226

NE AND PERIOD COSTS	PERIOD: WEEKDAY [/] SATURDAY [/] SUNDAY [/]
	VALUE
TOTAL, Sheet 2, Column I (AA)	
TOTAL, Sheet 3, Column 0 (BB)	1
TOTAL, Sheet 4, Column U (CC)	· 1 1
TOTAL, Sheet 5, Column A/ (DD)	1
TOTAL COSTS (Sum 4 rows a (AA+BB+CC+DD= EE)	above) \$257,859.03
PASSENGER REVENUE = Sheet (FF)	1
TOTAL NET COSTS (EE-FF)	\$233, 987.03

### APPENDIX A

## WORK SHEETS FOR LINE 203

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SHEET 1 OF 6

DIVISION NO. 3

LINE NO. 203

-	SOURCE	WEI DAILY STATISTIC (A)	EKDAY ANNUAL STATISTIC B=(A)*255 295	SATURI DAILY STATISTIC (C)	DAY   ANNUAL  STATISTIC  D=(C)*52	SUNI DAILY STATISTIC (E)	DAY ANNUAL STATISTIC F=(E)*58	ANNUAL TOTAL (B+D+F)
-	Peak Buses		295	میں میں میں میں میں میں میں میں میں میں	میرین که مراجع میرین از مانی مراجع میرین که مراجع میرین مراجع میرین که مراجع	,,		1
	Vehicle Hours	10.4	2,132	10.4	541	10:4	582	3,255
	Vehicle Miles	83.2	17,056	83.2	4,326	83.2	4,659	26,041
	Pass. Boarding	33	6,765	57	2,964	57	3,192	12, 921
	Pass. Revenue	\$12	\$2,460	\$23	\$1,196	\$23	\$1,288	\$4,944

FY 1986 C	OST BASIS				SHEET 2 OF 6
DIVISION	NO. <u>3</u>		LINE	NO. 203	<u> </u>
PEAK BUSE	S (enter num	ber from Sheet	(G) L 1) <u>C</u>	USE FOR WEEKD	AY SERVICE ONLY R SATURDAY OR SUNDAY
TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP CDST (J)	ANNUAL COST (K= I*J )	CDMMENTS/SOURCE
Direct	1.0	1	75.4907	\$75.49	Facilities Maint. Radio Supplies
Step D	5.8	_	31,945		Maint. Oper. Div. Servicing
Step S	31.5	_	42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div. Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div.   Wheelchair Lift Ser
Step S	47	ار می بین هرای سر می بین می اور این می اور این می اور این می این می این می این می این می این می این می این می این می بین می این می	39,927	e e e de la constante br>e de la constante br>e de la constante	Facilities Maint.   Electronics Maint.
Step D	60.2	ار هم هم هم هم کار هم کار این این این می این می این می باد میرین	40,173		Maint. Oper. Div.   Farebox Maint.
Step D	110		40,025	+	Maint. Oper. Div.   Special Projects
Step S	117		32,032		Central Maintenance Service
Step S	142		275,925		Facilities Maint. Elec.,Prop.,Supp.
Step S	.142		50 <b>,16</b> 8		Maintenance General   Instruction
Step D	153		750,139		Transportation Oper.
Step S	153		44,121	<u>+</u>	Transportation Serv.
Step D	153		729,656		Maint. Oper. Div.   Misc., Supp., Admin
Step D	153		96,867		Contracts & Purch.
Step S	166	-	47,954		Central Maintenance Cent. Shop Superv.
TOTAL		an ar an ar an an an an an an an an an an an an an	. د. د. اور اور در د. د. د. . د. د. اور اور ور در در در مر مر	\$75.49	ا میں بی سی میں بی بی بی بی بی بی بی بی بی بی بی بی بی

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SHEET 3 OF 6

DIVISION NO	3	_ LINE	NO	203
VEHICLE HOURS (	2,132 enter number	(L) from Sheet 1)	WEEKDAY Saturday Sunday	
				un jur an de parties en en en en en en en en en en en de jur de jur en en en en en en en en en en en en en

_	TYPE	STEP SIZE (M)	NUM8ER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUAL COST (P= N*O )	COMMENTS/SOURCE
	Step D	853	2	19,383	\$38,766	Transp.Oper.Div. Operators
-	Step D	853	2	1,681	\$3,362	Non-Departmental Exp Wkmn's CompOper.
-	Step S	216,714	-	34,400		Maint.Oper.Divisions    Non-revenue Maint.
	Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
	Step S	421,400	-	44,002	 	Transportation Serv. Street Supervisors
	Step S	446,176	-	34,471		Transit Police Transp. Serv. Insp.
-	Step S	474,000	-	44,244		Transportation Inst. Operator Training
	Step S	632,083		31,084		Account. & Fiscal Payroll Clerks
	TOTAL		ان و با با با با با با با با با با با با با		\$42, 128	

SHEET 4 OF 6

DIVISION NO.	3	LIN	E NO	203
VEHICLE MILES	17,056 (enter number from Sheet	(Q) 1)	WEEKDAY Saturday Sunday	

ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
)irect	1.0	17,056	0.2366	\$4,035.45	Maint.Oper.Divisions Parts, lube, etc.
)irect	1.0	17,056	0.2703	\$4,610.24	Non-Departmental Exp Fuel and Taxes
step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465		3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
Step D	2,149,300	به سرم می بود. 	40,180	* - * * * - * - * * * * * * * * * * * *	Maint. Oper. Div.   Inspectors
Step S	2,755,513		40,179		Central Maintenance Running Repairs
Step S	2,904,459		40,189	a na falan a sa  Central Maintenance Mechanical	
Step S	3,160,735	-	40,206		Central Maintenance Electrical
Step S	3,358,281	+ <u>-</u>	40,187	+ = = = = = = = = = = = = = = = = = = =	Central Maintenance Body Shop
Step S	3,582,167	_	40,200		Central Maintenance Transmission
Step S	3,960,185		39,984		Central Maintenance Engine Line
Step S	4,477,708		40,209		Central Maintenance Welding
Step S	5,656,053		80,316	kan a sa a sa	Central Maintenance Cyl. Hd. & Paint Sh
Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
Step S	8,266,538	+	80,462	<ul> <li>▲</li></ul>	Central Maintenance Frame Shp & Uphols.
TOTAL	الم الله الم الم الم الم الم الم الم الم الم الم	ال المراجع من عن من		\$8,645.69	الم الا الذي المانية الم المعالم المانية المعالم المانية المانية المانية المانية المانية المانية المانية المان المرابقة المانية br>المانية المانية

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SHEET 4B OF 6

DIVISION NO	3	LINE NO.	203
VEHICLE MILES(cc (er	nter number from She	(Q) WEEKD SATUR SUNDA	IAY [1] RDAY [1] IY [1]

TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
TOTAL Bt.Fwd.	ب میں بی بی بی بی بی بی بی بی بی بی بی بی بی	، ما به پر بر بن کر مار پر پیرون از این می بود. به به معرف می مارید. به به مارید با با با با با با به می مارید.	، هم هار خار اس وه . هار این این این این ا افغ خور هار هار سار بیان بیار - ماه ماه ماه ماه ماه ماه ماه ماه ما	\$8,645.69	ور میرید و باری از مربقه و این این این این این این این این این این
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125	-	80,250		Central Maintenance Engine Pts & Teard
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
•	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance Tool & Unit
TOTAL			a a a a a a a a a a a a a a a a a a a	\$8,645.69	هر مرتبع مرتبط می مرتبع مربع مرتبط می مرتبع این مرتبع ا

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SHEET 5 OF 6

DIVISION NO.	3	LINE ÑO	)203
PASSENGER BOARD	INGS 6,765 (enter number	(V) from Sheet 1)	WEEKDAY [/] Saturday [] Sunday []

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	6,765	0.0011	\$7.44	Print Shop Timetables
Step S	163,231		524		Non-Departmental Exp Expenses for PL
Step S	163,231	-	14,481		Non~Departmental Exp Provisions for PL
Step S	4,715,555	~	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	_	34,470		Transit Police Passenger Security
 Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	,	30,955		Marketing & Commun.   Ticket Clerks
TOTAL		an an an an an an an an an an an an an a		\$7.44	الم الم الم الم الم الم الم الم الم الم

SHEET 6 OF 6

WEEKDAY Saturday	

بالإيراب فالميانية والمراجع والمراجع ومراجع ومراجع أحاجت والمحاجم ومرجو والماعة المارقة المراجع والمراجع والمراجع	+ لا لا الم الم الم الم الم الم الم الم ا
SOURCE	VALUE
TOTAL, Sheet 2, Column I - Buses (AA)	\$75.49
TOTAL, Sheet 3, Column 0 - Hours (BB)	\$42,128.00
TOTAL, Sheet 4, Column U - Miles (CC)	\$8,645.69
TOTAL, Sheet 5, Column AA= Pass. (DD)	\$7.44
TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	\$50, 856.6Z
PASSENGER REVENUE - Sheet 1 (FF)	\$2,460
TOTAL NET COSTS (EE-FF)	\$48, 396.62

SHEET 3 OF 6

FY 1986 COST E	BASIS			
DIVISION NO.	3	_ L	INE NO.	203
VEHICLE HOURS	541 enter number	(L from Sheet 1)	) WEEK Satu	DAÝ [] RDAY [/]

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WEEKDAY

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	TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUÄL COST (P= N*O )	COMMENTS/SOURCE
	Step D	853		19,383	0	Transp.Oper.Div. Operators
	Step D	853	-	1,681		Non-Departmental Exp Wkmn's CompOper.
	Stëp S	216,714		34,400	   	Maint.Oper.Divisions Non-revenue Maint.
+	Step S	329,783		42,044		Scheduling Dept.
+,	Step S	421,400		44,002	Na produkter av de service av de service av de service av de service av de service av de service av de service	Transportation Serv. Street Supervisors
+.	Step S	446,176	ب مع بن الله عن الله الله الله الله الله الله عن الله الله عن الله الله الله الله الله الله الله عن الله الله ا 	34,471	*	Transit Police Transp. Serv. Insp.
+•	Step S	474,000	+,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	44,244	1 1 میں بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی بیاد کی	Transportation Inst. Operator Training
+:	Step S	632,083	£jini ingun, anjung na mina mina mina janjan mina ang 	31,084	+-,,,-,2;+;;;;;; ] ]	Account. & Fiscal Payroll Clerks
+-	TOTAL	این میرون کرون میروند. معالی جامع کرون مرد مرد مرد	ا- جي وجر هدر هد چي وي ده خلا حاد خلا خان هد چي هيرا مد الله الله هاه هاه خان الله مار بير يعني .	ا هر مه مداند مه مه مه . هر بور به بداره ای مراقب مراقب .	\$0.00	ت الم الم الم الم الم الم الم الم الم الم

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FY 1986 COST BASIS SHEET 4 OF 6 DIVISION NO. 3 LINE NO. 203 (enter number from Sheet 1) VEHICLE MILES WEEKDAY **(Q)** SATURDAY SUNDAY ANNUAL NUMBER OF STEP COMMENTS/SOURCE STEP SIZE TYPE COST STEPS COST (S= INT[Q/R]) (R) **(T)** (U=S\*T)Maint Oper Divisions \$1,023.53 Direct 4,326 0.2366 1.0 Parts, lube, etc Non-Departmental Exp Direct 1.0 4,326 Fuel and Taxes 0.2703 \$1,169.32 Non-Departmental Exp Wkmn's Comp. Maint. Stép S 69,332 3,710 Non-Departmental Exp Step S 107,465 3,055 Exp & Prov for PD Maint. Oper. Div. 178,810 Running Repairs Step D 40,186 Maint. Oper. Div. Step D 40,180 2,149,300 Inspectors Central Maintenance 2,755,513 40,179 Step S Running Repairs Central Maintenance 40,189 Step S 2,904,459 Mechanical Central Maintenance 3,160,735 40,206 Step S Electrical Central Maintenance Step S 40,187 3,358,281 Body Shop Central Maintenance 3,582,167 Step S 40,200 Transmission Central Maintenance 39,984 Step S 3,960,185 Engine Line Central Maintenance Step S 4,477,708 40,209 Welding Central Maintenance 5,656,053 Step S 80,316 Cvl. Hd. & Paint Sh Central Maintenance Step S 7,676,071 80,430 Mach.Shp & Sht.Met. Central Maintenance 80,462 Step S 8,266,538 Frame Shp & Uphols \$2,192.85 TOTAL

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SHEET 4B OF 6

FY 1986 COST BASIS

DIVISION NO.	3	LIN	E NO	203
VEHICLE MILES	(cont.) <u>A</u> (enter number f	326 (Q) from Sheet 1)	WEEKDAY Saturday Sunday	

الله مدين ورغه سريد غه	. هم مد شر تبدید و مربو مور هو هو هو			بنيا لذكر مركز أخراف أخراف أحراك	a là she a a a a she è a a a a a a a
ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
TOTAL Bt.Fwd.		د مرد به در به مرد مرد می مربع برمانی مرد مرد مرد مرد مرد مرد مرد مرد مرد مرد		\$2, 192.85	م من من من من من من من من من من من من من
Step S	9,769,545	-	40,182		Central Maintenance Systems
Step S	13,433,125		80,250		Central Maintenance   Engine Pts & Teardn
Step D	17,910,833	-	40,166		Maint. Oper. Div. Road Failure
	21,493,000	-	40,033		Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance Tool & Unit
TOTAL			المن المن المن المن المن المن المن المن	\$2, 192.85	مر میری در بر مزت که نیز به بعد مربع می اور می مربع پی در بر مزت که نیز بنیه به مدیر م

ومرضا فبالمرجا

SHEET 5 OF 6

أتحاكم سأرهد أسرحه معربت وتدانية

- بنوجو حديث فعا فعا ها

) LI 1300	0 003	I BASIS				SHEEL 5 UF 6
DIVISIO	DN NO	3		LINE	NO2C	3
PASSENG			2,964 ter number from		SATURDAY Sunday	
Түре		STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP ÇOST	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direc	:t	1.0	1 . 1	0.0011	\$3.26	Print Shop Timetables
Step	s	163,231		524		Non-Departmental Exp Expenses for PL
Step	s	163,231	-	14,481		Non-Departmental Exp Provisions for PL
Step	s	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step	s  12	2,482,353	_	34,470		Transit Police Passenger Security
Step	s  12	2,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step	s  19	,290,909		30,955		Marketing & Commun. Ticket Clerks

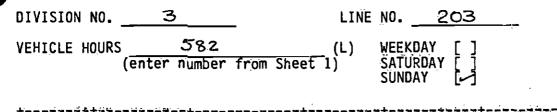
مترجع بمرجع فستحت والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والمحتر والم

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DIVISION	NO	3				LIN	E NO.	203	<u></u>
TOTAL LII	·					ERIOD:		WEEKDAY Saturday Sunday	
-		S	ÜRCI	E				VALUE	
4		, S <u>h</u> eet	: 2,	Column	I =	Buses	1 2 2	 	
4	TOTAL (Bi	_, Sheet	: 3,	Column	0 -	Hours			
	TOTAL (CC	., Sheet	4,	Column	U -		<b>\$</b> 2	192.85	
	(DC	<u>)</u>		Column	AA≒	Pass.	\$3	3.26	
	TOTAL (AA	COSTS	(Sun DD=	n 4 rows	abo	.		, 196.11	
	PASSE	NGER RE	VENL	JE = She	et 1		•	196	
		. NET CO	STS	(EE-FF)			\$ \	,000.11	

SHEET 3 OF 6

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	ТҮРЕ	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUAL COST (P= N*O )	COMMENTS/SOURCE
	Step D	853	-	19,383	0	Transp.Oper.Div. Operators
	Step D	853		1,681		Non-Departmental Exp Wkmn's CompOper.
+	Step S	216,714		34,400	ار بار مان مان مان مان مان مان مان مان مان مان	Maint.Oper.Divisions   Non-revenue Maint.
+	Step S	329,783		42,044		Scheduling Dept.   Schedule Makers
	Step S	421,400		44,002	<u>الم (تر المراجع الم الم الم الم الم الم الم الم الم الم</u>	Transportation Serv.   Street Supervisors
+.   	Step S	446,176		34,471	<u>+</u>	Transit Police   Transp. Serv. Insp.
+ · 	Step S	474,000		44,244	<u>له وقد تمركل تو مركل بو مركل بو رم وم</u> مرابع     	Transportation Inst.
÷.	Step S	632,083	ן- איזאי אין בי איי איי איין איי, איי, איי, איי, איי,	31,084	f -,, -, -, -, -, -, -, -, -,	Account. & Fiscal Payroll Clerks
	TOTAL	، سزی فرج نے پر سر نے کہ د کر میں ہے۔ ان مہ کا کر بر بے سر بے سر	و بی بر بر بر بر بر این که به از مار بر بر بر این بی بر بر بر بر بر بر این که به مزیر بر بر	، میں بی بی بی بی بی بی بی بی بی بی بی بی بی بی بی بی بی بی بی	\$0.00	+

	FI 1300 G	U21 BA212				<u>JUECT 4 01 0</u>
	DIVISION	NO. <u>3</u>	_ <u></u>	LINE	NO. <u>203</u>	
	VEHICLE M		4,659 umber from Shee	et 1) S	EEKDAY [] ATURDAY [] UNDAY [/]	
	TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
	Direct	1.0	4,659	0.2366	\$1,102.32	Maint.Oper.Divisions Parts, lube, etc.
	Direct	1.0	4,659	0.2703		Non-Departmental Exp Fuel and Taxes
	Step S	69,332	_	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
	Step S	107,465	÷	3,055		Non-Departmental Exp Exp.& Prov for PD
·	Step D	178,810		40,186		Maint. Oper. Div. Running Repairs
	Step D	2,149,300		40,180		Maint. Oper. Div. Inspectors
	Step S	2,755,513	_	40,179		Central Maintenance Running Repairs
	Step S	2,904,459		40,189		Central Maintenance Mechanical
	Step S	3,160,735	—	40,206		Central Maintenance Electrical
•	Step S	3,358,281		40,187		Central Maintenance Body Shop
	Step S	3,582,167	_	40,200		Central Maintenance
	Step S	3,960,185		<b>3</b> 9 <b>,984</b>		Central Maintenance   Engine Line
	Step S	4,477,708	_	40,209		Central Maintenance Welding
	Step S	5,656,053	_	80,316		Central Maintenance Cyl. Hd. & Paint Sh
	Step S	7,676,071	_	80,430		Central Maintenance Mach.Shp & Sht.Met.
•	Step S	8,266,538		80,462		Central Maintenance Frame Shp & Uphols.
	TOTAL	an in a se an an an an an an an an an an an an an	- به الله من الله الله الله من الله الله الله الله الله الله الله الل		\$2,361.65	الم الم الم الم الم الم الم الم الم الم
	∲,,,,,,,,,,,-	₽≈,≈,≈,≈,≈,≈,≈,≈, ₽≈,≈,≈,≈,≈,≈,	han in hai na ina an an an an an an an an an an an an a		poga, ang kilang poga ka	الم مد هد من توانية تحريق كالأنكان من يعني المالية المالية المالية. المالية من من توانية المالية المالية المالية عن المالية المالية المالية المالية المالية المالية المالية المالية

SHEET 4 OF 6

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DIVISION NO.	3	LINE NO.	2 <u>03</u>
VEHICLE MILES(c (e	ont.) <u>4,659</u> nter number from She	(Q) WEEKDA SATURD SUNDAY	

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ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
TOTAL Bt.Fwd.		, and the part of		\$2,361.65	
Step S	9,769,545	_	40,182		Central Maintenance   Systems
Step S	13,433,125		80,250		Central Maintenance Engine Pts & Teardu
Step D	17,910,833	-	40,166		Maint. Oper. Div.   Road Failure
Step S	21,493,000	-	40,033	م مربع مربع بر مربع این مربع م	Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance Tool & Unit
TÖTAL				\$2,361.65	ین بین بین مرحد نوب نوبز مرکب ساخان مان مان مان مان از مان از مان از مان از مان از مان از مان از مان از مان ما از مان بین مان مان مان مان مان مان مان مان مان ما

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SHEET 5 OF 6

DIVISION NO. <u>3</u>		LINE NO.	203	
PASSENGER BOARDINGS	<u>3,192</u> number from S	(V) Sheet 1)	WEEKDAY [] SATURDAY []	

ТҮРЕ	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	3,192	0.0011	\$3.51	Print Shop   Timetables
Step S	163,231	_	524		Non-Departmental Ex Expenses for PL
Step S	163,231		14,481		Non-Departmental Ex Provisions for PL
Step S	4,715,555		29,678	*	Customer Relations Telephone Clerks
Step S	12,482,353		34,470		Transit Police Passenger Security
Step S	12,860,606		32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909	+ 20 m = = = = = = = = = = = = = = = = = =	30,955	+422663266666666666666666666666666666666	Marketing & Commun   Ticket Clerks
TOTAL		<del>بار برگرد کر در در در در</del>   	i ana na ita ita na na ita ita	\$3.51	

DIVISION NO. 3	ĹĮ	<u>ve no2</u>	03
TOTAL LINE AND PERIOD CO	STS PERIOD	: WÉEKDAY Saturda Sûnday	
SOUR	ى سۇھۇچۇسۇرىيە ئۇرىپەرىكە تەرىپۇرىيە يەرىپۇرىيە يەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇر CE ئۆكتەرلۇرىيە ئۆرىيەرىزىم ھەتەرىيەرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇرىيە تەرىپۇر	VALUE	
TOTAL, Sheet 2 (AÃ)	, Column I ≓ Buses		
TOTAL, Sheet 3 (BB)	, Column 0 - Hours	\$0	
1	, Column U - Miles	\$2,361.6	
	, Column AA= Pass.	\$3.51	
TOTAL COSTS (S (AA+BB+CC+DD	um 4 rows above) = EE)	\$2, 365.1	ь
PASSENGER REVE	NUE - Sheet 1	\$1,288	
TOTAL NET COST	S (EE-FF)	\$1,077.16	1
	سرم مد مد سامه معنو ومرغو بني مرمد معرفت که منابع مد مد	و سا هه هه چه چه چه دو ده و دو دو ده که دو ده	

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SHEET 3 OF 6

 IVISION NO.
 3
 LINE NO.
 203

 VEHICLE HOURS
 3,255
 (L)
 WEEKDAY
 [-]

 (enter number from Sheet 1)
 SATURDAY
 [-]

FY 1986 COST BASIS

	وهواها فتشت سرعت تخذ عمر عبر بقا سواله				
ТҮРЕ	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STÉP COST (0)	ANNUAL COST (P= N*O )	COMMENTS/SOURCE
Step D	853	3	19,383	\$58,149	Transp.Oper.Div. Operators
Step D	853	3	1,681	\$5,043	Non-Departmental Exp Wkmn's CompOper.
Step S	216,714	_	34,400		Maint.Oper.Division Non-revenue Maint.
Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
Step S	421,400	-	44,002	2000	Transportation Serv. Street Supervisors
Step S	446,176	-	34,471		Transit Police   Transp. Serv. Insp.
Step S	474,000		44,244	ار بار بار بار بار بار بار بار بار بار ب	Transportation Inst. Operator Training
Step S	632,083		31,084		Account. & Fiscal Payroll Clerks
TOTAL	ور و مرکز بر از مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز ب ور هر این مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز بر مرکز ب		این در باری در از این ا	\$63,192	ار این بر باز این این این این این این بر برای باز باز باز این این این این این این این این این این

SHEET 4 OF 6

[	IVISION	NO3		LINE	NO. <u>203</u>	<u> </u>
	EHICLE M		معا umber from Shee	et 1) Sa	EEKOAY [.] ATURDAY [.] UNDAY [.]	
4	ТҮРЕ	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
	Direct	1.0	26,041	0.2366	\$6,161.30	Maint.Oper.Divisions Parts, lube, etc.
	Direct	1.0	26,041	0.2703	\$7,038.88	Non-Departmental Exp Fuel and Taxes
-	Step S	69,332		3,710		Non-Departmental Exp Wkmn's Comp. Maint.
	Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
-	Step D	178,810	-	40,186		Maint. Oper. Div. Running Repairs
	Step D	2,149,300	م تم تم الم الم الم الم الم الم الم الم الم ال	40,180		Maint. Oper. Div.
	Step S	2,755,513		40,179		Central Maintenance Running Repairs
4	Step S	2,904,459	4 - دین 40 - 18 مرفیر وب <sub>ر</sub> مرغ پور د 	40,189	h në të hëne në helet ka - h	Central Maintenance Mechanical
4	Step S	3,160,735	- <u> </u>	40,206	│ │ ↓ ``````````````````````````````````	Central Maintenance Electrical
4	Step S	3,358,281		40,187		Central Maintenance Body Shop
4	Step S	3,582,167		- <u>ترمرو</u> - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منهور - منه 40 <b>,</b> 200	]	Central Maintenance Transmission
-	Step S	3,960,185	ا می در د د م د رو رو ارم به تر مر مر م 	39,984	1	Central Maintenance Engine Line
-	Step S	4,477,708	,	40,209		Central Maintenance Welding
-	Step S	5,656,053	به هینه مینو مینونو مینونو مینونو 	ىرەرمەيمىرىمىيىنى 80 <b>,</b> 316		Central Maintenance Cyl. Hd. & Paint Sh
	Step S	7,676,071	-	80,430		Central Maintenance Mach.Shp & Sht.Met.
4	Step S	8,266,538	1	80,462		Central Maintenance Frame Shp & Uphols.
4	TOTAL	بو ه رس می می می می می می می می می می می می می			\$13,200.18  \$13,300.18	ا و منوف می بود و به به به به به به به به به به به به به
1	و ہو ہے ہے کہ بی جو ہی ہے ۔		هاري تيراني في يو شركي تيريني المحكمي من ا	, <u>19</u> a	ر ، ، ، ، ، ،	LASSESSESSESSESSESSESSESSESSESSESSESSESSE

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1986 COST BASIS

SHEET 4B OF 6

EHICLE M	ILES(cont.) (enter nī	26,041 umber from Shee	et 1) S	EEKDAY [1] ATURDAY [1] UNDAY [1]	
TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T)	COMMENTS/SOURCE
TOTAL Bt.Fwd.	ا به قد به قر ما به به به به به به به به به به به به به			\$13,200.18	
Step S	9,769,545		40,182		Central Maintenance Systems
Step S	13,433,125		80,250		Central Maintenance   Engine Pts & Teard
Step D	17,910,833		40,166		Maint. Oper. Div.   Road Failure
Step S	21,493,000		40,033	ا الم سراية الفريق مع مرينية (يشور مع مع مع مع مع مع مع مع مع مع مع مع مع	Central Maintenance Sign Shop
Step D	26,866,250	+	40,250		Central Maintenance   Tool & Unit
TOTAL	<u>م میکند بر میکند میکند میکند میکند. میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند می</u> مراجع میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکند میکن میکند میکند می		جرحيه برزيز بر مر ديمزيز برمر بريز بر مر	\$13,200.18	های بین یکی بینامش میز سازنی وی شین بین بین می سازند. های میگی بین بین بین بین بین بین بین بین بین بی

SHEET 5 OF 6

FY 1986 COST BASI	S
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DIVISION N	NO	3	LINE	NO	203	
PASSENGER		enter num	(V) Sheet 1	) <u>w</u> e ) Sa Sl	EKDAY TURDAY INDAY	

TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
Direct	1.0	12, 921	0.0011	\$14.21	Print Shop   Timetables
Step S	163,231		524		Non-Departmental Exp Expenses for PL
Step S	163,231	_	14,481		Non-Departmental Exp Provisions for PL
Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
Step S	12,482,353	-	34,470		Transit Police Passenger Security
Step S	12,860,606	-	32,273		Accounting & Fiscal Cash Clerks
Step S	19,290,909		30,955		Marketing & Commun. Ticket Clerks
TOTAL			an an an an an an an an an an an an an a	\$14.21	

1986 COST BASIS

SHEET 6 OF 6

DIVISION NO. 3 LINE NO. 203 WEEKDAY Saturday TOTAL LINE AND PERIOD COSTS PERIOD: SUNDAY ------VALUE SOURCE TOTAL, Sheet 2, Column I = Buses \$75.49 (AA) وجراحه فارتقر فوزت فترجه بعرك سرائه TOTAL, Sheet 3, Column 0 - Hours \$63,192 (BB) ويترجيهم مستحص فلاأته بترخير فترحن TOTAL, Sheet 4, Column U - Miles \$13,200.18 (CC) TOTAL, Sheet 5, Column AA Pass. \$14.2) (DD) TOTAL COSTS (Sum 4 rows above) \$76,481.88 (AA+BB+CC+DD = EE)وجد أبارتك بيريد وأرابة بترجد بيريد بيرجد بيرجد أنا تراج المراجع بتراجي **PASSENGER REVENUE - Sheet 1** \$ 4,944 (FF) الم المحركة المحركة المحركة ومناركة التم الترابط المربعة معرجة مسركين معرصوس مرج TOTAL NET COSTS (EE-FF) \$71, 537.88

### APPENDIX B

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## WORK SHEETS FOR LINES 208 AND 225/226

## DIVISION NO. 3

## LINE NO. \_ 208

SOURCE	H WE	EKDAY   ANNUAL	SATURI DAILY	DAY ANNUAL	SUNI DAILY	DAY ANNUAL	ANNUAL
	STATISTIC (A)	STATISTIC B=(A)*255	STATISTIC (C)	1	STATISTIC (E)	STATISTIC F=(E)*58	TOTAL (B+D+F)
Peak Buses				ار می این کار می اور این کار می رو او می این کار می آن مان کار می او			
Vehicle Hours					17.3	799	
Vehicle Miles					241.2	12,542	
Pass. Boarding					146	7,592	
Pass. Revenue	م م م م م م م م م م م م م م م م م م م	n kan jua na sa			\$47	2,444	

EAK BUSES	<u>SUNDAY -</u> (enter num)	- NOT USES Der from Sheet	> (G) 1)	USE FOR WEEK DO NOT USE F	DAY SERVICE ONLY OR SATURDAY OR SUNDAY
TYPE	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J )	COMMENTS/SOURCE
Direct	1.0		75.4907		Facilities Maint.   Radio Supplies
Step D	5.8	]	31,945		Maint. Oper. Div. Servicing
Step S	31.5		42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div.   Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div.   Wheelchair Lift Ser
Step S	47	د هر هر مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و مربع و م	39,927		Facilities Maint.   Electronics Maint.
Step D	60.2	الم معارض المراجع التركيل الله مع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع الم	40,173		Maint. Oper. Div.   Farebox Maint.
Step D	110		40,025	,	Maint. Oper. Div. Special Projects
Step S	117		32,032		Central Maintenance   Service
Step S	142		275,925		Facilities Maint.   Elec.,Prop.,Supp.
Step S	142	a ser an an an an an an an an an an an an an	50,168		Maintenance General Instruction
Step 0	153	h ini an mu mu mu mu ini ini an far far far far far far	750,139	,	Transportation Oper.
Step S	153	م هد هر ان می از انداز اند انداز انداز  44,121		Transportation Serv. Radio Dispatchers	
Step D	153	, <u>, , , , , , , , , , , , , , , , , , </u>	729,656		Maint. Oper. Div.   Misc., Supp., Admin
Step D	153	- 40 - 20 - 20 - 20 - 20 - 20 - 20 - 20	96,867		Contracts & Purch.
Step S	166	م به مر مر هر می می می می می می می می می می می	47,954	ر <sup>ال</sup> ور کرت <sub>ا ہ</sub> ی نہیں اور اور اور اور اور اور اور اور اور اور	Central Maintenance Cent. Shop Superv.
TOTAL	, an a a a a a a a a a a a a a a a a a a	ار هم او <sup>ر</sup> مدر وی وی میز سر سر میزین هر از هم او <sup>ر</sup> مدر وی ویز میز سر سر میزین میراند.	= = = <u>+</u> , = = = = + <u>+</u> ₩, = = <u>+</u> , = = = = +	0	· ************************************

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DIVISION	NO.	3

LINE NO. 208

VEHICLE MILES <u>12,542</u> (Q) WEEKDAY [] (enter number from Sheet 1) SATURDAY [] SUNDAY [/]

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	ب بیر در در این بیری بیری ا ا	ŧ,≈,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	NUMBER OF	بە مەرەپ مەرمەر مەرمەر STEP	ANNUAL	COMMENTS/SOURCE [
	TYPE	STEP SIZE (R)	STEPS (S= INT[Q/R])	COST (T)	COST (U= S*T )	
	Direct	1.0	12,542	0.2366	\$2,967	Maint.Oper.Divisions    Parts, lube, etc.
	Direct	1.0	12,542	0.2703	\$3,390	Non-Departmental Exp Fuel and Taxes
	Step S	69,332		3,710		Non-Departmental Exp Wkmn's Comp. Maint.
-	Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
-	Step D	178,810		40,186		Maint. Oper. Div. Running Repairs
	Step D	2,149,300	د. مراجع می می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مراجع می مرا	40,180		Maint. Oper. Div. Inspectors
	Step S	2,755,513		40,179	+ <u></u>	Central Maintenance Running Repairs
	Step S	2,904,459		40,189	- va rafagina na jarkalkaina varaa.	Central Maintenance Mechanical
	Step S	3,160,735	-	40,206		Central Maintenance   Electrical
-	Step S	3,358,281	+ = = = = = = = = = = = = = = = = = = =	40,187		Central Maintenance Body Shop
4	Step S	3,582,167	- yai na ma ya ya na na na na na ka isi isi a wa i	40 <b>,</b> 200	₽, <sup>1</sup> ₩,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞,∞	Central Maintenance     Transmission
4	Step S	3,960,185		39,984	tini tikti in tikti in tikti kana kana ta   	Central Maintenance   Engine Line
4	Step S	4,477,708		40,209	₩₩₩₩₩₩₩₩₩₩₩₩₩   	Central Maintenance     Welding
+	Step S	5,656,053		مرما مریف مرد می مردور. 80 <b>,316</b>	<u>}</u>	Central Maintenance   Cyl. Hd. & Paint Sh
4	Step S	7,676,071		80,430		Central Maintenance   Mach.Shp & Sht.Met.
	Step S	8,266,538	- <u> </u>	80,462		Central Maintenance     Frame Shp & Uphols.
	TOTAL	و نور شور به ایند مار به رهار به مع مد مد مد مار هم شور به ایند مدر به رهار مدر مار هم مار مدر مدر به رهار مدر	ا دور بعرهه هو کنر 25,23 مدهد مدر سر سر ای سر ا دور دور مدر مدر مدر مدر مدر مدر مدر ا		\$6,357	ال من المراجع من المراجع معرفها معرفها معرفها معرفها معرفها معرفها معرفها معرفها معرفها معرفها معرفها معرفها م معرفها معرفها

SHEET 4 OF 6

DIVISION	NO. <u>3</u>		LINE	NO. 208	
CEHICLE M		.542 umber from Shee	et 1) ' :	WEEKDAY [] SATURDAY [] SUNDAY []	
TYPE	STEP SIZE	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
Direct	1.0	12,542	0.2366	\$2,967	Maint.Oper.Divisions Parts, lube, etc.
Direct	1.0	12,542	0.2703	\$3,390	Non-Departmental Exp Fuel and Taxes
Step S	69,332	-	3,710		Non-Departmental Exp Wkmn's Comp. Maint.
Step S	107,465	-	3,055		Non-Departmental Exp Exp.& Prov for PD
Step D	178,810		40,186		Maint. Oper. Div.   Running Repairs
Step D	2,149,300		40,180		Maint. Oper. Div.   Inspectors
Step S	2,755,513		40,179		Central Maintenance     Running Repairs
Step S	2,904,459		40,189	a the first second second second second second second second second second second second second second second s	Central Maintenance     Mechanical
Step S	3,160,735		40,206		Central Maintenance Electrical
+ Step S	3,358,281		40,187	مر هر هر مرجع والشريع الم	Central Maintenance Body Shop
Step S	3,582,167		40 <b>,</b> 200	) ii 4 in - in malalaisi il ii	Central Maintenance Transmission
Step S	3,960,185		39,984		Central Maintenance Engine Line
Step S	4,477,708		40,209	*+*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	Central Maintenance     Welding
Step S	5,656,053		مەرپەيمەرمەرمەرمەرمەرمەرمەرمەر 80 <b>,</b> 316		Central Maintenance     Cyl. Hd. & Paint Sh
Step S	7,676,071	· · · · · · · · · · · · · · · · · · ·	80,430		Central Maintenance   Mach.Shp & Sht.Met.
Step S	8,266,538	▶, <u>= = = , , , , , , , , , , , , , , , ,</u>	80,462	- + inizini inizini inizini inizini inizini 	Central Maintenance Frame Shp & Uphols.
TOTAL	از می شود. که سال که به می می به به می می می شود. ها هارش وی بین بنی می بسی می بین می شود. است می می از می بین می بین می بین می شود.	ار نیز هر که که که که به مربع می به به به مربع به به در ۵۱ شرف مه که به به مربع م ۱۰ مه مواف مه حرف هر هارگر زمر می می می	م بینی می بین بینی می بینی می اسم ایند. بینی بینی میرون میکرده است. از اینی میرون می می بینی می بینی اینی	-+	ĸĸŧĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ   ```````````````

SHEET 4B OF 6

IVISION NO. 3	LIN	E NO.	208	<u>}                                    </u>
VEHICLE MILES(cont.) <u>12,542</u> (enter number from Sheet )	(Q) 1)	WEEKD Satur Sunda	AÝ [ Dày [ Y [	

				수 때 때 때 때 때 때 때 제 때 때 때 때	
TYPE	STEP SIZE (R)	NUMBER OF STEPS (S= INT[Q/R])	STEP COST (T)	ANNUAL COST (U= S*T )	COMMENTS/SOURCE
TOTAL Bt.Fwd.				\$6,357	
Step S	9,769,545	_	40,182		Central Maintenance   Systems
Step S	13,433,125		80,250		Central Maintenance Engine Pts & Teardn
Step D	17,910,833		40,166		Maint. Oper. Div. Road Failure
Step S	21,493,000		40,033		Central Maintenance Sign Shop
Step D	26,866,250		40,250		Central Maintenance   Tool & Unit
TOTAL			الم مرفع معرف معرف معرف معرف معرف معرف معر	\$6,357	مراجع المراجع المراجع من معرفين ويتراجع من معرف المراجع من معرف المراجع المراجع من معرف المراجع المراجع المراجع مراجع من من من من من من من من من من من من من

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Y	1980	CUST	BASIS

SHEET 5 OF 6

	Y 1986 C	DST BASIS				SHEET 5 OF 6
D	IVISION	NO. <u>3</u>		LINE	NO. 208	<u> </u>
Ρ	ASSENGER	BOARDINGS (ent	7,592 ter number from	(V) Sheet 1)	WEEKDAY Saturday Sunday	
+	TYPE	STEP SIZE (W)	NUMBER OF STEPS (X= INT[V/W])	STEP COST (Y)	ANNUAL COST (Z = X*Y)	COMMENTS/SOURCE
	Direct	1.0	7, 592	0.0011	\$ 8.35	Print Shop Timetables
	Step S	163,231	-	524		Non-Departmental Exp Expenses for PL
	Step S	163,231	-	14,481	,	Non-Departmental Exp Provisions for PL
	Step S	4,715,555	-	29,678		Customer Relations Telephone Clerks
	Step S	12,482,353	_	34,470		Transit Police   Passenger Security
+	Step S	12,860,606	_	32,273	ار بر بر بر از بر بر بر بر بر بر بر بر بر بر بر بر بر	Accounting & Fiscal     Cash Clerks
	Step S	19,290,909		30,955		Marketing & Commun.    Ticket Clerks
	TOTAL		an da angeneration da angeneration da angeneration da angeneration da angeneration da angeneration da angenerat Angeneration da angeneration da angeneration da angeneration da angeneration da angeneration da angeneration da	a an ing ing ing ing ing ing ing ing ing in	\$8.35	

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FY 1986	COST BASIS		SHEET 6 OF 6
DIVISION	N NO LIN	E NO208	
TOTAL LI	INE AND PERIOD COSTS PERIOD:	SATURDAY [] Sunday []	
		VALUE	
	TOTAL, Sheet 2, Column I - Buses (AA)		<i>.</i>
	TOTAL, Sheet 3, Column 0 - Hours (BB)	\$21,064	
	TOTAL, Sheet 4, Column U - Miles (CC)	\$ 6,357	
	TOTAL, Sheet 5, Column AA- Pass. (DD)	\$ 8.35	
	TOTAL COSTS (Sum 4 rows above) (AA+BB+CC+DD= EE)	\$27, 429.35	•
	PASSENGER REVENUE - Sheet 1 (FF)	\$ 2,444	
	TOTAL NET COSTS (EE-FF)	\$24,982.35	• •
		and the second second second second second second second second second second second second second second secon	e e e e e e e e e e e e e e e e e e e

SHEET 1 OF 6

# DIVISION NO. \_\_\_\_\_ 18

LINE NO. 225/226

	WEEKDAY		SATURDAY		SUNDAY		
SOURCE	DAILY	ANNUAL	DAILY	ANNUAL	DAILY	ANNUAL	ANNUAL
	STATISTIC (A)	STATISTIC B=(A)*255	STATISTIC (C)	STATISTIC D=(C)*52	STATISTIC (E)	STATISTIC F=(E)*58	TOTAL (B+D+F)
			(0)	0 = ( 0 )   0 2  - i= j= j= j= j= i= i= injn j= j= j= j= j= j= j= j= j= j= j= j= j=	ر هاي به مريد به محرب مريد ا		
Peak Buses	ا ب د د ک نه نه ک د د د ب	و سر می شد شد شد هم می می می می م اور به می شراید می می سر اور به می شراید می می سر		با افغ هو هر به میز اما بوانین برد. موز ها هار به میز آما بوانین برد. موز ها هار به میز آما بوانین برد.	بیزید د دینی بروند د میروز بروند د میروز		و چه کور خه می می ساخته
Vehicle Hours			87.4	4,544	- 16, 10, 01 in 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,		
Vehicle Miles			l <mark>,587.</mark> j	82,529			•••••
Pass. Boarding		م می بر بر بر مربوری می مربوری می مربوری می	638	33,176			
Pass. Revenue			\$317	\$16,484	_ فر تد ه تد د ۱		

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IVISION N	DST BASIS	с. С	LINE	NO. 225/2	26
eak buses	S Not User (enter num	<u>D - SATURDAY</u> ber from Sheet	(G) (	USE FOR WEEKD	AY SERVICE ONLY R SATURDAY OR SUNDAY
ТҮРЕ	STEP SIZE (H)	NUMBER OF STEPS (I= INT[G/H])	STEP COST (J)	ANNUAL COST (K= I*J )	COMMENTS/SOURCE
Direct	1.0	╊	75.4907		Facilities Maint. Radio Supplies
Step D	5.8	+	31,945	- +	Maint. Oper. Div. Servicing
Step S	31.5		42,645		Scheduling Sched. Checkers
Step D	33		31,771		Maint. Oper. Div.   Service Deep Clean
Step D	33.1		40,179		Maint. Oper. Div.   Wheelchair Lift Se
Step S	47		39,927	بر بر مربع می در در این مربع می مربع بر مربع مربع مربع مربع مربع مربع م	Facilities Maint.   Electronics Maint.
Step D	60.2	╋╻╸┓┍┊ <sup>╔</sup> ╞┊╝┊╩╷╩┊╣╚╕╺╸┍ ┃ ┃	40,173	= + A.S	Maint. Oper. Div. Farebox Maint.
Step D	110	+ <u>_</u>	40,025	g_t = = = = = = = = ,	Maint. Oper. Div.
Step S	117	+	32,032	 	Central Maintenance   Service
Step S	142		275,925		Facilities Maint.   Elec.,Prop.,Supp.
Step S	142		50,168		Maintenance General Instruction
Step D	153		750,139	,	Transportation Oper Division
Step S	153	ar na na na na na na na na na na na na na	44,121	- <u>1</u>	Transportation Serv Radio Dispatchers
Step D	153		729,656		Maint. Oper. Div. Misc., Supp., Admi
Step D	153		96,867		Contracts & Purch. Storekeepers
Step S	166	و به هر به هر می می به به مربع می مربع از مربع می مربع از مربع از مربع می مربع از مربع می مربع می مربع از مربع مربع می می می مربع می می می می می می می می می می می می می	47,954		Central Maintenance Cent. Shop Superv.
TOTAL		هه در هارس به رو هر مرد م ور هر مرد م و مر هارس به نیز بر نیز مرام مرد مارس مانس مرد م	م به وزید مدم مربع د م به وزید م ماند م	0	

FY 1986 COST BASIS

SHEET 2 OF 6

FY 1986 COST BASIS

SHEET 3 OF 6

SIVISION NO.	18	LINE	NO.	225	1226
VEHICLE HOURS	4,544 enter number f	(L) rom Sheet 1)	WEEKE Satur Sunda	DAY RDAY NY	
a tota managatas		t			

	TYPE	STEP SIZE (M)	NUMBER OF STEPS (N= INT[L/M])	STEP COST (0)	ANNUAL COST (P= N*O )	COMMENTS/SOURCE
	Step D	853	5	19,383	\$96,915	Transp.Oper.Div. Operators
ר   	Step D	853	5	1,681	\$8,405	Non-Departmental Exp Wkmn's CompOper.
,4   	Step S	216,714	-	34,400		Maint.Oper.Divisions    Non-revenue Maint.
1	Step S	329,783	-	42,044		Scheduling Dept. Schedule Makers
	Step S	421,400	-	44,002	1999 - 1999 -	Transportation Serv. Street Supervisors
	Step S	446,176	_	34,471		Transit Police   Transp. Serv. Insp.
ר   	Step S	474,000	-	44,244		Transportation Inst. Operator Training
,	Step S	632,083		31,084		Account. & Fiscal Payroll Clerks
	TOTAL	ان هاری و رو این و با می این هاری و رو این و با می این هاری و رو این و بی و با می و با می و با	د معرف من معرف من من من من من من من من من من من من من	an an an Ing ai an Ing Tao an an Ang an Ang Ang	\$105,320	

GENERAL PLANNING CONSULTANT: TECHNICAL MEMORANDUM 86.5.1 FY 86 CALIBRATION OF THE BUS OPERATING COST MODEL

Prepared for:

Southern California Rapid Transit District

Prepared by:

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> November, 1985 (Revised, January 1986)

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## 1. INTRODUCTION

### 1.1 BACKGROUND

Technical Memorandum 5.1.2 (June 1984) described the original specification of an SCRTD bus operating cost model. The purpose of this additional report is to document an update of the June, 1984 calibration of the model to FY 1986. This Technical Memorandum provides the detailed allocation of costs by category, as discussed below, and also describes those items that represent significant departures from the original FY 1984 calibration.

This bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e. a summation of the data for each specific route).

# 1.2 OVERVIEW OF THE MODEL STRUCTURE

Historically, most bus operating cost models have used level-of-service variables as the basis of the model and have selected those variables primarily from vehicle hours, vehicle miles, passenger boardings, number of pullouts, peak vehicle requirements, and revenue. Statistical analyses of bus operating costs have generally shown high correlations of cost with most of these variables, and conceptual arguments can be made for why various elements of the operating costs should be expected to relate to one or more of these variables. This cost model is based on selecting a set of level-of-service variables that meet several criteria:

- 1) the variables can be output from or derived from standard urban transportation simulation procedures for long-range forecasting
- the variables are sufficient to forecast costs on <u>all</u> line items of the budget
- the variables provide responsiveness to different types of service that may be offered, and to changes in service profile

Criterion 1 leads to a rejection of a variable such as pullouts, which is not readily derived from long-range forecasting techniques. Criterion 2 involves some application of judgment. It seems clear that vehicle hours and vehicle miles alone are unlikely to be adequate; for example, costs such as for bus cleaning are explained better by a fleet size measure than by miles and hours; while fare clerks, timetables, and transit police are explained best by numbers of passengers. Criterion 3 also suggests use of additional variables that would provide some differentiation between services offered throughout the day and peakperiod-only services.

Cost-allocation models of operating costs have invariably taken the relatively simple approach to modeling by assuming that any budget item

or expenditure line item can be set to vary with one level-of-service variable. While it could be argued that a number of line items are probably a function of more than one variable, decisions on how to split the effects on two or more variables and establishing a modeling mechanism that would ensure consistency in the use of such split allocations would lead to a very complex model. To date, it has not been established that an increase in model accuracy and realism would be achieved that would justify the added complexity.

Based on these criteria, it was the judgment of the developers of this model that the following four level-of-service measures be used for the model:

- 1) annual vehicle miles
- 2) annual service hours
- 3) average weekday p.m. peak vehicles
- 4) annual passenger boardings

The model is a fixed/variable cost allocation model, as described in Technical Memorandum 5.1.2, dated June 1984. The basic concept of this approach is to allocate the cost of each element of service to one of the level-of-service measures. The different elements of service are defined as the individual reported line items of expenditure, or groupings of these. It is possible to allocate costs only to the finest level of detail in expenditure or budget reports for District operations.

To calibrate the model, it is necessary first to review the allocations and determine if any service costs should be allocated differently from the original model. Allocation of each cost to one service measure requires judgment. There is always the potential need to reconsider the allocation of certain cost items, and there is the possibility that new line items may be introduced in a subsequent year's budget. Thus, it is advisable to recvaluate the individual line-item cost allocation.

Second, the budget lines and the amounts of service for the calibration year need to be determined. From these, the coefficients are recalculated and the step sizes for stepwise variables are also recalculated. The coefficients are determined by computing, for each line item in the budget or expenditure report, a unit cost equal to the amount of the budget or expenditure line divided by the value of the variable to which the line item is allocated. These individual unit costs are summed for each of the level-of-service variables and define the coefficients. Thus, if Body Shop Wages in Central Maintenance equal \$1,053,000 and these are allocated to Vehicle Miles, with a base value of 107,465,000, the unit cost of Body Shop Wages would be \$0.00980. The unit costs of all other line items allocated to Vehicle Miles.

These two activities comprise the calibration of the model. Once the costs are determined and allocated, the coefficients (unit costs) are computed to produce a model of the form:

 $COST \approx a1 VMT + a2 VHT + a3 PKBS + a4 PASS$ 

where:

VMT = Annual Vehicle Miles of Travel VHT = Annual Vehicle Hours of Travel PKBS = Average p.m. weekday Peak Bus Requirement PASS = Annual Passenger Boardings

For FY 1984, the cost allocation model was:

\$COST = 1.063\*VMT + 24.390\*VHT + 55969\*PKBS + 0.0744\*PASS

All unit costs are in dollars in this equation, and are based on FY 1984 dollars (i.e. dollars at about December 1984).

For FY 1986, the recalibrated model is:

\$COST = 0.97\*VMT + 25.82\*VHT + 68088\*PKBS + 0.1162\*PASS

In this case, unit costs are in calendar 1985 dollars.

# 2. INPUT DATA BASE

# 2.1 OPERATING COSTS

The bus operating costs in the recalibrated model are based on the current SCRID organization, the SCRID departments, and the projected account expenditures for Fiscal Year 1986. The Annual Budget for FY 1986 was used as the basic resource document. In addition, the June 1985 Revenue and Expense Statement and input from the appropriate departments were used to subdivide some items of labor into more detailed components, and to provide estimates of the labor resources and costs for these.

# 2.2 OPERATING STATISTICS

The projected operating statistics were supplied by SCRTD for the FY 1986 operations. These statistics were used to calibrate the model for the FY 1986 base year. The specific statistics are:

Annua 1	Vehicle	Miles:		107,465,000
Annua 1	Vehicle	Hours: 🐁		7,585,000
		Passenger		424,400,000
Average	e Weekday	P.M. Peak	Vehicles	: 1,987

The vehicle miles and vehicle hours are total miles and hours in this calibration, as compared to revenue miles and revenue hours used in the original FY 1984 calibration and reported in Technical Memorandum 5.2.1. Conversion can be made between the two by using the ratio for FY 1984 of each of revenue miles and hours to total miles and hours, respectively. Based on Section 15 Reports for FY 1984, these ratios are:

Vehicle Miles (Revenue:Total) = 0.8763 Vehicle Hours (Revenue:Total) = 0.9253

### 2.3 STEP SIZES

Step sizes are defined for those expenditure categories where costs vary with the level-of-service variable by increments, rather than continuously. For example, wages and fringes for operators (drivers) are allocated to vehicle hours. However, each saving of a vehicle hour does not generate a saving of operator costs, given procedures of assigning operators to service and union and contract rules. In the model, it is assumed that a cost saving or an additional cost outlay is involved each time the change amounts to the equivalent of one half-time operator for the year. This change, in FY 1986, is estimated to occur when there is a saving of 853 vehicle hours. If a change in vehicle hours smaller than this amount takes place, no change in operator cost will be obtained. If a change larger than 853 hours annually is projected, a change in cost is assumed to occur. The change is determined by dividing the total projected change in vehicle hours by 853, and truncating the result to an integer value. This integer value represents the number of half-time operators saved by the change in vehicle hours. The cost savings are estimated by multiplying this number by 853 and then multiplying the

product by the unit cost of operator wages and fringes. Two numerical examples should serve to illustrate the process.

With Operator Wages determined to have a FY 1986 unit cost of \$18.40 per vehicle hour, and Operator Fringes of \$4.33:

1. Cost savings from a reduction of 500 vehicle hours annually:

This value falls below the step size of 853 hours and therefore is assumed to provide no savings in operator wages and fringes.

2. Cost savings from a reduction of 10,000 vehicle hours annually:

The value of 10,000 is divided by 853, yielding the result of 11.72. This is truncated to an integer value of 11, indicating that 11 half-time equivalent operators can be saved by this reduction. Further, 11 half-time operators work 9,383 vehicle hours annually, and this is the number of vehicle hours for which there will be a cost saving. Total cost savings from operator wages and fringes are obtained by multiplying \$18.40 and \$4.33 by 9,383, for a savings estimate of \$1,726,472 in wages and \$40,628.39 in fringes. Note that the further reduction of 617 (10,000 - 9,383) hours produces no additional cost savings on operators.

Step sizes are based on the primary categories of 1) an employee, 2) an operating division, and 3) a bus facility. Table 1 summarizes the stepsize differences between FY 1984 and FY 1986 for these primary categories.

Because the number of employees at the District varies from Department to Department and from category to category, the step size (in miles, hours, buses, or passengers) also varies from Department to Department and from category to category. It can be seen that the average size of an operating division decreased from FY 1984 to FY 1986, with the average number of peak buses per operating division decreasing from 159 to 153. Similarly, the average size of a maintenance operating division decreased from 172 peak buses in FY 1984 to 153 in FY 1986.

Apart from these rather clear, recurrent step sizes, most of the remainder relate to employees in the Department or category, and show fluctuations between FY 1984 and FY 1986, in response to changes in the numbers of employees between FY 1984 actual employment and FY 1986 projected employment. In addition, there are changes in budgeting and organization that show up most strongly in Central Maintenance, where six line items from FY 1984 do not appear in the FY 1986 budget, while ten new line items appear in FY 1986. There is also a consistent change throughout the FY 1986 budgeting that Utilities are no longer separated from Miscellaneous Expenses, as they were in FY 1984.

# TABLE 1

# COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS		FY84	FY86
Miles	Maintenance Oper. Di	v Inspectors	1,251,605	2,149,300
	Maintenance Oper. Di		Ň/I	17,910,833
	Maintenance Oper. Di		154,169	178,810
	Central Maintenance	- Body Shop	N/I	3,358,281
	Central Maintenance	- Body & Frame	1,463,415	N/I
	Cëntral Maintenance	- Cylinder Head	N/I	5,656,053
	Central Maintenance		N/I	3,980,185
	Central Maintenance	- Engine Parts	N/I	13,433,125
·	Central Maintenance	<ul> <li>Engine Rebuild</li> </ul>	2,439,026	N/I
	Central Maintenance	🚽 Engine Teardown	9,512,200	13,433,125
	Central Maintenance	- Electrical Unit	s N/I	3,160,735
	Central Maintenance	- Electrical Shop	2,972,563	Ň/I
	Central Maintenance	- Frame Shop	N/Ī	8,266,538
	Central Maintenance	<ul> <li>Machine Shop</li> </ul>	7,317,077	7,676,071
	Central Maintenance	- Mechanical Unit	s N/Í	2,904,459
	Central Maintenance	- Misc. Repair	31,707,333	N/I
	Central Maintenance	- Paint Shop	2,320,049	5,656,053
	Central Maintenance	- Radiator Shop	11,890,250	N/Ĩ
	Central Maintenance	- Running Repairs	3,280,069	2,755,513
	Central Maintenance	- Sheet Metal Sho	p7,926,833	7,676,071
	Central Maintenance	- Sign Shop	Ň/Í	21,493,000
	Central Maintenance	- Small Unit Shop	3,523,037	Ň/Ĭ
	Central Maintenance	- Systems Shop	N/Î	9,769,545
	Central Maintenance	- Tool & Unit Roo		26,866,250
•	Central Maintenance	- Transmission	3,280,069	3,582,167
	Central Maintenance	- Welding Shop		4,477,708
	Central Maintenance	- Upholstery Shop		8,266,538
	Non-Departmental	- Workman's Comp.	59,451	69,332
	Non-Departmental	- Provisions for		107,465 (
		Uninsured PD	) \$634	\$2,531
	Non-Departmental	😑 Expenses for PD		107,465
			\$456	\$524
Hours	Transportation Oper.	Div Operators	777	853
	Transportation Servi	ces - Street Super	v. 476,800	421,400
	Transportation Instr	uction - Instructor	s 447,000	474,000
	Maintenance Oper. Di	v Non-revenue Wag	es 264,889	216,714

# TABLE 1 (continued)

# COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

ARIABLE	STEP BASIS	FY84	FY86
Hours (còn			
	Transit Police 🖶 Transportation Service	420,706	446,176
:	Scheduling Dept Schedule Maker Wages	596,000	329,783
,	Accounting & Fiscal - Payroll Clerk	447.,000	632,083
	Non-Departmental - Workman's Comp.	777	853
Peak Buses	Transportation Oper. Div Divisional Wag	ies 159	153
-,,	Transportation Oper. Div Services	159	153
	Transportation Oper. Div Materials & Su		153
:	Transportation Oper. Div Utilities	159	Ň/Ĭ
	Transportation Oper. Div Misc. Expenses		153
			153
	Transportation Services - Radio Dispatch Transportation Services - Utilities	ners 159 159	153 N/I
	Transportation Instruction- Divisional Wag	jes 172	N/I
	Maintenance Oper. Div Service Deep Clea		33
	Maintenance Oper. Div Servicing	5.6	
	Maintenance Oper. Div Servicing Superv	isor 188 👘	153
	Maintenance Oper. Div Wheelchair Maint.	. 34.4	33.1
	Maintenance Oper. Div Farebox Maintenan	nce 206	60.2
	Maintenance Oper. Div Campaigns & Reser	rve 60.7	
	Maintenance Oper. Div Supervision & Adr		153
	Maintenance Oper. Div Special Projects	Ň/I	110
	Maintenance Oper. Div Training & Oth.Fi		153
	Maintenance Oper. Div Services for Div.	172	153
	Maintenance Oper. Div Jools & Exp. Equ	in 172 N	irect by Mile
	Maintenance Oper. Div Other Mat. & Sup		N/I
	Maintonance Open. Div Utilities	172	N/I
	Maintenance Oper, Div Utilities Maintenance Oper, Div Miscollappous Ex		153
	Maintenance Oper. Div Miscellaneous Exp	μ. Ι/ζ	105
	Central Maintenance = Service Wages	121	117
	Central Maintenance - Central Shop Superv	. 138	166
	Facilities Maintenance - Electrical Maint	. 147	142
	Facilities Maintenance - Property Maint.	147	142
	Facilities Maintenance - Electronic Maint		47
	Facilities Maintenance - Materials & Supp		142

<sup>.</sup> 7

# TABLE 1 (continued)

# COMPARISON OF STEP SIZES BETWEEN FY84 AND FY86

VARIABLE	STEP BASIS	FY84	FY86
Peak Buses	(continued) Maintenance General - Instruction	188	142
	Telecommunications - Electronic Main	tenance 56	N/I.
	Scheduling - Checkers	40	.5 31.5
	Contract Procurement - Stores	159	153
Passengers	Transit Police - Passenger Security	13,688,235	12,482,353
	Marketing & Comm Ticket Clerks	21,154,545	19,290,909
	Customer Relations - Telephone Clerks	4,951,064	4,715,555
	Accounting & Fiscal - Cash Clerks	16,621,429	12,860,606
	Nondepartmental - Provisions for	101,174 @ \$4,916	
	Uninsured PL Nondepartmental - Expenses for PL	0 \$4,918 101,174 0 \$456	

## 2.4 DIRECTLY VARIABLE ITEMS

Directly-variable items are much simpler than stepwise variable items. These are expenditures that can be assumed to vary with every increment or decrement of the level-of-service variable to which they are allocated. For example, fuel is allocated to vehicle miles as a directly-variable item, with a unit cost of \$0.2521 in FY 1986. By allocating fuel as a directly-variable item, it is assumed that each change of a vehicle mile will produce a cost change of \$0.2521. Thus, a decrease of 1,000 vehicle miles will save \$252.10, and an increase of 10,000 vehicle miles will increase costs by \$2,521.

The model contains very few line items that are assumed to vary directly with one of the variables used in the model. Table 2 shows the line items that are assumed to vary directly for each of FY 1984 and FY 1986. The differences between FY 1984 and FY 1986 are minor: under Maintenance Operating Divisions, the Expendable Equipment for Revenue Vehicles is not split into component entries in FY 1986, but is in FY 1984; and Telecommunications equipment on revenue vehicles has moved from the Telecommunications Department to Facilities Maintenance between FY 1984 and FY 1986. Essentially, these changes have no net effect on the allocation of costs to direct variables.

## TABLE 2

COMPARISON OF DIRECTLY VARIABLE ITEMS BETWEEN FY84 AND FY86

VARIAB	LE LINE ITEM	FY84	FY8 <u>(</u> 6
Miles			
	for Revenue Vehicles	No	Yes
<b>*</b> 1	Maintenance Operating Div Lubricants (Rev. Veh.	) Yes	No
	Maintenance Operating Div Tires & Tubes (Rev Ve	h) Yes	Nò
	Maintenance Operating Div Bus Parts (Rev. Veh.)	Yes	No
	Nondepartmental Expenses - Fuel	Yes	Yes
	Nondepartmental Expenses - Fuel & Lube Taxes (Rev.	) Yes	Yeş
Hours		None	None
Peak B	uses Telecommunications - Mat.& Supp.(Revenue Equip	.) Yes	No
	Facilities Maint Mat. & Supplies (Radio)	No	Yes
Passen	gers Print Shop 🗧 Timetables	Yes	Yes

# 2.5 FIXED ITEMS

All remaining budget line items are considered to be fixed costs, and these are allocated, for fully-allocated costing at the line level, to one of the four variables used by the model. Unit costs are computed, as for the other expenditure items, for each line item that is defined as a fixed cost. If a change in service is examined, by definition there will be no changes to total fixed costs. Therefore, the unit cost of each fixed-cost item is recomputed, to yield the same total fixed cost for before the change in service.

Thus, for example, Wages for the General Manager's office are assigned as a fixed cost to peak buses, with a FY 1986 unit cost of \$179.668. If a service change is examined that will reduce peak buses from the FY 1986 value of 1987 (buses for the average p.m. weekday peak) to 1968, the unit cost for Wages for the General Manager's office will increase to \$181.402.

Rather than provide a detailed listing of all fixed-cost items for each year, Table 3 documents the differences between FY 1984 and FY 1986 in the make-up of line items and their allocation for the purposes of line costing. The general change, mentioned in Section 2.3 above, of combining Utilities into Miscellaneous Expenses or charging them under Nondepartmental Expenses in FY 1986 instead of keeping as a separate line item by department as in FY 1984, is not included in this table, because it happens consistently in all departments and generally represents no net change in the amounts allocated.

Several of the entries in Table 3 represent minor budget changes between FY 1984 and FY 1986. For example, inclusion of a "Services" or a "Miscellaneous Expenses" line item in several departments in one year and not the other indicates merely a zero budget line on that item for the year where it is omitted.

Table 3 also shows evidence of some reorganization within the SCRTD, but without any change in the allocation variable for the fixed costs. For example, the Human Relations Department has changed to an Equal Employment Opportunity Department and a DBE/WBE Department. Telecommunications has been absorbed into Facilities Maintenance, and new departments for Transit Systems Development, Risk Management, and Contract Compliance have been added.

There are also a few additional changes in detail in the allocations used that do not affect the underlying process. Several departments allocated to fixed costs have detailed itemized costs in the FY 1984 expenditures reports, using categories of Services, Materials and Supplies, and Miscellaneous Expenses. In the FY 1986 budget materials, treatment of these has been simplified to a category of "Non-Labor Expenses."

TA	<b>BLE</b>	3

DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

			** * *	
LINE ITEM		OCATION 1984		NBLE 1986
Stops & Zones - Miscellaneous Expenses	e u		Peak	Buses
Transportation Instruction - Services	Peak	Buseš		•
Maintenance Operating - Servicing Fringes Fixed	Peak	Buses	k	r
Central Maintenance - Training and Other Fringes	s Peak	Buses	. <b>.</b>	
Central Maintenance - Services	Peak	Buses	<b>.</b>	r
Central Maintenance - Miscellaneous Expenses	Peak	Buses	i.	r
Telecommunications - Administration Wages		Buses	#	
Telecommunications - Fringes		Buses	#	
Telecommunications - Services		Buses	#	<b>;</b>
Telecommunications - Materials & Supplies		Buses	#	
Telecommunications - Utilities & Misc. Exp.	Peak	Buses	#	<b>F</b>
A.G.M. for Planning & Comm Services	Peak	Buses	<del>.</del>	•
Human Relations - Wages	Peak	Buses	-	•
Human Relations - Fringes		Buses	-	
Human Relations – Services		Buses		•
Human Relations - Materials & Supplies		Buses	ير	
Human Relations - Utilities & Misc. Exp.	Peak	Buses	-	
Equal Employment Opp Wages		-		Büses
Equal Employment Opp Fringes		-		Büses
Equal Employment Opp Materials and Supplies		-		Buses
Equal Employment Opp Utilities & Misc. Exp.		-	Peak	Buses
Contract Compliance - Wages	•	-		Buses
Contract Compliance - Fringes				Buses
Contract Compliance - Materials and Supplies		-		Buses
Contract Compliance - Utilities & Misc. Exp.		· <del>•••</del>	Peak	Buses
DBE/WBE - Wages			Peak	Buses
DBE/WBE - Fringes		-		Buses
DBE/WBE - Materials and Supplies		-	Peak	Buses
DBE/WBE - Utilities & Misc. Exp.			Peak	· ·

Not Separated from nondepartmental expenses in FY 1986. Department reassigned under Facilities Maintenance in FY 1986.

# TABLE 3 (continued)

# DIFFERENCES IN ALLOCATION OF FIXED-COST ITEMS BETWEEN FY84 AND FY86

LINE ITEM

ALLOCATION VARIABLE FY84 FY86

AGM for Transit System Dev. - Materials and Supplies Peak Buses AGM for Transit System Dev. - Utilities & Misc. Exp. Peak Buses Peak Buses AGM for Management -Services Peak Buses Employee Activities Fringes Transit System Dev. Peak Buses Wages Peak Buses Transit System Dev. -Fringes Transit System Dev. Peak Buses Materials and Supplies -÷, Transit System Dev. Utilities & Misc. Exp. Peak Buses -Risk Management Peak Buses Wages Peak Buses Risk Management Fringes Peak Buses Risk Management Materials and Supplies -Risk Management Utilities & Misc. Exp. Peak Buses -

Not Separated from nondepartmental expenses in FY 1986.

12

Department reassigned under Facilities Maintenance in FY 1986.

## FY 1986 CALIBRATION OF COST ALLOCATION

#### ALLOCATION OF COSTS 3.1

Table 4 shows the complete itemization of the FY 1986 budget items and their allocation to the four variables and three types of allocation relationship. This table may be compared directly with Table 1 in Technical Memorandum 5.1.2 (June, 1984) to confirm the various differences pointed out in the foregoing sections. The Table shows the allocation of a Projected FY 1986 budget of \$484,174,000, compared to the earlier allocation of an Estimated FY 1984 budget of \$425,697,000.

It is important to note that the FY 1986 Cost Allocation is based on a projected (not actual) budget and for a slightly reorganized structure for SCRTD. The FY 1984 cost allocation was based on actual expenditures for three of the four quarters in FY 1984, plus estimates of the remaining expenditures in FY 1984. Similarly, the hours, miles, and passengers are annual totals for FY 1986 that are projected, while for FY 1984 they were actual expenditures for three guarters and estimates for the last quarter. Peak buses are based on weekday p.m. peak actuals for the first 9 months of FY 1984 and are projected for FY 1986.

Applying the FY 1984 coefficients (adjusted from revenue hours and miles to total miles and hours), the projected FY 1986 cost in 1984 dollars would be \$414,137,000.

### INFLATION EFFECTS

£ .

3.2

The change in CPI for the Los Angeles-Long Beach area between mid FY 1984 (December 1983) and the end of FY 1986 (which is the time for which the budget is assumed to be correct) in June 1986 is 11.285%. Applying this change to the annual expenditure for FY 1984 would project FY 1986 costs of \$460,873,000. This percentage change provides a budget figure that requires an additional upward adjustment of 5.0558% to match the projections made for FY 1986. Applying the total of these two adjustments to the unit costs from the FY 1984 model produces the estimates shown in Table 5. As expected, the annual costs would then be projected as \$484,152,000, which is (within rounding error) the result that should be achieved.

Of much more interest is to observe that the inflation adjustment provides coefficients for miles and hours that are marginally higher than the calibrated values for FY 1986, while the other two coefficients are underestimated for FY 1986. No correction has been made in this process for changes to the miles, hours, buses, and passengers variables that would require spreading fixed costs over a smaller base and would also adjust step sizes. The results of such adjustments are reported in a second Technical Memorandum, number 86.5.2 (November, 1985).

#### Table 4 BUS COST ALLOCATION

Department and	Estimated	<u> Re</u>	source A	llocated Peak	Passen-			
Expense Iten	FY 84 Cost (\$000)	Hours	Miles	Buses	gers	Fixed	Variable	If Variable How?
·								
loand of Directors			•					
Wages	0			۲.		x		
Fringes	Ó			х				
Services	73			Ŷ	,	X		·
Materials and Supplies	5			x				
Miscellaneous Expenses	67			x		x		
General Manager								
Wages	357	,		X.		x		
Fringes	0 211			X		X X		
Services Materials and Supplies	1			X X		x		•
Miscellaneous Expenses	. 41			Ţx.		x		
Office of District Secretar	Ŷ							
Wages	- 274			x		x		
Fringes				x		X		
Services	.55			Â.		.x		
Materials and Supplies	9			x	٠.	x		
Miscellaneous Expenses	49			x	-	×		
Legn)	_			•				•
Wages	392			x		x		
Fringes	4	•	· ·	x		x		·
Services	330			X		X		
Materials and Supplies Miscellaneous Expenses	. <sup>5</sup> 5 11			. X X		X X		
Assistant General Manager	**			^		^		
for Operations								
Wages	317			x		x	. '	
Fringes	2			X		X	•	
Services	0			x		x		
Materials and Supplies	777	•	,	X		X X		
Miscellaneous Expenses	f .	•		~				
Transportation Operating - Divisions						-		
Wages	7,899			x			x	By 153 Peak Vehicle
Fringes.	1,731			x			x	By 153 Peak Vehicle
Operator Wages	139,552	x					X	By 853 Revenue Hour
Operator Fringes	32,806 1	x		x			X X	By 853 Revenue Hour By 153 Peak Vehicle
Services Materials and Supplies	97			X			x	By 153 Peak Vehicle
Miscellaneous Expenses	14			x		<i>.</i> .	x	By 153 Peak Vehicle
Stops and Zones			• .		1			
Wages	738			x		X.	•	
Frinces	3			х		х		
Services	6			x		X		
Materials and Supplies Miscellaneous Expenses	103			X X		X X	•	
Operations Control	, ,							
and Services								
Wages	1,864			.X		X X		
Wages	2,523	X			•	X		Die 431, 400 Hausen
Wages	649	Ŷ					x	By 421,400 Hours of Service
Fringes	143	x					x	By 421,400 Hours of
	938			~		x		Service
Wages Wages	938 469			X X		~	x	By 153 Peak Vehicle
Pringes	104		•	â		•	x	By 153 Peak Vehicle
	25			x		. X.,		



#### Table 4 BUS COST ALLOCATION (continue

	Estimated							
Department Expense Iten	FY 84 Cost (\$000)	Hours	Miles	Peak Buses	Passen- gers	Fined	Variable	If Variable How?
Operations Control and Services (cont'd)		•	•	•	, <u>,</u>		/	<b>-</b>
Services Materials and Supplies Miscellaneous Expenses	1 2 3		· ·.	X X X		X X X		· ·
Transportation Instruction								
Wages	748			x		x	~	Dur 474 000 Navan of
Wages Fring <b>es</b>	580 128	x x	•				x x	By 474,000 Hours of Service By 474,000 Hours of
Pringes		•• ·		x		x		Service
Materials and Supplies Miscellaneous Expenses	34 6			X X		x x		
Transportation General						· .	:	
Wages Fringes Services	575 11 11	X X X				X X X		•
Materials and Supplies Miscellaneous Expenses	509 180	x x				X X		•
<u>Maintenance Operating</u> Divisions								•
Servicing Deep Clean Wages Servicing Deep Clean Fringer Servicing Wages	8,789			x x x			X X X	By 33 Peak Vehicles By 33 Peak Vehicles By 5.8 Peak Vehicles
Servicing Pringes Servicing Supervisor Wages Servicing Supervisor Pringes Wheelchair Maintenance Wages				X X X X			X X : X X	By 5.8 Peak Vehicles By 153 Peak Vehicles By 153 Peak Vehicles By 33.1 Peak Vehicles
Wheelchair Maintenance Fring Non-Revenue Wages Non-Revenue Fringes		X		x			X X X	By 33.1 Peak Vehicles By 216,714 Hours By 216,714 Hours
Farebox Maintenance Wages Farebox Maintenance Fringes Inspection Wages	1,086 240 1,645		x	x x			X X X	By 60.2 Peak Vehicles By 60.2 Peak Vehicles By 2,149,300 Miles
Inspection Fringes Running Repair Wages Running Repair Fringes Supervision and Adminis-	364 19,773 4,379		X X X				x X X	By 2,149,300 Miles By 178,810 Miles By 178,810 Miles
tration Wages Supervision and Adminis-	6,587			x			x	By 153 Peak Vehicles
tration Fringes Road Pailure Wages Road Failure Fringes	· . 1, <b>316</b> 197 44		× X	x			X X X X	By 153 Peak Vehicles By 17,910,833 Miles By 17,910,833 Miles By 110 Peak Vehicles
Special Projects Wages Special Projects Fringes Servicing Wages Fixed Training and Other Fringe	592 131 282			X X X		<b>X</b>	x	By 110 Peak Vehicles
Benefits Services for Divisions Lubricants, Tires and Tubes Bus Parts, and Tools and	637 285	<u>.</u>		X X	•		X X	By 153 Peak Vehicles By 153 Peak Vehicles
Expendable Equipment for Revenue Equipment Miscellaneous Expenses	25,421 123		x	x			X X	Directly By Miles By 153 Vehicles
Central Maintenance	Ň							
Running Repair Wages Running Repair Fringes Engine Teardown Wages	1,283 284 263 58		: X X X X				x x x x	By 2,755,513 Miles By 2,755,513 Miles By 13,433,125 Miles By 13,433,125 Miles
Engine Teardown Fringes Cylinder Head Wages Cylinder Head Fringes Engine Line Wages	58 625 138 886		<u>x</u> x x x				X X X	By 5,656,053 Miles By 5,656,053 Miles By 3,980,185 Miles
Engine Line Fringes Engine Parts Crib Wages Engine Parts Crib Fringes	197 263 58		X X _X				X X X	By 3,980,185 Miles By 13,433,125 Miles By 13,433,125 Miles

#### Tal

Table 4 BIS COST ALLOCATION (continued)

· .		Estimated	Re	source A	llocated	b			,
	Department and Expense	FY 64 Cost (\$000)	Hours	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
	Central Maintenance (cont'd)	L							
	Electrical Units Wages	1,119		x				x	By 3,160,735 Miles
	Electrical Units Fringes	246		X				x	By 3,160,735 Miles
	Mechanical Units Wages	1,217		X	•			x	By 2,904,459 Miles
	Mechanical Units Pringes	270 987		X X	-			x	By 2,904,459 Miles
	Transmission Wages Transmission Fringes	219		x				X	By 3,582,167 Miles By 3,582,167 Miles
	Welding Shop Wages	790		x				X	By 4,477,708 Miles
	Welding Shop Fringes	175		x				x	By 4,477,708 Miles
	Machine Shop Wages	461		x				́х	By 7,676,071 Miles
	Machine Shop Fringes	102		X				<u>x</u>	By 7,676,071 Miles
	Body Shop Wages	1,053		x x				x	By 3,358,281 Miles
	Body Shop Fringes	233		X				X	By 3,358,261 Miles
	Frame Shop Wages	428 95		x				X X	By 8,266,538 Miles By 8,266,538 Miles
	Frame Shop Fringes Sheet Metal Shop Wages	461		X X	•			x	By 7,676,071 Miles
	Sheet Metal Shop Fringes	102	•	x				x	By 7,676,071 Miles
	Upholstery Shop Wages	428		· X				x	By 8,266,538 Miles
	Upholstery Shop Fringes	95		x				x	By 8,266,536 Miles
	Systems Shop Wages	362		X				X	By 9,769,545 Miles
	Systems Shop Fringes	60 625		<u>,</u> Х Х				X X	By 9,769,545 Miles By 5,656,053 Miles
	Paint Shop Wages Paint Shop Fringes	136		x				x	By 5,656,053 Miles
	Sign Shop Wages	165		x				x	By 21,493,000 Miles
	Sign Shop Fringes	36		X		•		x	· By 21,493,000 Miles
	Tool and Unit Room Wages	132		x		,		x	By 26,866,250 Miles
	Tool and Unit Room Fringes	29		x				X	By 26,866,250 Miles
	Service Wages	436			X			X	By 117 Peak Vehicles
	Service Fringes	108			X.			x	By 117 Peak Vehicles
	Central Shop Supervision Wa Central Shop Supervision Fri				X			X X	By 166 Peak Vehicles By 166 Peak Vehicles
	Central Shop Administration				*			Ý	By 100 Peak Venicies
	Wages	601			х		x		
•									
	Maintenance General Departme	ent	· .					, (*	
		500	•						
	Instruction Wages	580 122			Ϋ́χ			x	By 142 Peak Vehicles
. •	Instruction Fringes Wages	1,715			X X		x	x	By 142 Peak Vehciles
	Non-Labor Expenses	371	•		x ·		x		
	Equipment Engineering Depart	tment.		-					
	Wages	618			<b>x</b> .		x		
	Non-Labor Expenses	69	·		x		x		
•	Facilities Maintenance Depar								·
,			J					· .	
	Electrical Maintenance Wage				X.			X	By 142 Peak Vehicles
•	Electrical Maintenance Fring	ges 174 1,546			X			X ' X	By 142 Peak Véhicles By 142 Peak Vehicles
	Property Maintenance Wages Property Maintenance Fringer				x			â	By 142 Peak Vehicles
	Electronic Maintenance Wages				x			x	By 47 Peak Vehicles
	Electronic Maintenance Fring				x			x	By 47 Peak Vehicles
	Administration and Super-						•		
·	vision Wages	3,056			x		X		
	Training and Fringe Benefits				X		X		
	Services Materials and Supplies - Rad	58 Mai 150			X X		x	x	Divictly By Book Mahdelon
	Materials and Supplies - Kak	10 150			~			~	Directly By Peak Vehicles
	· Pacilities	1,000			x			x	By 142 Peak Vehicles
·	Materials and Supplies	730			x		x		
	Miscellaneous Expenses	61			x		x		
	Transit Police Department								
	Police Wages	941				х		x	By 12,482,353 Passengers
	Police Fringes	231				x	-	x	By 12,482,353 Passengers
	Police Wages	-471	x					X	By 446,176 Hours
	Police Fringes Administrative Wages	115 2,740	x		x		x	<b>x</b>	By 446,176 Hours
	Fringes	71		•	x		Ŷ	ż	
•	Services	228			x		X.		
	Materials and Supplies	52			x		X		
	Miscellaneous Expenses	36	· · ·		<u>x</u>		<u>X</u> .		

# Table 4 ELS COST ALLOCATION (continued)

Department	Estimated FY 84 Cost	Re	source A	llocated Feak	vassen-	-		
Expense Item	¥ 84 COBE (\$000)	Bours	Miles	Buses	yassen- gers	Fixed	Variable	If Variable Bow?
Scheduling Department								·• · ·
Schedule Maker Wages	786	Ŷ					<b>x</b> . '	By 329,783 Hours
Schedule Maker Fringes	181	X					X	By 329,783 Hours
Checker Wages	2,207	-		·X			X	By 31.5 Peak Vehicles
Checker Fringes	483			x			· x	By 31.5 Peak Vehicles
Wages	1,129			x		х	· •	by SILS FOR VEREIES
Fringes	3			x		x		
	45						•	
Services		•		x		X		
Materials and Supplies Miscellaneous Expenses	43 61			X X		X		`
Assistant General Manager		• •						
nications	•							
Wages	111 '			x		x		· ·
Fringes	1			X		x		
Materials and Supplies	1			х		х		,
Miscellaneous Expenses	2			X		X		
Planning								
Wages	2,400			x	• •	x		
Fringes	6			х		́х		
Services	322			x	•	х		
Materials and Supplies	68			x		х		
Miscellaneous Expenses	35			X		X		•
Marketing and Communication	<u>ns</u>							
Ticket Clerk Wages	556				· x	•	x	By 19,290,909 Passenge
Ticket Clerk Pringes	125				x		х	By 19,290,909 Passenge
Wages	1,468				x	х		
Fringes	16				x	x		
Services	484				x	x	1	
Materials and Supplies	887				x	x		
Miscellaneous Expenses	128				· 🗘	x		
Customer Relations	· .	·. ·			•			
Telephone Clerks Wages	2,170				x		x	By 4,715,555 Passenger
Telephone Clerks Fringes	501	•			x	-	x	By 4,715,555 Passenger
Wages	1,157				. X	x		
Pringes	15				X	·Χ		
Services	21				X	Ŷ		
Materials and Supplies	28				x	Ŷ		
Miscellaneous Expenses	14				x	X		
Assistant General Manager	·							. •
for Government and		•						
Community Affairs			•					
Wages	107			x		X		
Materials and Supplies	1			X X		X X		
Miscellaneous Expenses	.2			Λ.		<u>^</u>		
				~				
Wages Fringes	277			<u>.x</u> x		X		
Services	86			x	•	X.		
Materials and Supplies	7			X		х		
Miscellaneous Expenses	38			x		x		
Community Relations								
Wages	189	•		x		x	•	
Pringes	· · · · · · · · · · · · · · · · · · ·			·χ	-	X		
Services	21			X		X	• -	
Materials and Supplies	· 38			х		X		
Miscellaneous Expenses	26			х				

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•		1
•		1
•		

#### Table 4 BIS COST ALLOCATION (continued

	Estimated	Resource Allocated to						
Department Expense Item	FY 84 Cost (\$000)	HOURB	Miles	Peak Buses	Passen- gers	Fixed	Variable	If Variable How?
Assistant General Manager for Equal Opportunity								
Wages Services Materials and Supplies Miscellaneous Expenses	83 4 1 11			X X X X		X X X X		
Equal Employment Opportunity	Ź							
Wages Pringes Materials and Supplies Miscellancous Expenses	140 2 5 . 3	•	•	X X X X	, <b>*</b>	X X X		•
Contract Compliance	<u>'</u> .		•.					
Wages Pringes Materials and Supplies Miscellancous Expenses	71 1 2 3	· · ·		X X X X		X X X X		۰ <sup>۱</sup>
Employee Education, Trainin and Development	9	•				•		<i>,</i> .
Wages Fringes Services Materials and Supplies Miscellaneous Expenses	1,166 342 33 5 11			X X X X	•	X X X X X		• • • • • •
DEE/MEE				•	· .			
Wages Fringes Materials and Supplies Miscellancous Expenses	74 1 2 3		• 	X X X X		X X X	ı	•
Controller-Treasurer-Andito	r						-	
Wages Fringes Services Materials and Supplies Miscellaneous Expenses	275 6 1 3 13		• •	X X X X X		X X X X		· · · ·
Accounting and Piscal								
Payroll Clerk Wages Payroll Clerk Fringes Cash Clerk Wages Cash Clerk Pringes Wages Fringes Services Materials and Supplies Miscellaneous Expenses	305 68 873 192 1,767 21 277 34 11	x X		X X X X X	X X	X X X X X	X X X X	By 632,083 Hours By 632,083 Hours By 12,860,606 Passenger By 12,860,606 Passenger
Data Processing								
Wages Pringes Sarvices Materials and Supplies Miscellaneous Expenses	3,515 43 1,332 251 148		· ·	x x x x x x		X X X X		· · · · · · · · · · · · · · · · · · ·
Assistant General Managar for Transit System Development		· .						
Wages	26			x		x		

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Table 4 BIS COST ALLOCATION (continued)

epartment and	Estimated FY 84 Cost (\$000)			Peak	Passen			
Department and Expense Item	(\$000)	Hours	Miles	Buses	gers	Fixed	Variable	If Variable How?
ransit Systems Development								
	3.064					~		·
Wages Services	1,064			X		x		
Materials and Supplies	1	•		x		x		•
liscellaneous Expenses	3.		•	X		x		
Bus Facilities Engineering		•		•	•			
Wages	353		.· ·	x		x		,
Fringes	9			x		X		
Services	262		-	x		x		
Materials and Supplies	40			X		X		•
discellaneous Expenses	- 39		· ·	x		x		•
Assistant General Manager for <u>Management</u>								
Wages	112			x		x		
Services	2			x		x		
laterials and Supplies	2			x		X		
liscellaneous Expenses	4			x	•	X		·
Safety Department					· .	· .		•
Wages	198			x	•	x		
Fringes	4			x		X		
Services	172			X	•	Χ.		•
Materials and Supplies Miscellaneous Expenses	67 34			X X		X X		,
Insuance								
								•
Wages S	230	••••		X		X		
Fringes Services	37 .			X X		X X	· :	•
Materials and Supplies	2			x		x		
Miscellaneous Expenses	6	•		x		x		• •
Risk Management	,							
Wages	79			x		x		
Fringes	1			x		â		
Materials and Supplies	ĩ		•	x		x		
Miscellaneous Expenses	.2			x		x,		
Contract Procurement & Mater	<u>-1ä1</u>	•						
Stores Wages	1,035			x			X.	By 153 Peak Vehicle
Stores Fringes	223			X.		v	x	By 153 Peak Vehicle
Wages Fringes	3,612 40			X X		,X X		
Services	37			â		â		
Materials and Supplies	113			x		x		
Miscellaneous Expenses	64			X		x		
Personnel Department	- ·							
Wages Fringes	1,581			X		X X		
Services	8 711			. X		x		
Materials and Supplies	112	•	·	x		x .		
liscellaneous Expenses	65			x	•	x		
General Services						1. N. N.		
Wages	2,143			x		, <b>X</b>		
	4			X		X		
Pringes	~ 1			•-		<b>.</b> -		
Services Materials and Supplies	24 290			X X		X X X X		





### Table 4 BUS COST ALLOCATION (continued

•		Estimated Resource Allocated to						•	
Department and	Estimated FY 84 Cost	FY 84 Cost Peak Pass			- Passen-				
Expense	(\$000)	Hours	Miles	Buses	gers	Fixed	Variable	If Variable How?	
Print Shop									
Wages	779			x		x	. •		
Fringes	6			x		X		. '	
Services	76			X		X			
Timetables	476				x		x	Directly by Passenger	
Materials and Supplies Miscellaneous Expenses	24 3			x		X X			
Nanagement and Budget	-	•			•	•		· ·	
Managenera, and Bullet									
Wages	566		i.	X		X			
Fringes Services	.6 .3			X X		X X			
Materials and Supplies	9		-	x		Ŷ		•	
Miscellaneous Expenses	5			x		x			
Labor Relations						•			
·		-							
Wages Bringer	261 3			X X		x x		· .	
Fringes Services	43			x		x			
Materials and Supplies	10			x	•	x			
Miscellaneous Expenses	8			X		x			
Employee Activities					•	1		· · · ·	
Wages	124			x		x		•	
Fringes	2			x	4	x			
Services	1			X		х			
Materials and Supplies Miscellaneous Expenses	7 32			X X		X			
•	34		•	~					
Nondepartmental Expenses	, ,	•					· ,		
Wages	1,214			X		X			
Fringes Workman's Compensation	15,500 14,950	<b>x</b> '		Х,		X	x	By 853 Hours	
Workman's Compensation	5,750	~	X				x	By 69,332 Miles	
Workman's Compensation	2,300		-	х		х́			
Services	7.896			x		x			
Fuel	27,090		х				x	Directly by Miles	
Materials and Supplies	850			. X		X			
Utilities Premiums for Physical	5,206			×		X	•		
Damage	22			x		x			
Premiums for PL & PD . Insurance	190			x		x			
Premiums for Corporate		•						,	
Insurance Provisions for Uninsured P	578	•		X	·x	x	· X	By 163,231 Passengers	
PL	u 37,030					•	~	at \$14,481 Each	
Provisions for Uninsured PD	2,531		x				x	By 107,465 Miles	
		•						at \$2,531 Each	
Expenses for FL PL	1,362				<b>. x</b>		x	By 163,231 Passengers at \$524 per Step	
Expenses for PD	524		x				x	Bỹ 107,465 Miles	
PD Fuel and Lube Taxes Non-	· ·	·			·			at \$524 per Step	
Revenue Equipment	60	x				x			
Fuel and Lube Taxes	1 067		~		• •		~	Dimently By Hiles	
Revenue Equipment Leases and Rentals	1,957		x	x		x	x	Directly By Miles	
	\$484,174								

TABLE 5

COMPARISON OF COEFFICIENTS BETWEEN FY84 AND FY86, ADJUSTED FOR INFLATION

COEFFICIENT	FY84 CALIBRATI	ADJUSTED FOR ON INFLATION	ADJUSTED FOR REAL INCREAS	FY86 E CALIBRATION
Revenue Miles	1.063	1.1830	1.243	*
Total Milesl	0.932	1.037	1.089	0.97
Revenue Hours	24.39	27.14	28.52	*
Total Hours2	22.57	25.12	26.39	25.82
Peak Buses	55,969	62,285	65,441	68,088
Passengers	0.0744	0.0828	0.0870	0.1162

\* In FY 1986, no values are projected for revenue miles and revenue hours.

1. Coefficients are factored by the ratio of revenue miles to total miles in FY 1984 (93,031,164/106,163,110).

2. Coefficients are factored by the ratio of revenue hours to total hours in FY 1984 (7,062,585/7,632,855).

DRAFT

GENERAL PLANNING CONSULTANT: TECHNICAL MEMORANDUM 86.5.2 SENSITIVITY ANALYSES FOR THE BUS COST MODEL: SERVICE CHANGES AND INTERNAL RECALIBRATION

Prepared for:

Southern California Rapid Transit District

Prepared by:

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Barton-Aschman Associates, Inc. Cordoba Corporation Myra L. Frank & Associates Manuel Padron The Planning Group, Inc.

February, 1986

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# 1.1 BACKGROUND

Technical Memorandum 86.5.1 (November 1985) describes the bus operating cost-allocation model currently under development for the District by the GPC. Technical Memorandum 86.5.3 (December 1985) provides statistics on the model and provides details on the application of the model for short-range service changes.

While the bus operating cost model is calibrated in a specific year of operation of the District, there is a procedure inherent to the model that allows it to be recalibrated internally to adjust for inflation and changes in service levels provided. Such recalibration requires the assumption that there are no significant organizational changes made in the District, and that the number of operating divisions and maintenance operating divisions remain unchanged.

The bus operating cost model is designed to allow the District to compute the operating expenses for bus operation associated with either increases or decreases in service. The model generates these estimates from projections of annual bus operating statistics based upon the quantity of service for the whole SCRTD system (i.e., a summation of the data for each specific route). The costs of individual lines, and service by periods within a line, can be estimated by using systemwide averages of productivity and costs of different elements of operation and maintenance activities and staffing. As part of the procedure applied in these sensitivity tests, a spreadsheet has been built in Appleworks to compute the costs for any incremental change in service. Details of the use of these spreadsheets are provided within this document.

# 1.2 DESCRIPTION OF THE SENSITIVITY TESTS

The first sensitivity test was to perform an internal calibration of the FY 1984 coefficients to FY 1985 service levels and project FY 1985 expenditures. The aim of this test is to determine the ability of the model to respond to changes in District structure and service levels, and to provide guidance on the frequency with which full calibration to a new budget or financial statement will be needed. Having performed this update to FY 1985, a further update was undertaken to FY 1986, in order to compare the results with the FY 1986 full calibration. Because the period from FY 1984 to FY 1986 covers a number of organizational and service level changes, this was felt to be a guite stringent test of the robustness of the cost-allocation model.

The second sensitivity test was to determine the ability of the model to project costs for a package of service changes, and to determine whether or not it is necessary to undertake an internal recalibration of the model whenever such a package of changes is examined. The test was also intended to provide a comparison between the existing cost model used by the District and the results that can be expected from substituting the GPC Cost Model. As part of the investigation of potential service cuts that the District might implement if UMTA operating assistance were cut under the FY 1986 federal budget, the Planning Department assembled a list of service cuts that were almed at saving a total of \$10 million per year in operating and maintenance costs. The estimation of the extent of the savings to be obtained was determined by using the current version of the Scatchard Model, reduced by a factor of 25 percent (to account for fixed overhead costs) and net of revenues.

Two sensitivity tests were designed to be executed with this procedure. First, it was desired to determine the results of a straightforward application of the GPC cost model. In this application, marginal costs would be estimated, and all step sizes would remain the same as in calibration. This estimation would provide a comparison of the GPC cost model with the Scatchard model and would also indicate what is involved in application of the GPC model to small service changes. Second, it was desired to determine how much effect there would be on the estimated cost savings if the model is internally recalibrated before completing the cost estimation. This would provide an indication of the extent to which such recalibration may or may not be necessary for short-range application of the model to cost service changes.

## 2.1 INTERNAL RECALIBRATION OF THE COST MODEL

The procedure used to undertake the internal recalibration consists of several steps.

- A. Determine the change in CPI from the original calibration year to the update year.
- B. Determine the total budget from the original calibration year for each level-of-service variable and for each type of variation (fixed, direct, stepwise).
- C. Apply a CPI adjustment to each budget value obtained in step B.
- D. Divide each budget line by the update year's values of peak buses, vehicle miles, vehicle hours, and passenger boardings.

The result of step D is to obtain new coefficients for each of the fixed, directly variable, and stepwise variable components of each level-ofservice allocation. In addition, by simply summing the escalated budget lines from Step C, the total systemwide budget for the year can be obtained, as forecast by the model.

### 2.2 DIRECT MODEL APPLICATION WITHOUT RECALIBRATION

In this procedure, the GPC model is used in a fairly complex, sequential process. The service cuts constituted specification of a route number and the period of service to be cut, either Sunday, Saturday, or weekday. In working through the list, a route for which Sunday service was cut early in the process might appear later with Saturday service to be cut, and later again with weekday service to be cut. Because the GPC cost model takes account of the true nature of District operations and permits cost savings only when whole staff positions can be saved, it is necessary to re-estimate savings with a sequential buildup of the amount of service on a line to be cut. In addition, further economies can be gained within an Operating Division when service on several routes is to be cut from a single Operating Division, while yet other savings accrue on a systemwide basis, as service cuts are accumulated. The GPC cost model is not structured currently to allow such estimates to be made efficiently. As a result, the scale economies for individual Operating Divisions and the entire system were estimated only at the completion of all cost estimates.

Three different spreadsheets were created to permit the cost estimates to be obtained. The first is designed for line use and requires entry of the line number, division number, any modification to the annualization factors coded into the spreadsheet, and entry of average figures for p.m. peak buses (weekday only), total vehicle hours, total vehicle miles, passenger boardings, and revenue for any or all of an average weekday, an average Saturday, and an average Sunday. These inputs are structured to be consistent with the Line Performance Trend Reports. The spreadsheet then uses these input data to compute the operating costs both gross and net of revenue. Costs are determined on an annual basis, and the spreadsheet also calculates annual values of each of the vehicle hours, vehicle miles, passenger boardings, and revenue.

The second spreadsheet contains only those items identified as "Step D," which are the stepwise costs incurred on a divisional basis. This spreadsheet operates in the same manner as the first one, except that totals of average daily values of peak buses, vehicle hours, vehicle miles, passenger boardings, and revenue from all lines to be cut from or added to a single operating division are entered, instead of the values pertaining to a single route. The third spreadsheet contains all the items not included in the Divisional spreadsheet, i.e., the Direct items and the "Step S" items. Inputs to this spreadsheet are the sum totals of all peak buses, vehicle hours, vehicle miles, passenger boardings, and revenue for all service to be cut or added, Districtwide. No deduction is made from these costs for revenue, this being done at the Division level. Estimates of total savings (or costs) are obtained by adding together the results from all Division spreadsheets and the systemwide spreadsheets, and can be done for gross costs and for net costs (net of revenue).

### 2.3 MODEL APPLICATION WITH RECALIBRATION

The GPC model is based largely on stepwise variable elements and also contains a provision to allow fully-allocated costs to be obtained. The step sizes are determined by finding the average productivity of each line item in the budget. For example, there may be 4,445 full-time equivalent (FTE) bus operators employed by the District, with the operation of 7,585,000 total vehicle hours. This calculates out to an average of 1706 vehicle hours per FTE operator. Because the District can hire part-time operators, the smallest increment of a bus operator is one-half of the FTE productivity, or 853 vehicle hours. When service is cut, both the annual vehicle hours and the number of operators will be cut, but with the result that the step size may change. This changed step size needs to be recalibrated into the model. In addition, if fully-allocated costs are being used, the fixed costs are now being spread over a smaller base of buses, hours, miles, and passengers, so that the allocation to any line is larger. These changes in allocation represent an internal recalibration of the model which should be done whenever large changes are made in service levels, as well as when the model is to be applied to a different year from the original calibration.

Correctly, the procedure entails deducting the positions saved and other units saved from the original totals, as well as deducting the saved buses, hours, miles, and passenger boardings. If a policy exists not to lay off some of the positions indicated in the cost-savings calculation, then the amount of change will be considerably more dramatic. However, if adjustment is made for positions saved, it is expected that the internal recalibration will largely affect only the allocation of fixed costs.

### 3.1 INTERNAL RECALIBRATION OF THE COST MODEL

The change in the Consumer Price Index (CPI) from the end of FY 1984 to the middle of FY 1986, based on Bureau of Labor Statistics monthly releases, was 4.6%. Table 3-1 shows the FY 1984, FY 1985, and FY 1986 (projected) values of the level-of-service variables used in the cost model, and also shows the final audited values for FY 1984 (the calibration was done with actual data for the first three quarters of FY 1984 and projected data for the last quarter). It should be noted that it does not affect the recalibration whether vehicle hours and vehicle miles are expressed as revenue values, scheduled, total, or any other variant, as long as it is known which are used and that the model is applied always with values consistent with the model calibration or recalibration.

#### TABLE 3-1

ACTUAL AND PROJECTED ANNUAL LEVELS OF SERVICE FOR FY 1984, FY 1985, AND FY 1986

VARIABLE	VALUE									
	FY 1984 (CALIBRATED)	FY 1985 (ACTUAL)	FY 1986 (ESTIMATED)	FY 1984 (AUDITED)						
P.M. Peak Buses	2,063	2,009	1,987	1,992						
Vehicle Hours	7,152,000	7,041,642	7,585,000*	7,062,585						
Vehicle Miles	95,122,000	91,959,736	107,465,000*	93,031,164						
Passengers	465,400,000	497,158,321	424,400,000	465,637,732						

\* These are total miles and hours, while all other entries are revenue miles and hours.

Table 3-2 shows the budgets for FY 1984 for each service-level variable and for each type of variation. The Table also shows, for reference, the unit costs as derived for FY 1984. The CPI adjustment is then applied to determine the FY 1985 escalated budget, as shown, and the budget values are then divided by the FY 1985 service-level values to obtain new unit costs. These latter two items are shown in Table 3-2 as the escalated budget and the recalibrated unit costs. The same two calculations are also shown for FY 1986, for which the CPI change from FY 1984 was determined to be 11.285 percent.

# TABLE 3-2

# COMPUTATION OF RECALIBRATED COSTS AND ESCALATED BUDGETS

VARI	ABLE TYP	E FY 1984 UNIT COS (\$)		4 FY 1985 BUDGET (\$000)	FY 1985 UNIT COST (\$)	FY 1986 BUDGET (\$000)	FY 1986 UNIT COST (\$)
Peak	· • • • • •	79.01	163.0	170.3	82.57	181.4	87.93
Buse	s Fixed	33,279.69	68,656.0	71,745.5	35,712.06	76,403.8	38,451.85
	Step	22,497.33	46,412.0	48,500.5	24,141.63	51,649.6	25,993.76
	SUBTOTAL	55,856.03	115,231.0	120,412.0	59,936.26	128,228.0	64,533.54
Veh. Hour		0.59	4,250.0	4,441.3	0.63	4,729.6	0.62
	s Step	23.80	170,185.0	177,843.3	25.26	189,390.4	24.97
	SUBTOTAL	24,39	174,435.0	182,285.0	25.89	194,120.0	25.59
Veh.		0.57	54,491.0	56,943.1	0.60	60,640.3	0.64
Mile	s Step	0.49	46,644.0	48,743.0	0.53	51,907.8	0.48
	SUBTOTAL	1.06	101,135.0	103,785.0	1.13	120,415.0	1.12
Pass		0.0011	490.0	512.1	0.0011	545.3	0.0012
Bdgs	Flxed	0.01	4,078.0	4,261.5	0.0086	4,538.2	0,0107
	Step	0.06	30,065.0	31,417.9	0.06	33,457.8	0.0788
	SUBTOTAL	0.0711	34,633.0	36,245.0	0.0729	38,493.0	0,0907
TOTAL COST/BUDGET \$425,434,000		\$442,727,000		\$481,256,000			

As can be seen from Table 3-2, the result of the test is that the model projects a total expenditure of 442,727,000 for FY 1985. The actual audited expenditures on operating budget for FY 1985 were 439,903,899. The difference (overestimate) of 2,823,101 represents 0.64 percent of the FY 1985 actual expenditures. The same process for the FY 1986

estimated budget, using the FY 1986 estimated service level data employed earlier to recalibrate the model, provides budget lines and coefficients that generate a total forecast budget of \$481,256,000. This compares to the District budget of \$484,174,000. In this case, the difference (underestimate) is \$2,918,000 and represents 0.60 percent of the District budget for FY 1986.

Table 3-3 summarizes the final coefficients from Table 3-2 for the four service-level variables. There is some shifting of cost between the service-level variables resulting from some internal reorganization of the District between FY 1984 and FY 1986. As a result, the match between the internally recalibrated figures and the actual calibration of FY 1986 is not as close as the overall budget projections would indicate. However, the results are encouraging in terms of the robustness of the model and the ability of the internal recalibration to produce sensible results.

### TABLE 3-3

# SUMMARY OF FINAL COEFFICIENTS FROM INTERNAL RECALIBRATION AND FULL CALIBRATION OF FY 1986

	COEFFICIENT/UNIT COST (\$)						
VARIABLE	FY 1984 Calibrated	FY 1985 Internally Recalibrated	FY 1986 Internally Recalibrated	FY 1986 Calibrated			
Peak Buses	55,969	59,936	64,534	68,088			
Vehicle Hours	24.390	25.887	25.593	25.82			
Vehicle Miles	1.063	1.129	1.121	0,97			
Passengers	0.0744	0.0729	0.0907	0.1162			

### 3.2 DIRECT MODEL APPLICATION WITHOUT RECALIBRATION

A number of service cuts were identified by District Planning Staff, intended to total to a package of \$10,000,000 in operating cost cuts for a full year, based on FY 1986 costs. These service cuts were costed originally using a version of the Scatchard model that has been adjusted to approximate marginal costs. Figure 3-1 shows an example of the spreadsheet used to compute a cost for a period of service on a line, using the FY 1986 calibrated model (from Technical Memorandum 86.5.1). Table 3-4 summarizes the calculations for each line or period on a line and compares these with the Planning Department cost estimates. It must be emphasized that the costs in Table 3-4 do not reflect the potential savings within a division or across the entire District that would be achieved as the service cuts are summed together. The total effects are summarized at the end of the Table.

From these data, it is clear that the GPC Bus Operating Cost Model differs from the existing SCRTD cost model in that the full set of proposed service reductions are costed out at \$7,913,600 instead of the \$10,407,000 derived from the current SCRTD model. The GPC model estimate is approximately 24 percent lower than the Scatchard model. It is also clear from the table that there are significant intra-Division and Systemwide economies possible in a package of service changes of this size, given that the difference between the line-by-line costs and the division/systemwide costs is about \$1.5 million in a set of service changes initially costed at \$6.4 million. Gross costs of these service changes are \$10,412,900, with revenues of \$2,499,200.

The second notable element of the GPC Cost Model is shown in Table 3-5. This Table shows the sources of the costs identified in Table 3-4 and indicates the amount of cost attributable to each element. Of the gross costs for the service changes listed in these tables, approximately \$2.8 million is derived from materials savings, such as fuel and parts, and from savings on property damage and public liability. These savings would be achieved without any other action on the part of the District than cutting the service. All of the remaining \$7.6 million in costs are from labor positions or labor-related costs. For example, \$6.1 million in savings will accrue from the 144 operators used to operate the services in Table 3-4. However, if these operators are not laid off, only a small fraction of the savings will occur from reductions in hours paid.

#### 3.3 MODEL APPLICATION WITH RECALIBRATION

To determine the effects of internal recalibration of the model for a significant set of service changes, the changes used in the preceding section were re-estimated using a single recalibration for the entire package. Clearly, the primary effects of internal recalibration will be on the fixed costs, which were not included in the estimation of the service-change costs in Section 3.2. However, some changes may occur in step sizes as a result of the service changes. These can be identified readily by using Table 3-5, which indicates those line items that are changed and effectively identifies all unchanged labor categories.

The internal recalibration undertaken was done by recomputing each stepwise line item in the spreadsheets, determining the change in FY 1986 cost, the change in the base, and the change in the number of positions. These produced a new estimated step size for all steps. Using these new step sizes in the calculations for the division and systemwide costs of the service changes produced a revised estimate of net costs of \$8,061,900, an increase of \$148,300, or 2 percent of the original cost estimate. Based on this, it appears that internal recalibration of the model is unnecessary, at least for service changes on the order of 50 peak buses, and \$10 million in gross costs.

### TABLE 3-4

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Line No.	Div. Service GPC Operating No. Day Cost		GPC Operating Cost	Cumulative GPC Cost	Scatchard Op. Cost	Cumulative Scatchard Cost
203	3	Weekday	\$48,400	\$48,400	\$98,000	\$98,000
203	3	Saturday	1,000	49,400	19,000	117,000
203	3	Sunday	1,100	50,500	21,000	138,000
203	3	All	94,100	94,100	138,000	138,000
225/226	18	Saturday	134,400	228,500	233,000	371,000
208	3	Sunday	25,700	254,200	34,000	405,000
175	3	Saturday	24,200	278,400	55,000	460,000
175	3	Sunday	800	279,200	30,000	490,000
175	3	Sat/Sun	46,000	300,200	85,000	490,000
208	3	Saturday	23,000	323,200	29,000	519,000
192/194	16	Weekday	427,700	750,900	636,000	1,155,000
250/253	10	Sunday	21,600	772,500	52,000	1,207,000
430	б	Weekday	44,400	816,900	83,000	1,290,000
130	12	Sunday	64,300	881,200	151,000	1,441,000
259	9	Sunday	42,100	923,300	103,000	1,544,000
236	8	Sunday	21,600	944,900	63,000	1,607,000
161	8	Weekday	181,600	1,126,500	333,000	1,940,000
205	12	Saturday	56,200	1,182,700	130,000	2,070,000
205	12	Sundaý	14,500	1,197,200	52,000	2,122,000
205	12	Sat/Sun	70,700	1,197,200	182,000	2,122,000
220	7	Sunday	40,800	1,238,000	91,000	2,213,000
487/491	9	Saturday	85,800	1,323,800	168,000	2,381,000
487/491	9	Sunday	40,100	1,363,900	115,000	2,496,000
487/491	9	Sat/Sun	132,700	1,370,700	283,000	2,496,000
166/168	8	Sunday	42,300	1,413,000	129,000	2,625,000
208	3	Weekday	190,300	1,603,300	137,000	2,762,000
208	3	A11	242,400	1,606,700	200,000	2,762,000
462	1	Sunday	41,400	1,648,100	92,000	2,854,000
236	8	Saturday	41,900	1,690,000	103,000	2,957,000
236	8	Sat/Sun	84,500	1,711,000	166,000	2,957,000
293	16	Weekday	454,100	2,165,100	255,000	3,212,000
262	9	Sunday	38,800	2,203,900	114,000	3,326,000
225/226	18	Weekday	769,700	2,973,600	1,126,000	4,452,000
225/226	18	<u>A11</u>	968,400	3,037,900	1,359,000	4,452,000
268	3	Sunday	39,900	3,077,800	97,000	4,549,000
130	12	Saturday	59,300	3,137,100	130,000	4,679,000
130	12	Sat/Sun	148,400	3,161,900	281,000	4,679,000
250/253	10	Saturday	36,900	3,198,800	82,000	4,761,000
250/253	10	Sat/Sun	79,600	3,219,900	134,000	4,761,000
271	12	Weekdaÿ	164,900	3,384,800	299,000	5,060,000

SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

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### TABLE 3-4 (Continued)

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SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

Line No.	Div. No.	Service Day	GPC Operating Cost	Cumulative GPC Cost	Scatchard Op. Cost	Cumulative Scatchard Cost
147	12	Saturday	\$16,800	\$3,401,600	\$44,000	\$5,104,000
147	12	Sunday	(4,900)	3,396,700	23,000	5,127,000
1.47	12	Sat/Sun	33,000	3,417,800	67,000	5,127,000
488	9	Sundaý	18,000	3,435,800	54,000	5,181,000
274/276	9	Weekday	495,200	3,931,000	767,000	5,948,000
42	18	Sunday	99,600	4,030,600	203,000	б,151,000
259	9	Saturday	37,100	4,067,700	88,000	6,239,000
259	9	Sat/Sun	100,200	4,088,700	191,000	6,239,000
434	6	Sunday	83,200	4,171,900	198,000	6,437,000
220	7	Saturday	36,500	4,208,400	77,000	6,514,000
220	7	Sat/Sun	77,300	4,208,400	168,000	6,514,000
482	16	Sunday	38,200	4,246,600	123,000	6,637,000
267	9	Sunday	17,500	4,264,100	63,000	6,700,000
209	5	Sunday	54,200	4,318,300	110,000	6,810,000
493	9	Sunday	17,900	4,336,200	36,000	6,846,000
215	18	Saturday	15,900	4,352,100	57,000	6,903,000
262	9	Saturday	54,800	4,406,900	100,000	7,003,000
262	9	Sat/Sun	118,400	4,431,700	214,000	7,003,000
434	б	Saturday	79,500	4,511,200	174,000	7,177,000
434	б	Sat/Sun	180,700	4,529,200	372,000	7,177,000
158	15	Sunday	17,200	4,546,400	71,000	7,248,000
154	8	Sunday	36,200	4,582,600	86,000	7,334,000
183	15	Sunday	35,400	4,618,000	68,000	7,402,000
169	15	Saturday	35,400	4,653,400	100,000	7,502,000
423	8	Weekday	88,000	4,741,400	223,000	7,725,000
119/126	18	Saturday	52,100	4,793,500	108,000	7,833,000
438	18	Weekday	96,300	4,889,800	197,000	8,030,000
265/275	12	Weekday	374,400	5,264,200	588,000	8,618,000
211	5	Saturday	14,100	5,278,300	56,000	8,674,000
434	б	Weekday	638,400	5,916,700	993,000	9,667,000
434	б	A11	883,600	5,981,200	1,365,000	9,667,000
256	10	Sunday	31,400	6,012,600	95,000	9,762,000
103	5	Sunday	14,900	6,027,500	44,000	9,806,000
255	10	Sunday	32,200	6,059,700	66,000	9,872,000
576	10	Weekday	361,500	6,421,200	535,000	10,407,000



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# TABLE 3-4 (Continued)

SUMMARY OF COSTS FOR SPECIFIC LINE AND PERIOD SERVICE CUTS, BASED ON THE FY 1986 GPC OPERATING COST MODEL

Line No.	Div. No.	Service Day	GPC	Operating Cost	Cumulative GPC Cost	Scatcharc Op. Cost	
System	wide Cos	sta	\$3,	,423,100		ſ	
		-			on Costs:		
Divi	sion 1			25,100			
	3			349,800			
	5 6			69,400			
	6			479,100			
	7			48,200			
	8			333,800			
	9			685,500			
	10			319,200			
	12			603,700			
	15			62,000			
	16			687,500			
	18			827,200			
TOTAL	(Systemw	ide and ]	Divisi	on)	\$7,913,60 <u>0</u>		

## TABLE 3-5

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SOURCES OF COSTS FOR THE SERVICE CHANGES IN TABLE 3-4

SOURCE	LEVEL	DEPARTMENT	ITEM	QUANTIT	TY ALLOCATED COST
Systemw	ide	Facilities Maintenance	Supplies Radios	52	\$3,926
-		Scheduling	Schedule Checkers	1	42,645
		Facilities Maintenance	Electronics Maint.	1	39,928
		Maintenance Oper. Div.	Non-Revenue Maint.	1	34,400
		Maintenance Oper. Div.	Parts, Lubricants	-	1,030,705
		Non-Departmental Exp.	Fuel and Taxes		1,177,723
		Non-Departmental Exp.	Workmen's Comp. Mair		229,999
		Non-Departmental Exp.	Exp. & Provisions PI	) 40**	
		Central Maintenance	Running Repair Mech	. 1	40,179
		Central Maintenance	Mechanical Maint.Mec	:h. 1	40,189
		Central Maintenance	Electrical Maint.Med	:h. 1	40,206
		Central Maintenance	Body Shop Mechanic	1	40,187
		Central Maintenance	Transmission Mechani	c 1	40,200
		Central Maintenance	Engine Line Mechanic	: 1	39,983
		Print Shop	Timetable Printing	-	5,769
		Non-Departmental Exp.	Expenses for PL	31 <b>*</b> *	16,239
		Non-Departmental Exp.	Provisions for PL	31. <del>*</del> *	448,904
		Customer Relations	Telephone Clerks	1	29,678
Divisio	n 1	Transp. Oper. Division	Operators	1*	38,766
		Non-Depart. Expenses	Workmen's Comp. Oper	·. 1*	3,363
Divisio	n 3	Transp. Oper. Division	Operators	9 <del>*</del>	348,897
		Non-Departmental Exp.	Workmen's Comp. Oper		30,263
		Maint. Oper. Division	Running Repairs Mech	<b>1</b>	40,186
Divisio	n 5	Transp. Oper. Division	Operators	<del>3*</del>	116,299
		Non-Depart, Expenses	Workmen's Comp. Oper	• 3*	10,088
Divisio	пб	Maint. Oper. Division	Service Workers	1	31,945
		Transp. Oper. Division	Operators	18 <del>×</del>	697,794
		Non-Departmental Exp.	Workmen's Comp. Oper	∿ <b>.</b> 18 <del>×</del>	60,525
		Maint. Oper. Division	Running Repairs Mech	n. <del>3</del>	120,559
Divisio	n 7	Transp. Oper. Division	Operators	2 <del>*</del>	77,533
		Non-Depart. Expenses	Workmen's Comp. Oper	- 2*	6,725
Divisio	n 8	Transp. Oper. Division	Operators	11 <b>*</b>	426, 430
		Non-Departmental Exp.	Workmen's Comp. Open	. 11×	36,988
		Maint. Oper. Division	Running Repairs Mech		80,373

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Full-Time Equivalent positions Number of accidents involving property damage (average) ж×

### TABLE 3-5 (Continued)

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### SOURCES OF COSTS FOR THE SERVICE CHANGES IN TABLE 3-4

SOURCE LEVEL	DEPARTMENT	ITEM	Q1	UANTITY	ALLOCATED COST
Division 9	Transp. Oper. Division	Operators		22.5*	\$872,243
•	Non-Departmental Exp.	Workmen's Comp.	Oper.	22.5*	75,657
	Maint. Oper. Division	Running Repairs	Mech.	3	120,559
Division 10	Maint. Oper. Division	Service Workers		1	31,945
	Transp. Oper. Division	Operators		12 <b>*</b>	465,196
	Non-Departmental Exp.	Workmen's Comp.	Oper.	12 <b>*</b>	40,350
	Maint. Oper. Division	Running Repairs	Mech.	Î	40,185
Division 12	Maint. Oper. Division	Service Workers		1	31,945
	Transp. Oper. Division	Operators		19.5 <del>*</del>	755,944
	Non-Departmental Exp.	Workmen's Comp.	Oper.	19.5 <del>*</del>	65,569
	Maint. Oper. Division	Running Repairs	Mech.	.3	120,559
Division 15	Transp. Oper. Division	Operators		3 <del>X</del>	116,299
	Non-Depart. Expenses	Workmen's Comp.	Oper.	3*	10,088
)ivision 16	Maint. Oper. Division	Service Workers		1	31,945
	Transp. Oper. Division	Operators		18 <b>*</b>	697,794
	Non-Departmental Exp.	Workmen's Comp.	Oper.	18 <del>*</del>	60,525
	Maint. Oper. Division	Running Repairs	Mech.	2	80,373
)ivision 18	Maint. Oper. Division	Service Workers		1	31,945
	Transp. Oper. Division	Operators		25*	969,159
	Non-Departmental Exp.	Workmen's Comp.	Oper.	25 <b>*</b>	84,063
	Maint. Oper. Division	Running Repairs		4	160,745

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Full-Time Equivalent positions Number of accidents involving property damage (average) ××

4. \_\_\_\_ SPREADSHEETS FOR USING THE GPC BUS OPERATING COST MODEL

### 4.1 APPLEWORKS SPREADSHEETS

Appendix A shows three sample spreadsheets, one for a line and period, one for a division, and one for the system. These spreadsheets are currently being run on Apple //e computers under Appleworks, but an integrated database and spreadsheet system is under development in LOTUS 1-2-3 for use on IBM-PCs. The mechanics of the spreadsheets are little different. In the Appleworks version, the user follows the steps at the top of the sheet, entering only the line and division identifiers, as appropriate; adjusting the annual expansion factors, if necessary; and entering average data for the day or days defined for costing (i.e., an average weekday, an average Saturday, or an average Sunday). Recalculation of the spreadsheet is set to be done manually, not automatically, so the user must then request recalculation of the Sheet, which produces the estimates of the Total Marginal Costs and the Net Total Marginal Costs.

If costs are desired for different periods of operation of the same line, service data can be entered for all periods of interest and the calculations controlled by means of the Period Designator (Step 1). The only exception to this is for a case where first one period, then two periods, and finally three periods are to be costed. In this case, it is necessary to wait until after the two periods have been run, before entering the data for the third period.

The spreadsheet calculates the annual service statistics from the daily ones provided by the user and also sums the total across periods, if more than one period of data is specified. Keyed to the Period Designator, the appropriate annual service statistic is then displayed before each of the four groups of cost calculations, i.e., buses, hours, miles, and passengers. The number of steps is then calculated for each stepwise line item and the costs are computed. These are summed and entered into the summary table, where the total costs are determined.

After completing all cost estimates by line and period, the data should be entered into the division spreadsheets for as many divisions as necessary. The division spreadsheets compute only the component of cost that is incurred within a division. To complete the estimation, even if only one division is involved, total service-level statistics should be entered into the systemwide spreadsheet, where the remaining variable costs are estimated at a systemwide level. The systemwide spreadsheet also permits the user to estimate both marginal and fully-allocated costs by toggling the "Fully-alloc." switch between 1 and 0.

### 4.2 LOTUS 1-2-3 SPREADSHEETS

At the time of preparation of this Technical Memorandum, an enhanced spreadsheet and database procedure is under development. This procedure will use a data base developed from a mainframe file containing all scheduled trips by all routes and from all divisions, together with the most recent available data on revenue and passenger boardings. The spreadsheet-database system, which runs on an IBM or compatible personal computer in LOTUS 1-2-3, is designed so that the user is asked to indicate only the line and period for which costs are to be estimated. After the first line and period is entered, the program asks the user if more lines or periods are to be costed. As each additional line or period is entered, data are accumulated by division and for the system. At any time that the user wishes to do so, estimates can be obtained of the total costs, for all lines and periods entered so far, including divisional and systemwide economies.

A Users Manual and description of the procedures will be prepared once the procedures are complete, together with a Technical Memorandum describing the methods to update the data bases.

# APPENDIX A

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# SAMPLE SPREADSHEETS FOR LINE, DIVISION, AND SYSTEMWIDE COSTS

File: line.cost.208t

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NOTE: EP 2: STEP 3:	Then enter DA Enter Line Nu	Saturday = cion of ANY ALLY STATIST umber and Di er of days i entries in STATISTICS f	2, Sunday TWO period ICS for de vision Numi n the year in "Number	= 3, Total s is desir sired TWO per correct f rs of Days	ed, enter 4 f periods in St or this line? " cells	ep 4
Perlo Line Num Division	ber	4 208 3	Number of	Days:	Weekdays Saturday Sundays	255 52 58

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Days in Year	Week	day 255	Satur	rday 52	Sunc	lay 58	TOTAL
SOURCE	Dally	Annúal	Daily	Annual	Dàily	Annual	ANNUAL
Peak Buses	1						1
Vehicle Hrs.	24.0	6,120	17.0	884	17.0	986	7 <b>,99</b> 0
Vehicle His.	483	123,165	216	11,232	241	13,978	148,375
Passengers	358	91,290	235	12,220	146	8,468	111,978
Passenger Revenue	\$104	· • • •	\$73	\$3,796	\$47	\$2,726	\$33,042
COST CALCULATI	ONS BY SOUR		208		DIVISION	3	

	Buses	I	1					\$			
	Туре	, 	FY 1986 Cost	FY 1986 Base	Step Basis	Step Size	No. of Steps	Step Cost	Annual Cost	Department	Item
	Direc	t	\$150,000	1987	1987	1.0	1	\$75	\$75	Facilities Maint.	Supplies Radio
	Step	D	\$10,944,000	1987	343	5.8	i O	\$31,907	\$0	Maint. Oper. Div.	Servicing Mechanics
	Step	S	\$2,690,000	1987	63	31.5	Û	\$42,698	\$0	Scheduling	Scheduling Checkers
	Step	D	\$1,913,000	1987	60	33.1	Û	\$31,883	\$0	Maint, Oper, Div.	Servicing Deep Clean Wk
	Step	D	\$2,412,000	1987	<b>6</b> 0	33.1	0	\$40,200	\$0	Maint, Oper, Div.	Wheelchair Maint, Mecha
	Step	S	\$1,688,000	1987	42	47.3		\$40,190	\$0	Pacilities Maint.	Electronic Maint. Mecha
	Step	D	\$1,326,000	1987	-33	60.2	0	\$40,182	\$0	Maint. Oper. Div.	Farebox Maint. Mechanic
	Step	D	\$723,000	1987	18	110.4	0	\$40,167	\$0	Malnt, Oper, Div.	Special Projects Mechan
	Step	S	\$544,000	1987	17	116.9	0	\$32,000	\$0	Central Maint.	Service Workers
	Step	S	\$3,861,000	1987	14	141.9	0	\$275,786	\$0	Facilities Maint.	Electrical, Property, S
	Step	S	\$702,000	1987	14	141.9	0	\$50,143	\$0	Maintenance Gen.	Maintenance Instructors
	Step	D	\$9,742,000	1987	13	152.8	0	\$749,385	\$0	Transp. Oper. Div.	All except Operators
	Step	S	\$573,000	1987	13	152.8	0	\$44,077	\$0	Transp. Services	Radio Dispatchers
	Step		\$1,258,000	1987	13	152.8		\$96,769	\$0	Purchasing	Division Storekeepers
	Step		\$9,476,000	1987	13	152.8	0	\$728,923	\$0	Maint. Oper. Div.	Misc., Supp., Admin.,Su
-	Step		\$574,000	1987	12	165.6		\$47,833	\$Û	Centrai Maint.	Central Shop Supervisio
	Total		\$48,576,000					·	\$75		

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Hours	7;,990								
Туре	FY 1986 Cost	FY 1986 Base	Step Slze	Step Size	No. of Steps	Step Cost	Annua) Cost		
Step D	\$172,358,000	7585000	8890	853	9	\$19,388	\$174,491	Transp. Oper. Div.	Operators
Step D	\$14,950,000	7585000		853	9	\$1,682	\$15,135	Non-Dept. Expenses	Workmen's CompOpe
Step S	\$1,204,000	7585000		216714	Û	\$34,400	\$0		Non-Revenue Maintena
Step S	\$967,000	7585000		329783		\$42,043	<b>\$</b> Û	Scheduling	Schedule Makers
Step S	\$792,000	7585000		421389		\$44,000	<b>\$</b> 0	Transp. Services	Street Supervisors
Step S	\$586,000	7585000		446176		\$34,471	\$0	Transit Police	Transp. Service Insp
Step S	\$708,000	7585000		474062		\$44,250	\$0	Transp. Instruct.	Operator Training
Step S	\$373,000	7585000	12	632083	0	\$31,083	\$() •(````	Account. & Fiscal	Payroll Clerks
Total	\$191,938,000						\$189,626 		
Miles	148,375								
Туре	FÝ 1986 Cost	FY 1986 Base	Step Size		No. of Steps	Step Cost	Annual Cost		
Direct	\$25,421,000	107465000	107465000	1	148375	\$.2366	\$35,098	Haint. Oper. Div.	Parts, lubricants, d
Direct	\$29,047,000			1	148375	\$.2703	\$40,105		Fuel and Taxes on Fi
Step S	\$5,750,000			69332	2	\$3,710	\$7,419	Non-Dept. Expenses	Workmen's Comp.
Step S	\$3,055,000			107465	1	\$3,055	\$3,055	Non-Dept. Expenses	Expen, and Prov. fo
Step D	\$24,152,000	107465000	601	178810	Û	\$40,186	\$0	Maint. Oper. Div.	Running Repair Mech
Step D	\$2,009,000	107465000	50	2149300	Û	\$40,180	\$0	-	Inspectors
Step S	\$1,567,000	107465000	39	2755513	0	\$40,179	\$0	Central Maint.	Running Repair Mech
Step S	\$1,487,000			2904459	Û	\$40,189	\$0	Central Maint.	Mechanical Maint. W
Step S	\$1,367,000			3160735	Û	\$40,206	\$0	Central Maint.	Electrical Maint. W
Step S	\$1,286,000		•	3358281	0	\$40,188	<b>\$</b> ()	Central Maint.	Body Shop Mechanics
Step S	\$1,206,000			3582167	0	\$40,200	\$() \$	Central Maint.	Transmission Mechan
Step S	\$1,085,000			3980185		\$40,185	\$Û	Central Maint.	Engine Line Mechani
Step S		107465000	_	4477708	0	\$40,208	\$Û	Central Maint.	Welding Mechanics
Step S		107465000		5656053		\$40,158	\$() #0	Central Haint. Central Maint.	Cylinder Head Mecha
Step S	•	107465000		5656053 7676071	0	\$40,158	\$() \$()	Central Maint.	Paint Shop Workers Machine Shop Mechan
Step S		107465000		7676071	Ŭ	\$40,214 \$40,214	\$0 \$0	Central Maint.	Sheet Metal Shop Me
Step S Step S		107465000 107465000	1	8266538	-	\$40,214 \$40,231	\$Û	Central Maint.	Frame Shop Mechanic
Step S		107465000		8266538	Ŭ	\$40,231	\$0	Central Maint.	Upholstery Workers
Step S	•	107465000		9769545	-	\$40,182	\$Û	Central Maint.	Systems Shop Mechan
Step S	•	107465000		13433125		\$40,125	\$0	Central Maint.	Engine Parts Crib M
Step S		107465000		13433125		\$40,125	\$Û	Central Maint.	Engine Teardown Mec
Step D	•	107465000		17910833		\$40,167	\$0	Maint. Oper. Div.	Road Failure Mechan
DICE D					Ŭ	\$40,200	\$0	Central Maint.	Sign Shop Mechanics
	<u>\$201 000</u>	111 //165/1111							
Step S Step S	\$201,000 \$161,000	107465000		21493000 26866250	Ŭ	\$40,250	\$0	Central Maint.	Tool & Unit Room Me

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Issengers	111,978								
Туре	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Direct	\$476,000	424400000	424400000	1	111978	\$0	\$126	Print Shop Ti	metables
Step S	\$1,362,000	424400000	2600	163231	0	\$524	\$0	Non-Dept. Expenses Ex	penses for PL
Step S	\$37,650,000	424400000	2600	163231	0	\$14,481	\$0	Non-Dept. Expenses Pr	ovisions for Unins, P
Step S	\$2,671,000	424400000	90	4715556	0	\$29,678	\$Ŭ	Customer Relations Te	lephone Clerks
Step S	\$1,172,000	424400000	34	12482353	0	\$34,471	\$0	Transit Police Po	licePassenger Secur
Step S	\$1,065,000	424400000	33	12860606	Û	\$32,273	\$0	•	sh Clerks
Step S	\$681.000	424400000	22	19290909	0	\$30,955	\$0	Marketing and Comm.Ti	cket Clerks
Total	\$45,077,000						\$126	-	

# SUMMARY COST TABLE

.

Source	Value
Peak Buses	\$75
Vehicle Hours	\$189,626
Vehicle Miles	\$85,677
Passenger Boardings	\$1,26
TOTAL MARGINAL COSTS	\$275,504
Passenger Revenue	\$33,042
NET TOTAL MARGINAL COSTS	\$242,462

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NOTE: STEP 2: 1 STEP 3: 1 STEP 3: 1	Enter period for Weekday = 1, Sa If a combination Then enter DAIL Enter Line Number Are the number of If NO, change en Enter DAILY STA calculating line	turday = 2 n of ANY T Y STATISTIC er and Div of days in ntries in FISTICS for	, Sunday = WO periods CS for des ision Number the year o in "Numbers	3, Total is desire ired TWO   er correct fo s of Days	ed, enter periods in por this li cells	Step 4	d.		×
Period Line Numbe Division I	er (	4 1 ) 3	Number of 1	Days:	Weekdays Saturday Sundays	255 52 58			
	Veek	cday	Satur	dav	Sund	iav			
Days in Ye	ear Daily	255 Annual		52		58	TOTAL ANNUAL		
Peak Buse	es 2	2		······			2		
Vehicle H	rs. 34.4	8,772	53.7	2,792	79.4	4,605	16,170		
Vehicle MI	is. 566	144,330	613	31,876	1,143	66,294	242,500		
assenger	rs 391	99,705	577	30,004	1,267	73,486	203,195		
Passenger Revenue	\$1 <u>1</u> 6	\$29,580	\$196	\$10,192	\$514	\$29,812	\$69,584		
	JLATIONS BY SOUR		 0		DIVISION	3			
Buses			U		DIVISION	J			
Туре	FY 1986 Cost	FY 1986 Base	Step Basis	Step Size	No. of Steps	Step Cost	<u>Annual</u> Cost	Department	Item
Step D	\$10,944,000	1987	343	5.8	. 0	\$31,907	\$0	Maint. Oper. Div.	Servicing Mechanics
Step D	\$1,913,000	1987	60	33.1		\$31,883	\$0	Maint. Oper. Div.	Servicing Deep Clean
Step D	\$2,412,000	1987	60	33.1		\$40,200	<b>\$</b> 0	-	Wheelchair Maint. Mec
Step D	\$1,326,000	1987	33	60.2		\$40,182	\$0		Parebox Maint. Mechan
Step D	\$723,000	1987	18	110.4		\$40,167	<b>\$</b> 0	-	Special Projects Mech
Step D	\$9,742,000	1987	13	152.8		\$749,385	\$0 \$0		All except Operators
Step D Step D	\$1,258,000 \$9,476,000	1987 1987	13 13	152.8		\$96,769 \$728,923	\$0 \$0	-	Division Storekeepers Misc., Supp., Admin.,
Totai	\$37,794,000	1707	15	152.8	, v	₩120°,72J	\$0 \$	Maine, oper, Div.	moor, suppr, numme,
Hours	16,170		<u></u>	<u> </u>					
Туре	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Co <del>s</del> t		
Step D Step D Total	\$172,358,000 \$14,950,000 \$187,308,000	7585000 7585000	8890 8890	853 853		\$19,388 \$1,682	\$348,981 \$30,270 \$379,251	Transp. Oper. Div. Non-Dept. Expenses	Operators Workmen's CompOper

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Miles	242,500								
Туре	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Stjep Cost	<u>Annua)</u> Cost		
Step D	\$24,152,000		601	178810	1	\$40,186	\$40,186	•	Running Repair Mechan
Step D	\$2,009,000		50	2149300		\$40,180	\$0	Maint, Oper, Div,	Inspectors
Step D Total	\$241,000 \$26,402,000	107465000	6	17910833	0	\$40,167	\$0 \$40,186	Maint. Oper. Div.	Road Failure Mechanic

# SUMMARY COST TABLE

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Source	Value		
Peak Buses	\$0		
Vehicle Hours	\$379,251		
Vehicle Miles	\$40;186		
TOTAL MARGINAL COSTS	\$419,438		
Passenger Revenue	\$69,584		
NET TOTAL NARGINAL COSTS	\$349,854		

NOTE: 11 TT STEP 2: En STEP 3: An If STEP 4: En Ca STEP 5: 11	eekday f a con hen en hter L re the f NO, n hter D alcula f marg	= 1, Sa mbinatio ter DAIL ine Numb number change en AILY STA ting lin inal cos	r computatio turday = 2, n of ANY TWO Y STATISTICS er and Divis of days in t ntries in "N TISTICS for e costs ts are to be ted costs ar	Sunday = 3 periods i for desir ion Number he year co umber of I the perloc calculate	B, Total = s desired red TWO per prrect for bays' cells is to be used, enter 1	, enter 4 riods in S this line? s sed ln 0 against f	Step 4	ted.
Period			4	Number of	Nave:	Veekdavs	255	
Line Number	•		)		Mile.	Saturdays		
Division Nu			0			Sundays		
Fully-Alloc			5				••	
Days in Yea			kday 255 Annua I		5	Sun 2 Daily	58	
SOURCE								
Peak Buses	3	5	2					52
Vehicle Hrs	3.	597.4	152,337	792.7	41,220	1,004.4	58,255	251,813
vehicle Mis	ł.	10,911	2,782,305	12,590	654,680	15,866	920,228	4,357,213
Passengers	3	12,254	3,124,770	15,516	806,832	20,891	1,211,678	5,143,280
Passenger Revenue		\$6,121	\$1,560,855	\$7,267	\$377,884	\$9,878	\$572,924	\$2,511,663
COST CALCUL	ATIONS	5 BY SOU	RCE - LINE	0		DIVISION	 0	

Buses 52 FY 1986 FY 1986 Step Step Step Annua] Department Item No. of Cost Туре Cost Size Steps Cost Base Basis \$3,926 Supplies -- Radi Direct \$150,000 1987 1987 52 \$75 Facilities Maint. 1.0 Step S \$2,690,000 \$42,698 \$42,698 Scheduling Scheduling Check 1987 63 31.5 1 Facilities Maint. Step S \$1,688,000 1987 42 47.3 1 \$40,190 \$40,190 Electronic Maint \$32,000 \$0 Central Maint. Service Workers Step S \$544,000 1987 17 116.9 Û Step S \$3,861,000 141.9 Û \$275,786 \$0 Facilities Maint. Electrical, Prop 1987 14 \$0 \$50,143 Maintenance Gen. Maintenance Inst Step S \$702,000 1987 141.9 Û 14 \$44,077 \$0 Transp. Services Radio Dispatcher Step S \$573,000 1987 13 152.8 Û \$0 \$47,833 Central Maint. Central Shop Sup Step S \$574,000 1987 12 165.6 Û Fixed 52 \$43,641 \$2,269,315 \$86,714,000 1987 1987 1.0 Total \$10,782,000 \$86,814

File:	cost.calc.dist

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Hours	251812.6								
Туре	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost		
Step S	\$1 <b>,204,</b> 000	7585000	35	216714	1	\$34,400	\$34,400	Maint, Oper. Div.	Non-Revenue Main
Step S	\$967,000	7585000	23	329783	Û	\$42,043	\$0	Schedul i ng	Schedule Makers
Step S	\$792,000	7585000	18	421389	0	\$44,000	\$0	Transp. Services	Street Superviso
Step S	\$586,000	7585000	17	446176	0	\$34,471	\$0	Transit Police	Transp. Service
Step S	\$708,000	7585000	16	474062	Ő	\$44,250	\$0	Transp. Instruct.	-
Step S	\$373,000	7585000	12	632083	0	\$31,083	-\$0	Account. & Fiscal	Payroll Clerks
Fixed Total	\$3,869,000 \$4,630,000	7585000	7585000	1	251812	\$1	\$128,446 \$34,400		
Miles	4,357,213						<u> </u>		
	FY 1986	FY 1986	Step	Step	No. of	Step	Annual		
Туре	Cost	Base	Size	Size	Steps	Cost	Cost		
Direct	\$25,421,000	107465000	107465000	1	4357213	\$,2366	\$1,030,705	Maint, Oper, Div.	Parts, lubricant
Direct	\$29,047,000	107465000		1	4357213	\$.2703	\$1,177,723	Non-Dept. Expenses	Fuel and Taxes o
Step S	\$5,750,000	107465000	1550	69332	62	\$3,710	\$230,000	Non-Dept. Expenses	Workmen's Comp.
Step S	\$3,055,000	107465000	1000	107465	-40	\$3,055	\$122,200	Non-Dept. Expenses	Expen. and Prov.
Step S	\$1,567,000	107465000	39	2755513	1	\$40,179	\$40,179	Central Maint.	Running Repair M
Step S	\$1,487,000	107465000	37	2904459	1	\$40,189	\$40,189	Central Maint.	Mechanical Maint
Step S	\$1,367,000	107465000	34	3160735	1	\$40,206	\$40,206	Central Maint.	Electrical Maint
Step S	\$1,286,000	107465000	32	3358281	1	\$40,188	\$40,188	Central Maint.	Body Shop Mechan
Step S	\$1,206,000	107465000	30	3582167	1	\$40,200	\$40,200	Central Maint.	Transmission Mec
Step S	\$1,085,000	107465000	27	3980185	1	\$40,185	\$40,185	Central Maint.	Engine Line Mech
Step S	\$965,000	107465000	24	4477708	0	\$40,208	\$0	Central Maint.	Welding Mechanic
Step S	\$763,000	107465000	19	5656053	0	\$40,158	\$0	Central Maint.	Cylinder Head Me
Step S	\$763,000	107465000	19	5656053	0	\$40,158	\$0	Central Maint.	Paint Shop Worke
Step S	\$563,000	107465000	14	7676071	0	\$40,214	\$0	Central Maint.	Machine Shop Mec
Step S	\$563,000	107465000	. 14	7676071	0	\$40,214	\$0	Central Maint.	Sheet Metal Shop
Step S	\$523,000	107465000	13	8266538	0	\$40,231	\$0	Central Maint.	Frame Shop Mecha
Step S	\$523,000	107465000	13	8266538	0	\$40,231	\$0	Central Maint.	Upholstery Worke
Step S	\$442,000	107465000	11	9769545	0	\$40,182	\$0	Central Maint.	Systems Shop Mec
Step S	\$321,000	107465000	8	13433125	0	\$40,125	<b>\$</b> 0	Central Maint.	Engine Parts Cri
Step S	\$321,000	107465000	8	13433125	0	\$40,125	<b>\$</b> 0	Central Haint.	Engine Teardown
Step S	\$201,000	107465000	5	21493000	0	\$40,200	<b>\$</b> 0	Centrai Maint.	Sign Shop Mechan
Step S	\$161,000	107465000	4	26866250	0	\$40,250	\$0	Central Maint.	Tool & Unit Room
Total	\$77,380,000						\$2,801,775		

Page 2 3/06/86 Passengers 5,143,280

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Туре	FY 1986 Cost	FY 1986 Base	Step Size	Step Size	No. of Steps	Step Cost	Annual Cost	
Direct	\$476,000	424400000	424400000	1	5143280	\$0	\$5,769	Print Shop Timetables
Step S	\$1,362,000	424400000	2600	163231	31	\$524	\$16,239	Non-Dept. Expenses Expenses for PL
Step S	\$37,650,000	424400000	2600	163231	31	\$14,481	\$448,904	Non-Dept. Expenses Provisions for U
Step S	\$2,671,000	424400000	90	4715556	1	\$29,678	\$29,678	Customer Relations Telephone Clerks
Step S	\$1,172,000	424400000	34	12482353	Û	\$34,471	\$()	Transit Police PolicePassenge
Step S	\$1,065,000	424400000	33	12860606	0	\$32,273	\$0	Account. & Fiscal Cash Clerks
Step S	\$681,000	424400000	22	19290909	Û	\$30,955	\$0	Marketing and Comm.Ticket Clerks
Fixed	\$4,218,000	424400000	424400000	1	5143280	\$0	\$51,118	-
Total	\$45,077,000						\$500,589	

SUMMARY COST TABLE

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Source	Value
Peak Buses	\$86,814
Vehicle Hours	\$34,400
Vehicle Hiles	\$2,801,775
Passenger Boardings	\$500,589
TOTAL COSTS	\$3,423,579

#### GENERAL PLANNING CONSULTANT

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To: Steve Parry

From: David Wilson

Date: April 9, 1986

Subject: BUS COST MODEL DATA BASE

Background:

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As you know, we have been working to develop a data base of daily miles, hours and peak buses for each line by operating division. The 4-24 reports provide these data by line only and do not split miles and hours by division.

To obtain this information we have developed an algorithm to summarize this data from the bus run data base files (for September 8, 1985) provided by Dennis Shoemaker in scheduling.

Current Position:

The algorithm we have developed matches the results of the 4-24 reports for most records, however, these are some discrepancies between the records. Discussions with Dennis Shoemaker indicate two likely causes or sources for the discrepancies:

1. The 4-24 reports assume the evening peak hour is between 3.45pm and 7pm, whereas, our algorithm calculates buses in the peak between 3pm and 6pm. The margin of error usually involves+1 bus per line.

2. The 4-24 report assigns driver relief runs to the line which the bus operated prior to commencing the relief run. Our algorithm assigns the hours and miles to the division to which or from which the driver relief run is made. This effectively creates a pool of hours and miles that is assigned to a division but not a line.

Possible Directions To Proceed:

We believe that there is no reason to change the algorithm we use to calculate buses in the peak because the discrepancies are small and can be ignored.

However, a decision is needed on the procedure to be used to handle driver relief runs. There are 4 alternative techniques that may be used and each has advantages and disadvantages.

First the procedure used to generate the 4-24 reports could be used. This uses the assignment of miles and hours to the bus line number that happens to be used for the relief run. However this will overestimate the costs of running that line and underestimate the costs of running lines whose buses do not happen to be used for relief runs but whose drivers may be carried on the relief runs.

Alternatively if we use our algorithm which spreads the costs over the division then we are adding to the fixed or overhead costs of the division and by definition these will not be sensitive to changes in the amount of buses operated. Any reductions of buses would usually be associated with some reduction in the need for relief runs. Totally shutting down all lines in a division would still leave a residual of hours and miles associated with relief bus runs that were no longer needed.

A third and new method of allocation is to identify all the bus lines that come into a terminal and that use one of the buses for the relief run. The costs associated with the relief run could then be spread over all the bus lines that use the relief run. This is theoretically better, but this will require a more complex algorithm and consequently take more time to implement.

A fourth and final alternative is to take a combination of the second and third alternatives. For the purposes of implementing the cost model we can accept our existing algorithm (allocation to division) and continue to build the model but plan in fiscal '87 to revise the allocation procedure using the theoretically better third technique.

We request your advice and direction regarding which of the four alternatives we should proceed to implement.

CC Leo Bevon Keith Killough Anne Odell Dennis Shoemaker Peter Stopher Project File (2 copies)

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Keith Killough

DEPARTMENTAL

### SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

DO NOT INCLUDE MORE THAN ONE SUBJECT IN THIS COMMUNICATION

DATE: June 19, 1986

mm. Section Managers TO; Stephen T. Par FROM: SUBJECT: BUS COST FORMU

The General Planning Consultants have developed a version of the Bus Cost Model for our review and application. The result of several months of development, it is our intent to eventually replace the present cost formula with this. With that in mind, please have your staff work with it so we may see how it performs. As with any program, the bugs must be worked on.

A floppy disk of the program and two copies of the draft user documentation are for your section's use. Please appoint a contact person(s) for your section so we may keep the material current as new issues are released.

Mike Brewer will serve as the focal point for your comments, suggestions, and intermediary with the GPC staff.

Attachments

cc: Peter Stopher Gary Spivack

Info Support

# BŰSCOST

# VERSION 1.0

# USER DOCUMENTATION

DRAFT

June, 1986

### WHAT IS THE BUS COST MODEL?

The Bus Cost Model is designed to predict the annual operating cost of a bus line or group of lines. The model is based on the actual 1985/1986 operating budget and can be used to estimate the costs of running a bus line on a weekday or a Säturday or a Sunday or some combination.

Specifically the model can perform the following tasks:

- 1. Cost an existing bus line already in the data base
- 2. Cost a group of lines in the data base
- 3. Cost a proposed line where the level of service is supplied by the user.

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4. Change the level of service of existing bus lines in the data base and then cost the results.

The cost model contains a large data base of existing RTD bus services so that the user only has to specify the bus line number and day of the week for the model to be able to calculate operating costs.

The cost model has been developed as a spreadsheet program using LOTUS 123. You do not have to know about the theory of the model or how to use spreadsheet programs like LOTUS in order to be able to run the program. This is because the Bus Cost Model is menu driven. All you have to do is learn to use a menu of functions which run the cost calculations for you and print reports.

However, should you want to come to grips with the theory of the Bus Cost Model then there are a number of technical documents that you could read. Technical Memoranda 5.1.2, June 1984, and 86.5.1 and 86.5.3 November 1985 and 86.5.2 February 1986 explain the theory and procedures used for calculating the model.

Different Costs.. Systemwide and Divisional.

As the name suggests the bus cost model estimates costs of operating a bus. These costs are estimated simply by taking each line item of the bus system budget (wages,maintenance,fuel etc.) and allocating them to one of four measures of how much work a bus performs. This is because the more work or services a bus produces the more it costs to operate. The measures of the work or level of service used are: the number of buses used in peak operations, the annual amount of miles and hours travelled and the number of passengers that boarded the bus. As these measures go up costs go up and as they go down costs go down. These measures have been found to be accurate predictors of bus costs.

The Bus Cost Model splits costs into divisional and systemwide costs. .

Cost of Operating A Bus

Divisional

Certain functions of running a bus company can be located at a bus garage or divisional level. For example, daily or weekly maintenance takes place in the division. For savings to occur in maintenance there needs to be changes in the number of buses serviced by that division. In a multidivision operation cutting buses in several divisions may in fact create no saving because not enough buses have been removed from the division to warrant the saving of say a mechanic or bus driver. On the other hand some functions like central maintenance, administration and märketing are a function of the total bus fleet and changes can be pooled across all divisions. This is why bus costs are partitioned into division and systemwide costs. A more detailed description of the theory is contained in the technical reports.

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### SAMPLE OUTPUT

This section describes the columns of the systemwide and division spreadsheets. Recall that the bus cost model has two different calculation areas, one for system effects and another for divisional effects. The columns of each sheet are similar so it will suffice to detail the systemwide spreadsheet.

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First let's consider the overall layout of the bus cost analysis printout. Figure 1 is a printout of the calculations for the system costs of a bus line (line 203). It shows all costs that cannot be easily or meaningfully allocated to any one division. For example, scheduling departments, central facilities maintenance, administration, and training, etc., are functions that must be be performed for the whole fleet and cannot easily be allocated to any one group or division of buses.

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	Hours	Fy 1986 Cost \$		Step Size	No. of Steps	Step Cost \$	Annua Cost		···	

Figure 2 shows the costs for the operating divisions. These costs (e.g., daily maintenance and driver wages) can be allocated by division.

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COSTS FOR DIVISION 3 Buses FY 1985 FY 1986 Department Step Step Annual No. of Type Cost \$ Base Size Steps Cost \$ Cöst \$ 10, 944, 000 1, 913, 000 2, 412, 000 1, 326, 000 723, 000 9, 742, 000 1, 258, 000 9, 476, 000 37, 794, 000 O Maint. Oper. Div. Servicing Mechanics O Maint.-Oper.-Div.-Servicing Deep Clean O Maint. Oper. Div. Wheelchair Maint. Mec. 1,987 1,987 1,987 1,987 1,987 1,987 1,987 31, 945 31, 771 40, 180 40, 174 6 Step D 0 z i 33 33 Step D 0 Step D 0 O Maint, Oper. Div. Farebox Maint. Mechan O Maint. Oper. Div. Special Projects Mech. O Transp. Oper. Div. All except Operators --60 Ó Step D 40,025 750,139 96,667 729,657 110 0 Step D 153 Step D 0 0 Purchasing 153 0 Division Storekeepers Step D 0 Maint. OPer. Div. Misc., Supp., Admin., Step D 1,987 153 Ũ 0 Total 10,400 Hours Step. Step Fy\_1985. Annual .Fy..1985. .No. .. of. Cost 5 Cost \$ Type Cost \$ Base Size Steps 19, 383. 1, 681 232, 595 -Transp. - Oper. - Div. - Operators 20, 172 Non-Dept. Expenses Workmen's Comp. --Oper 172, 358, 000 - 7, 585, 000 14, 950, 000 - 7, 585, 000 7, 585, 000 Step.D 12 Step D 853 12 Total 187, 308, 000 252,769 miles 52,000 Step Annual Fy 1985 Fy 1986 Step No. of Type Cost \$ Base .. Size .Steps Cost Cost ..... \$ 24, 152,000 107, 465,000 178,810 2,009,000 107, 465,000 2, 149, 300 241,000 107, 465,000 17, 910, 833 40, 166 40, 180 40, 167 0 Maint. Oper. Div. Running Re 0 Maint. Oper. Div. Inspectors Running Repair Mech. Step D 0 Step D Ò Step D 0 O Maint. Oper. Div. Road Failure Mechanics Total 26,402,000

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Step S Step S	1.286.000	107.465.000	3,358,281	ŏ	40, 187		) Central Maint.	Body Shop Mech.
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Step S	763, 000	107,465,000	5,556,053	0	40, 158		) Central Maint.	Cylinder Head Mec
Step S	763,000	107,465,000	5,656,053	0	40, 158	· (	) Central Maint.	Paint Shop Worker
Step S Step S	563,000	107,465,000	7,676,071		40,214		) Central Maint.	Machine Shop Mech
Step S	523.000	107, 465, 000	8,266,538	ŏ	40,213	(		Sheet Metal Shop Frame Shop Mech.
Step S	523,000	107,465,000	8,266,538	0	40, 213	. (	) Central Maint.	Upholstery Worker
Step S	442,000	107,465,000	9,769,545	Q.	40, 182		Central Maint.	Systems Shop Mec
Step S Step S	321,000	107,465,000	13,433,125 13,433,125	0	40, 125	0	) Central Maint.   Central Maint.	"Engine Parts Cri Engine Teardown
Step S	201,000	107,465,000	21,493,000	Ŏ	40,200	, Č	Central Maint.	Sign Shop Mech.
Step S	151,000	107, 465, 000	26,866,250		40,250		Central Maint.	Tool & Unit Room
-Total	77, 380, 000			<u>`</u>		1,518,655		
Passengers		16, 713, 895		······	<u> </u>		·	<u> </u>
Type	Fy 1986 Cost \$	Fy 1986 Base	Step Size		Step Cost \$	Annual Cost \$		
Direct	476,000	924,400,000	i	16,713,895	0	18, 385	Print Shop	Timetables
Step S Step S	1, 352, 000 37, 650, 000	424, 400, 000 424, 400, 000	163, 231 163 <b>, 2</b> 31	102 102	524 14,481	53, 448 1, 477, 062	Non-Dept. Expenses Non-Dept. Expenses	Expenses for PL Provisions for U
			an dan takan dari salah salah salah salah salah salah salah salah salah salah salah salah salah salah salah sa Takan salah salah salah salah salah salah salah salah salah salah salah salah salah salah salah salah salah sala					
Step S	2, 671, 000	424,400,000	4, 715, 555	3	29, 678 34, 471	89,034	Customer Relations	Telephone Clerks
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Fixed	4,218,000	424, 400, 000 424, 400, 000 424, 400, 000 424, 400, 000	, i	16, 713, 895	0	167,139		
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assengers otal Marg Co		5,973,687	<u> </u>				· · ·	

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Returning to the system cost printout (Figure 1), we can divide the sheet into six areas (schematically presented in Figure 3). The first area, at the top, is the level of service measures for a selected bus line or the sum of these measures for a group of lines. Areas two to five then take these level of service measures and allocate them to specific line items to determine operating costs.

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For example, area two includes line item costs that are related to (or allocated to) the level of service measure peak buses. Area three includes line items that are related to the annual hours of travel, area four line item costs related to annual miles of travel, and area five is line items related to annual passengers. Area 6 is a summary of the total costs from areas two, three, four, and five. This summary is copied into the report section (Figure 4).

The divisional printout has a similar layout, but because of space limitations in the spreadsheet, we have omitted the level of service measures summary in area one. Kowever, these measures are identical to the totals in the system cost printout.

Having described the basic layout of these printouts, we will now examine the columns and rows of some of the areas in the printout.

The first column in Figure 1 refers to the type of variable. As discussed in the section on theory, there are direct costs, both step and fixed. The second column is the fiscal year cost for the line item. The third column, FY 1986 BASE, is the total level of service measure for the system. The first part of spreadsheet (area 2) 1987 refers to the number of buses in the system.

In the section section below, (area 3) 7585000 refers to the total number of bus hours in the system. The fourth column, step size, is the increment in the level of service (or the decrement) necessary to incur a cost increase (or decrease). Where costs are direct, the stepsize is one, meaning that costs will be a continuous function of the level of service.

The step size is calculated by dividing the annual level of service measures for the whole system by the number of employees in the corresponding line item. The number of steps (column 5) generated is calculated by dividing the total level of service measure (say peak buses or annual vehicle hours) by the step size. The sixth column is the step cost. This cost is determined by dividing the FY 1986 cost by the Fy 1986 BASE. The final column is the annual cost, which is the product of the step cost multiplied by the number of steps.

It is useful to consider a sample output to clarify the above brief description of the spreadsheet cost model. Suppose that you wish to calculate the cost of cutting bus line 203, for weekdays, Saturdays and Sundays. After specifying line 203 in the data input area the spreadsheet macro accesses the data base and places the annual totals for vehicle hours, miles, passengers, revenue and average daily peak pm buses at the top of the spreadsheet. For line 203, there is 1 PM peak bus, a total of 3785 vehicle hours, 30368 miles and 59310 passengers for a revenue of \$12730 dollars.

Taking the 1 peak bus, let's work through the first part of the spreadsheet. The first line item of \$150000 refers to the cost of radios in the total bus fleet (1987 buses). Since each radio costs \$75 (step cost), the cost of the radios for 1 PM peak bus is \$75. The second line item involves scheduling services. For there to be an increase in this cost, there must be at least 32 buses. Since there is only 1 bus, the scheduling costs will be absorbed by the existing mannower and total cost will not increase.

The systemwide costs are summarized at the foot of the spreadsheet In Figure 1.

<u>;</u> ...

The system costs of running line 203 are \$63553 allocated amongst peak buses (\$43716), vehicle hours (\$3785) vehicle miles (\$15394) and passengers (\$658).

The division costs for line 203 are given in the next spreadsheet, Figure 2. The level of service totals for line 203 in the division spreadsheet are the same as those for the system spreadsheet. However, the unit costs, step sizes and line items are different. The method of calculation, though, is identical. In this example the division costs are \$84256 and are attributable to the vehicle hours level of service variable.

Finally the summary report (Figure 3) takes the information from the two spreadsheets and combines them to produce the total cost effect of the line.

#### BEFORE YOU BEGIN

3. Handling Disks

1, Checking Your Package,

Your Bus Cost Model package should contain this user manual, plus 1 Bus Cost Model disk. The disk contains a lotus spreadsheet model of the bus cost system. Do not use this disk except to perform the installation. Always use a copy of this disk. Naking copies (backups) of your bus cost system disk is described in section 3, Installation.

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Equipment Required To Run The Bus Cost Model.

The Bus Cost System Model you will be using requires the following computer equipment in order to be able to operate.

1. An IBM XT with a hard disk. It should have XYK memory. 2. A 122 character wide printer

The model cannot run on a standard IBM PC because of limited memory.

### INSTALLING THE BUS COST MODEL ON AN IBM XT.

#### Make a Backup

Before you do anything else take out the Bus Cost System disk and make a backup copy on a new disk. First make sure that you are using an IBM XT or its equivalent and that it has a hard disk. To make the backup peform the following tasks.

- 1. Insert a DOS 2.0 disk in drive A and turn on the computer.
- 2. Check to make sure that you have an A disk prompt (A)) on the screen

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3. If you do not you will have a prompt from the hard disk like:C>. Change this by entering directly after this Ayand press return.

- 4. Insert a formatted blank disk in drive B. If it is not formatted then format the disk first by typing FORMAT Brand press return,
- 5. Change the prompt to drive B by typing B:(don't forget return) Now type COPY A: \*.\* and press return.

The drive light above disk B should light up and the Lotus spreadsheet file will be copied to your back up disk. Remove the master disk from drive A and store it in a safe place apart from your back up. From now on use the backup.

#### STORING THE SPREADSHEET ON HARD DISK.

Next create a subdirectory on your hard disk so that you can run the buscost model from the hard disk directly. Peform the following steps:

> 1. Change the prompt to C: by typing C: and press return. 2. Next type MD BUSCOST and press return.

3. Then type COPY B: \*.\* AND PRESS RETURN.

The Bus cost spreadsheet is now stored under the subdirectory BUSCOST.

To access this spreadsheet first run LOTUS 123 then the following commands:

1. /FD\BUSCOST and press return. (Changes the file directory) 2. /FRBUSCOST and press return. (Gets the Buscost spreadsheet)

The Buscost spreadsheet will then be loaded and commence automatically.



STARTING AND ENDING A BUS COST MODEL SESSION

### Starting a Session

Before starting a bus cost model session, first install BUSCOST on your IBM XT hard disk. (See "Installation" chapter)

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To run BUSCOST, load LOTUS 123 as you would normally (for instructions, see the LOTUS manual). The first screen of LOTUS is the blank spreadsheet:

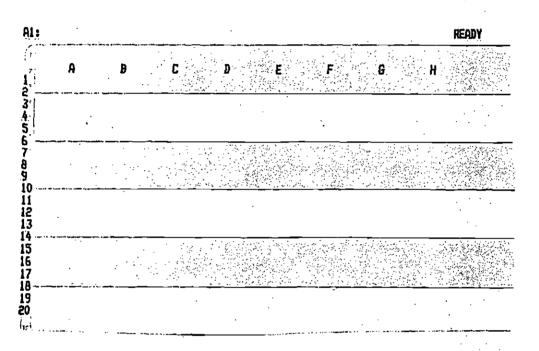


Figure 1.

Once you have loaded 123, change the directory to NBUSCOST. To do that type /fd/buscost

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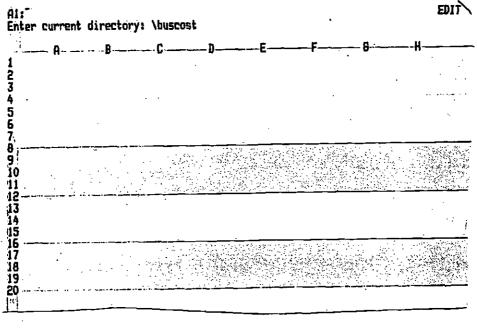
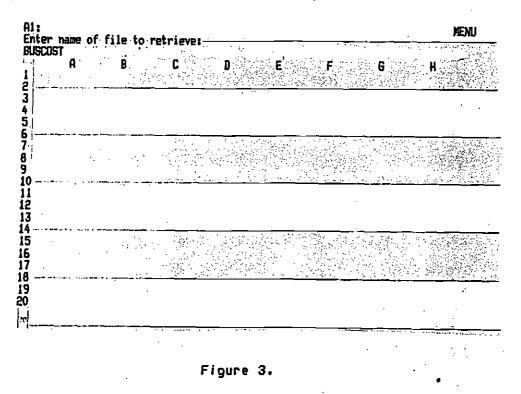


Figure 2,

To load BUSCOST enter file, retrieve buscost. To do that, type /frbuscost. If BUSCOST is the first file in the subdiretory, the cursor will be positioned on BUSCOST, and it will only be necessary to type /frreturn.



The first BUSCOST screen ccontains a welcome message, a bus logo which moves quickly across the screen and stops, and the main BUSCOST menu. Figure 4 shows this screen.

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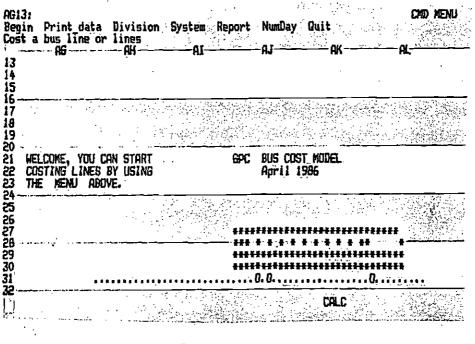


Figure 4.

To begin costing lines, simply use the direction keys to move the cursor to the Begin position and press return.

### <u>Ending a Session</u>

All costing procedures finish by returning you to the main menu. <u>Advancedure to wrisk to an averate to make to make to make to make the attraction to be and press return</u>.

To end a sesse n simply continue to the end proceedure then use the direction the cursor to QUIT then hit

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# THE BUSCOST MENU

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At the top of the screen, just above the spreadsheet, is the menu which allows the user to select various options for running the model and printing parts of the spreadsheet. The menu has seven options:

> 1. Begin. Allows you to cost a line or group of lines. Begin contains the data entry sequence.

1. S. S. S. S. S. S.

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2. Print Data. Prints a list of the number of buses, annual vehicle hours and miles and annual passengers and revenues for each line specified.

#### EXTRACTED LINE DATA FOR COSTING

		IDD MTIED		TOTOCI
DAY LINE WEEK 1	DIVISION HO	JRS MILES 90,507 868,5	PEAK BUS PASS 25 25 7,205,7	30 1.530.000
	·	-93,105-1,127.3	3726	85
SAT 1	7			58 236, 964
SAT	<u> </u>	13,755 161,6	41 695,8	52 169,676
SUN 1	<u>/</u>	14,588 152,5	77 570 E	28 211,020
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3. Division.

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Produces a printout of the spreadsheet showing division costs.

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- 	COSTS FOR L	NVISION							
Buses	51	L in the second second	a sin in <sub>de</sub>			e de se	persent on a setting		States in the second second second second second second second second second second second second second second
Турё^	FY 1986 Cost \$	FY 1986 Báse	Step Size	No. of Steps	Sti Co		Annual Cost \$	Department	
<u></u>									
Step D	10,944,000	1,98	7	33	8	31, 945 31, 775	5 255, 560	) Maint. Dper. Div. Maint. Door. Div	- Servicing Mechanics
Step D Step D	1,913,000	) 1,987 ) 1,987	7	33	i	40, 180	) 40.180	) Maint. Oper. Div	. Wheelchair Maint. Me
Step D	2,412,000 1,326,000 723,000	) <u>1,987</u>	7	33 60	Ō	40, 174		) Maint, Ober, Div	<ul> <li>Farebox Maint. Mechan</li> </ul>
Step D	723,000	1,987		110	<u> </u>	40, 025		Maint, Uper, Div	<ul> <li>Special Projects Mech</li> <li>All except Operators</li> </ul>
Step D	9,742,000	) 1,987 ) 1,987	7	153 153	õ	750, 139 96, 867	7 U	Purchasing	Division Storekeepers
Step D Step D	9, 476, 000	1,987		153	ŏ	729,657	i d	Maint. OPer. Div	Misc., Supp., Admin.,
Total	1,258,000 9,476,000 	<u></u>					327,511		
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18	076 J71		•••••						
Hours	236, 731	·							<u> </u>
Туре	Fy 1986 Cost \$	Fy 1986 Base	Step Size	No. of Steps	Ste Cos	F \$	Annual Cost \$		•
 Step D	172, 358, 000	7, 585, 000		853	277	19, 383	5, 359, 091	Transp. Oper. Di	v. Operators es Workmen's CompOper
Step D	14, 950, 000	7,585,000		853	277	1,681	460,637	Non-Dept. Expens	es workmen's compuper
Total	187, 308, 000			· · · · · · · · · · · · · · · · · · ·			5, 834, 728		
ailes	2, 580, 520								
	- Fy 1986	-Fy 1986	-Step	No: of-	Ste	p	-Annual		
type	Cost \$	Base	Size	Steps	Cos	t \$ 	Cost \$	-	
Step D	24, 152, 000	107,455,000	179,6	B10 ·	-14	40, 185	562,604	Maint. Oper. Div.	. Running Repair Mech.
Step D	2,009,000	107, 455, 000	2, 149, 3	300	1	40, 180	40, 180	Maint. Oper. Div.	Inspectors
Step D	241,000	107,465,000	17,910,8	333	0	40, 167	U	Maint. Oper. Div	. Road Failure Mechanic
	<del>_</del>		,	;					· · · · · · · · · · · · · · · · · · ·
otal	26,402,000			÷			602,784		
19141	201 4021 000		· · ·						· · ·
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	,								
<u> </u>					Ter ta da da da	internet and a state of the second second second second second second second second second second second second		مېر د د د د د کې کې کې کې د د د د د د د د د کې کې کې کې د د د د د د	
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		<u> </u>	<u> </u>		20. <sup>41</sup>	: المراجع ( ) : - بر المراجع ( )			<u></u>
assengers		16, 713, 895							
	*****************		·				-Onnun1		
уре	Fy 1985 Cost \$	Fy 1985 Base	Step Size	No. of Steps	Ster Cos		Annual Cost \$		
			·······					·····	
otal			•				<u> </u>		
ource		\$ Value							
eak buses		327,511							
ehicle hour ehicle Mile	"5 NG	5,834,728 602,784							
assengers		1	<u> </u>						
otal Marg (		6,765,024	·	<del></del> • • • • • • • •	(				

4. System,

Produces a printout of the system wide spreadsheet showing for system wide costs.

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System wide calculations area

 Totals:	peak buses	_51	vehicle hours 236.	vehicle miles 7312,580,520	pass- pass 	revenue dollars \$ .8953.640.080	
			· · ·				

16

	FY 1986	FY 1986	Step	No. of	Step	Annual	Department	
Туре	Cost \$	Base	Size	Steps	Cost \$	Cost \$		
Direct	150,000	1,987		1 51	75	3, 825	Facilities Maint.	Supplies Radio
Step S	2,690,000	1.987	3	2 1	42,645 39,928 32,032	42, 645	Scheduling	Scheduling Checkers
Step S Step S	1,688,000	1,987	4 7 11		39,928	22, 258	Facilities Maint. Central Maint.	Electronic Maint. Mec Service Workers
Step 5	3,851;000 3,851;000	1,987	14	· · · V	275,925	0		
Step S	702,000	1, 987	14		50, 168	ŏ	Maintenance Gen.	Maintenance Inst
Step 5	573,000	1,987	' i5	ž č	44, 121	Ő	Transp. Services	Radio Dispatcher
Step S		1.987	16	50	44, 121 47, 954	0	Central_Maint	Central_Shop_Sup
Fixed	86,714,000	1, 987	' i	i 51	43,641	2,225,691	<del>`</del>	<u> </u>
Total	10, 782, 000					2, 312, 089		
Hours	236, 731					<u> </u>		·
Туре	Fy 1986	Fy 1986 Base	Step Size	No. of Steps	Step Cost \$	Annual Cost \$		
							<u> </u>	
Step S Step S	1,204,000	7,585,000	216,714 329,783		34,400	0	Maint. Oper. Div. Scheduling	Non-Revenue Main Schedule Makers
			· · · · · · · · · · · · · · · · · · ·	a the section has a	ورجا بالمجار المحارج	waa taalaa waa ta	a and the state of the second	

5. Report. Produces a summary printout of costs allocated to each major level of service variable: peak buses, annual hours, miles and passengers.

17

6. Numday.

Permits the user to change the number of days a year a bus line operates during weekdays, Saturdays and Sundays.

. .

Summary Screen	Date:	18-Jun-85
Summaries for division		7
	System \$	Division \$
Peak buses Vehicle hours Vehicle miles Passengers	271,131 271,131 1,518,655 1,871,812	327, 511 5, 834, 728 602, 784
Total	5, 973, 687	6, 765, 023
CUMULATIVE DIVISION COST		6, 765, 023
TOTAL COST (SYS+DIV) \$-	12,738,710	·····
MARG. COST (SYS+DIV-REV)\$	9,098,630	, ·
peak buses hours	miles	pass rev
51 236, 731	2, 580, 520 1	6, 713, 895 3, 640, 080

7: Quit.

Exits the user from the spreadsheet program and returns the user to DDS.

· . . .

CHANGING THE NUMBER OF WEEKDAYS, SATURDAYS, OR SUNDAYS

The NumDay option on the main BUSCOST menu allows you to adjust the number of days a year that the chosen bus lines operate on a weekday, Saturday, or Sunday schedule. Of course, the total number of days per year must always equal 365.

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The standard NumDay setting is:

Weekdays: 255 Saturday: 52 Sundjays: 58

If you wish to adjust these settings, use NumDay <u>before</u> you use Begin to begin your run.

#### Using NumDay

To use the NumDay option, bring up the main menu and use the direction keys to move the cursor to NumDay.

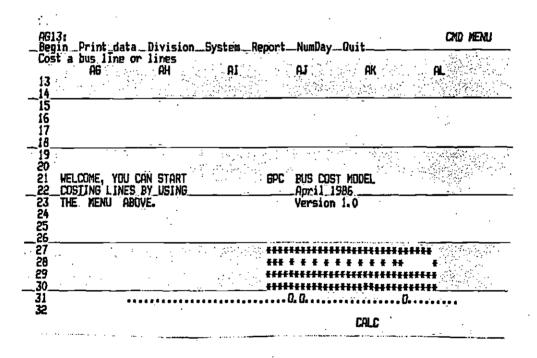


Figure 1.

CMD READY AF10: 255 . AD. ΛE 123 5 SET THE NUMBER OF DAYS IN A YEAR FOR WEEKDAYS SAT, SUN 6 7 . . . . \_8 9 NUMBER OF WEEKDAYS IN YEAR NUMBER OF SATURDAYS IN YEAR NUMBER OF SUNDAYS IN YEAR 10 255 52 Īİ 58 12 13  $\sim 2$ 14 15 15 TOTAL DAYS 365 (IF\_TOTAL\_DAYS\_()\_365\_TRY\_AGAIN,\_PRESS\_RETURN) 17 18 19 20 

Figure 2.

Enter the new schedule, being sure the total is 365.

Hit return to bring up the NumDay screen.

AF13: +AF10+AF11+AF12 Begin Print\_data Division System Report NumDay Quit Gost a bus line or lines CHO MENU AB AC ÄD Æ ΑF A6 SET THE NUMBER OF DAYS IN A YEAR FOR HEEKDAYS SAT, SUN 6 8,, 9 NUMBER OF NEEKDAYS IN YEAR NUMBER OF SATURDAYS IN YEAR NUMBER OF SUNDAYS IN YEAR 10 247 ĪŤ 60 12 58 13 365 14 15 16 17 18 19 TUTAL DAYS <u>`</u> 365 . . . . (IF TOTAL DAYS () 365 TRY AGAIN, PRESS RETURN) 

Figure 3.

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When the schedule is correct, hit return to continue with your BUSCOST run.

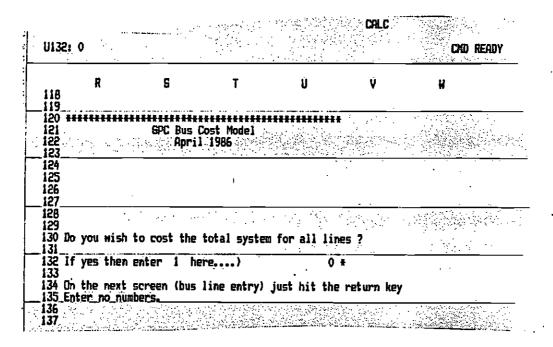


Figure 4.

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r 5.

#### HOW TO COST A SINGLE BUS LINE.

First run the model (/FRBUSCOST) so that the first screen appears. It will look like figure 1, a cartoon bus moving quickly across the sceen and stopping. Notice at the top of the spreadsheet screen there is a menu with the following items:

Begin Print data Division System Report Numday Buit Cost a bus line or lines

This is the main menu of the program and each item is described in the chapter on Menu Options. To cost a single bus line select the item Begin by pressing the return key because the cursor is already resting on that item. If you have been performing other menu options the cursor may not be on the Begin option. Use the direction keys to move the cursor to the Begin option and then press return to select this option.

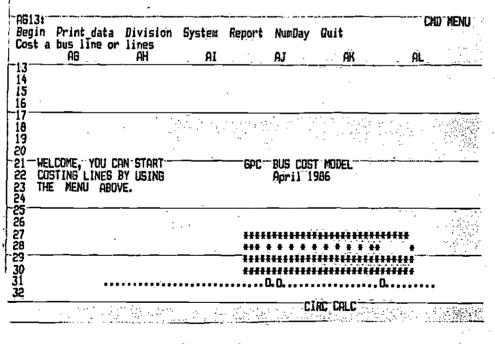
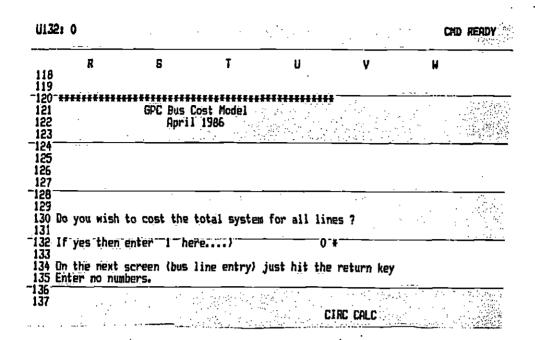


figure 1

The second screen of the bus cost model should now appear and ask you if you wish to cost the entire system (all bus lines in the data base). In this case the answer is no and you should enter a 0 and press return. This screen should look like figure 2.

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The next screen asks you if you wish to cost existing bus lines or cost proposed or new lines. This screen should appear like figure 3 below. Since you wish to cost a single (existing ) line just enter a 0 and press rturn.

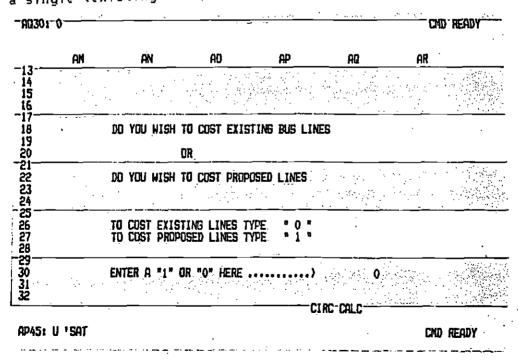


figure 3.

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So far so good. In the next screen (Figure 4), the user must specify the bus line and the day of the week to be costed.

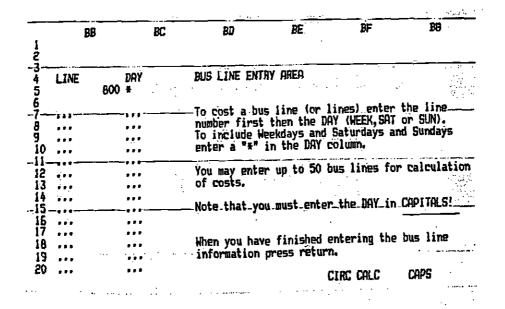
23

۱- ۶	BB	BC	BD BE BF BG	
234	LINE _	DAY	BUS LINE: ENTRY AREA	
Σ,				
b.			<u> </u>	
1		121	To cost a bus line (or lines) enter the line	·
8			number first then the DAY (WEEK, SAT or SUN).	
9 ***			To include Weekdays and Saturdays and Sundays	
			to therefor heerobys and paralogys and panadys	
0	***		enter a "#" in the DAY column.	
i	•••	 	enter a "#" in the DAY column.	
10 11 12	•••	 	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio	n
i	•••	• • • • • • • • • •	enter a "#" in the DAY column.	<u>n</u>
1 2 3-	•••• ••••	*** *** *** ***	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio	<u>n</u>
1  2  3-  4	····	• • • • • • • • • • • •	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio	<u>n</u>
12345	• • •	· · · · · · · · · · · · · · · · · · ·	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio of costs.	<u>n</u>
12	•••	····	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio of costs. Note that you must enter the DAY in CAPITALS!	<b>n</b> 
1234567	• • • • • • • • •	····	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio of costs. Note that you must enter the DAY in CAPITALS!	<b>n</b> 
12-3-	···· ···	· · · · · · · · · · · · · · · · · · ·	enter a "#" in the DAY column. You may enter up to 50 bus lines for calculatio of costs.	

The cursor is resting directly under LINE. Next the user enters a line number between 1 and xyz. Note that some lines are coupled and appear under just one number. For example, 471 is not in the data base because it is coupled with 470 and 471 is in the data base. Coupled lines cannot be split. After entering the line number use the right direction arrow to enter the number into the spreadsheet and move the cursor over to the DAY column. You have a choice of obtaining the cost for either weekdays, Saturdays or Sundays.

For weekdays type WEEK For Saturdays type SAT For Sundays type Sun

If you wish to cost the line for all these days you could just enter a \* in the day column. If you wanted to cost just Weekdays and Saturdays then you need to type the following. Enter WEEK under the day column and then use the direction arrows(left and down) to move to the LINE column and enter below the first line number you entered the same line number again. Use the right direction arrow to move to the DAY column and enter SAT. Your screen should look like figure 5, which appears on the following page.

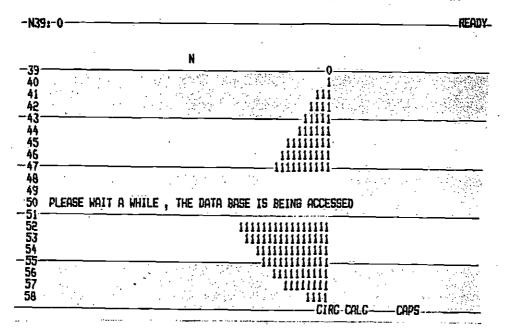


## SCREEN AFTER DATA ENTRY FIGURE 5.

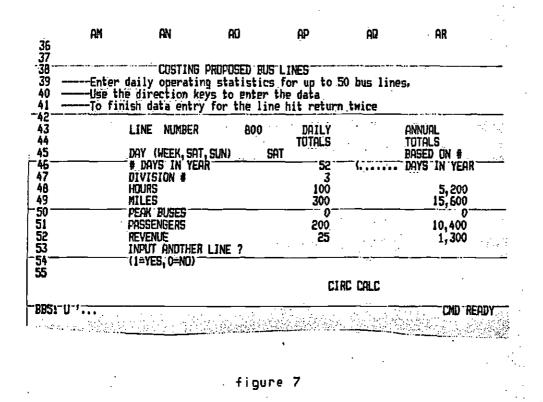
IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

Now if they are not just press caps lock and then use the direction keys to move to those entries you want to change.

Finally press return twice and the following screen will appear.



Once this is accomplished the program then displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.



The final screen to appear automatically asks you if you want a print out of the division calculations and the summary sheet. You usually will so enter a 1 and press return in each case. (figure 8). Make sure the printer is turned on and the condensed print is on..(note to me... need to have printer set up chapter)

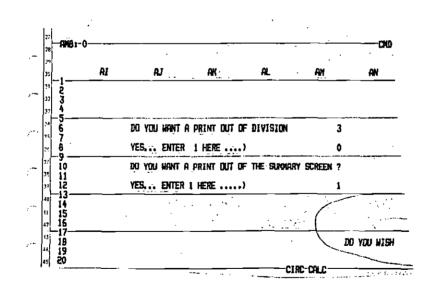
; on..(note



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W.



### figure 8.

The next screen to appear is the beginning screen with the bus logo. This is the master menu and you should now move the cursor to System and print out the System costs and to Frint Data for a print out of the data base.

This completes the process of costing a single line. You could now go on to cost more lines, change the lines level of service etc.

AG13: CMD MENU \_Begin \_\_Print\_data \_\_Division \_\_System \_\_Report\_\_NumDay.\_\_Quit. Prints your Extracted data set AG AH AJ. 1A AK AL, . . . 13 . \_14 15 16 17 1A 19 20 21 Welcome, you can start - Costing lines by-using The Menu Above. BUS COST MODEL ÷ 6PC -22 April\_1986 23 24 25 25 27 28 29 \*\*\*\*\*\*\*\*\*\*\*\*\* ................ . .. .30 ŧ<del>ŧŧŧŧŧŧŧŧŧŧŧŧŧŧŧŧŧŧ</del>ŧŧŧŧŧ 31 32 0.0.. CIRC CALC

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COSTING GROUPS OF LINES

The procedues for costing groups of lines are identical to costing one line. Any group of up to 50 lines may be costed at one time.

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Remember, the BUSCOST options for choosing to cost existing or proposed lines and fully allocated or not fully allocated costs can only be exercised once for the entire group of lines to be costed.

Also, when costing groups of lines, remember that while line numbers are essentially consecutive, gaps exist so that not every number represents an existing line.

# LOST

HOW TO THE ENTIRE BUS SYSTEM

· • •

Load the model (/FRBUSCOST) to bring up the first screen. It will look like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen is the following menu:

Begin Print data Division System Report Numday Quit Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost the entire bus system, select the item Begin by moving the cursor to Begin using the direction keys and pressing the return key.

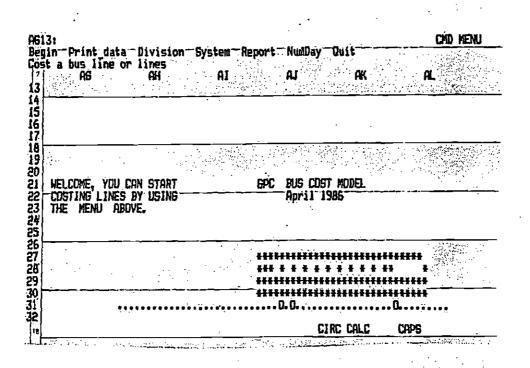


Figure 1

The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is yes, you enter D and press return. This screen will look like Figure 2.

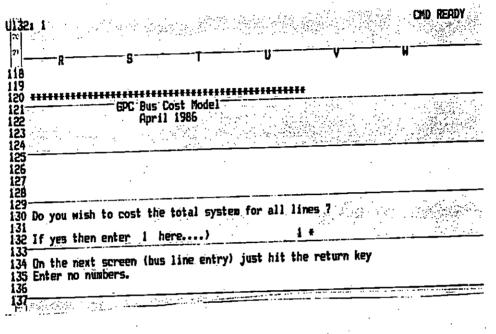


Figure 2.

The bus line entry screen will appear. To cost the entire system, press return twice.

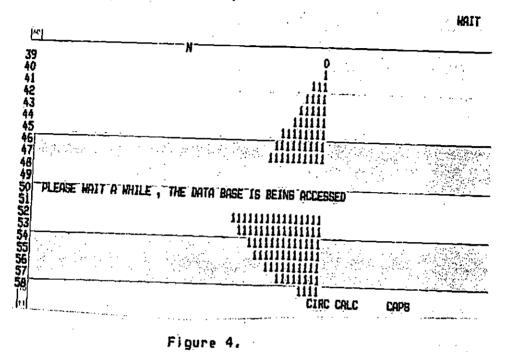
	88	BC	BD	BE	BF	BG
LINE	DAY		BUS LINE ENTR	iy area		
	•••	1	To cost a bus number first To include We enter a "#" j	then the DAY ekdavs and S	Y (WEEK,SAT) Saturdays am	or CIN)
	•••	ý.	ou may enter		•	calculation
1 e 8 1 e 1 8 1 e	•••	Ņ	ote that you	aust enter	the DAY in C	XAPITALS!
	*** ***	——————————————————————————————————————	hen you have nformation pr	ess return.		us line

Figure 3.

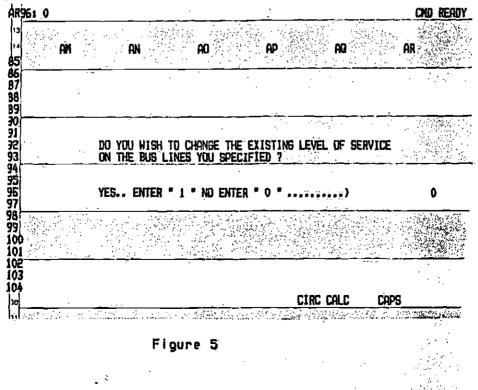
2

The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

30



The next screen (Figure 6) asks you if you wish to change the service on an existing bus line. You may if you wish, but in this example we do not. Therefore, enter 0.



Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 6.

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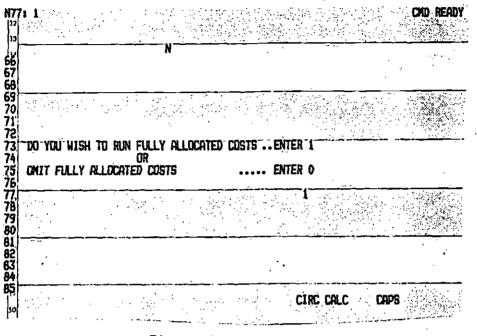


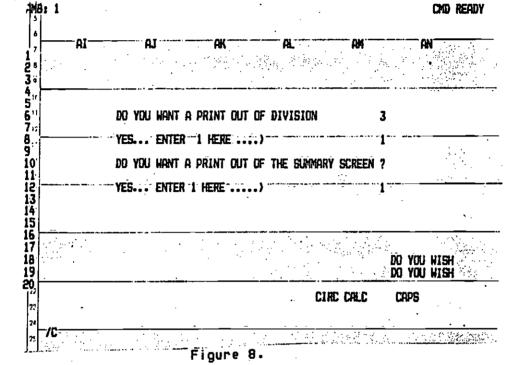
Figure 6

The program now displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.

	AB	AC AD Summary Screen	AE Date:	AF 17-Jun-85	AG
		Summaries for division)			
			System 🕴	· . <u></u>	Division \$
		Peak buses Vehicle hours Vehicle miles Passengers	0	,	0
(		Total	ŏ		0
		CUMULATIVE DIVISION COSTS			0
• ••	• •	TOTAL COST (SYS+DIV) \$	0 .		• • • • • • • •
		MARE. COST (SYS+DIV-REV) \$	• 0		
	el of	peak buses hours	iles	pass	rev
Jer.	vice }	189 652, 216 8,	048,524	39, 955, 456 RC CALC	9, 262, 566 CAPS

Figure 7

The next screen asks whether you want a printout of the division calculations and the summary sheet. You usually will, so enter a 1 and press return in each case. (Figure 8). Be sure your printer is turned on and that condensed print is on. AMB: 1 CMD READY



In this case the last division to be printed is Division 16. The Division 16 Summary Screen includes the cumulative costs for the entire bus system.

Summaries for divis Peak buses Vehicle hours	System \$ 102,109,277 11,947,840 74,924,550 -	Division \$ 599,361 5,497,704 1,125,196	
Vehicle miles Passengers Total CUMULATIVE DIVISIO	54,636,314 243,617,981	7, 222, 261	
TOTAL COST (SYS+DIV 	\$ 484, 599, 008		
neak buses how	irs miles	pass rev 	

Figure 9.

A Start Start

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### HOW TO COST A NEW LINE.

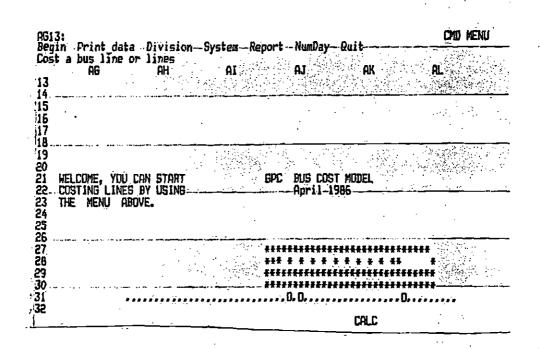
100

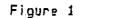
First load the model (/FRBUSCOST) to bring up the first screen. It will lock like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen there is a menu with the following items:

Begin Print data Division System Report Numday Quit Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost a new bus line, select the item Begin by moving the cursor to Begin using the direction Keys and pressing the return Key.

.





The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is no, you enter 0 and press return. This screen will look like Figure 2.

CMD READY U132: 0 118 119 <del>╒╪╪╪╪╪╪╪╪┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊┊</del> 320 GPC Bus Cost Model-121 April 1986 122 123 124 125 125 127 128 129 130 Do you wish to cost the total system for all lines ? 131 132 If yes then enter 1 here....) 133 134 On the next screen (bus line entry) just hit the return key 135 Enter no numbers, 136 CALC . . . . . . .

Figure 2,

The next screen asks whether you wish to cost existing bus lines or proposed (new) lines. This screen will appear like Figure 3 below, Since you wish to cost a new line just enter 1 and press return.

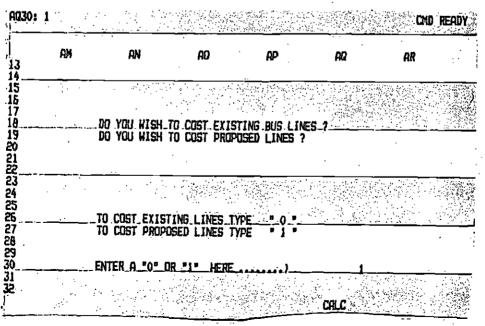
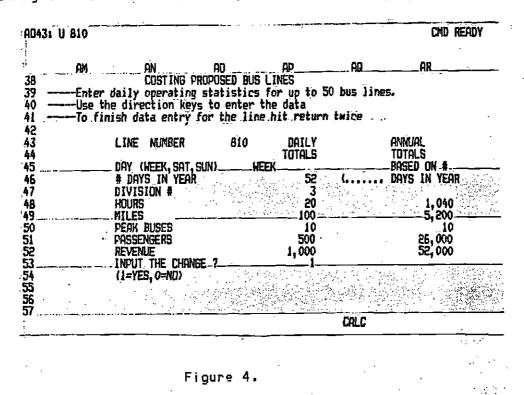


Figure 3.

The next screen, Figure 4, asks you to cost a proposed line. You can cost up to 50 bus lines, but let's just do one for a weekday and Saturday. The cursur will be resting on the line number and you can enter any number between 800 and 850.



Suppose you enter the following data in Figure 5:

AP53: U 1

CMD READY

			data it return twic	
	LINE NUMBER		DAILY TOTALS	TOTALS
	DAY (WEEK, SAT, SU	N) WEEK		Based on #
5	DAY (HEEK, SAT, SU # DAYS IN YEAR		255 (	DAYS IN YEAR
/		ندو ن <u>مبر خ</u> ر <u>ت ن</u>	200	1 060
	MILES		1,000	1,040 5,200
)	PEAK BUSES		10	10
	PASSENGERS	······································	1,000	25,000
	REVENUE	<b>1</b>	2,000	52,000
	(1=VFS_0=ND)	1. See 17 -	• • • • • • •	
	INPUT THE CHANGE (1=YES, 0=ND)	<b>?</b>	1	vv i⊐c

Figure 5.

The next screen to appear, Figure 6, will contain an error message telling you that the line number is incorrect and must be changed.

36

AM		AO	AP	AQ. AR.	
18 19Enter	COSTING daily connation	PROPOSED BUS L	INES in to 50	bus lings,	
0Use ti	daily operation he direction ke hish data entry	ys to enter th	e data	uine	
0Use ti 1To fi 2 3 4 5	nish data entry	_tor_the_line_i	UTE LEFALV-E	*1 <b>CE</b>	
3	LINE NUMBER	700	DAILY	annual Totals	
i4 5 ·	DAY WEEK, SAT	SUN) WEE	TOTALS	BASED O	N. 4
6	# Days in yea	R	255	( DAYS IN	Year
7	DIVISION #		200	1.	040
8 9 10 11 12 13	MILES		1,000	5	200
0	PEAK BUSES		10	2 <b>1</b>	10 000
	Passengers Revenue		1,000		000
3	INPUT THE CHA	NGE_?			
14 15 16	(1=YES, 0=ND)	•			• .

Figure 6.

If you correct the line number and reenter the data by pressing return, you will receive another error message telling you that the division number is incorrect.

A043: U 825 CND READY

-Use the dire -To finish da	ection keys t ita entry for	o enter the the line b	data it return	twice	
 LINE	NUMBER	825	DAILY		ANNUAL
 DAY ( # DAY DIVIS	Week, Sat, Sun 'S IN Year ION 4	î) week	255	(	Totals Based on # Days in year
 Hours Miles Peak	,		200 1,000 10 1,000		1,040 5,200 10 26,000
 REVEN		?	2,000		52,000

Figure 7,

When you have finished entering proposed bus lines, enter a 1 on the last line of the column as in Figure 8. and hit refure funce

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5 S. . . . . .

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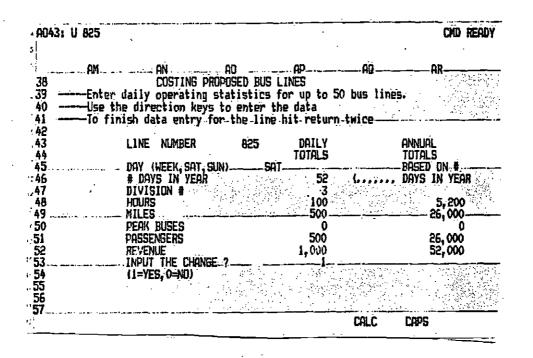


Figure 8.

So far so good. In the next screen (Figure 9), the you must specify the bus line and the day of the week to be costed.

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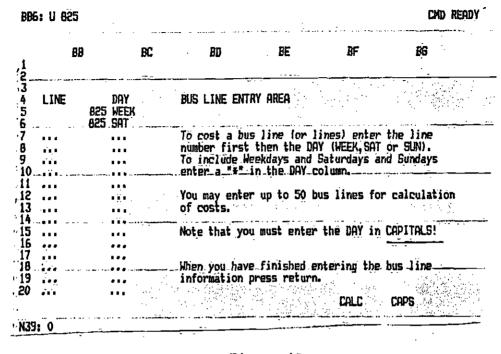
· · · ·		
	BC	BDBE
LINE		BUS LINE ENTRY AREA
		To set a bug line (ou liner) optow the line '
		To cost a bus line (or lines) enter the line
•••• ••• •••	••• 	number first then the DAY (WEEK, SAT or SUN). To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column.
•••		To include Weekdays and Saturdays and Sundays
•••	•••	To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column.
1 1	· · · · · · ·	<pre>number first then the DAY (WEEK, SAT or SUN). To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column. You may enter_up_to_50_bus_lines_for_calculation of costs.</pre>
	· · · · · · ·	To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column.
		<pre>number first then the DAY (WEEK, SAT or SUN). To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column. You may enter_up_to_50_bus_lines_for_calculation of costs. Note that you must enter the DAY in CAPITALS!</pre>
• •	• • • • • • • • • • • • • • • • • • •	<pre>number first then the DAY (WEEK, SAT or SUN). To include Weekdays and Saturdays and Sundays enter a "*" in the DAY column. You may enter_up_to_50_bus_lines_for_calculation of costs.</pre>

## Figure 9.

The cursor is resting directly under LINE. Enter the line number previously chosen above. After entering the chosen line number (825), use the right direction arrow to enter the number into the spreadsheet and move the cursor over to the DAY column.

For weekdays type WEEK For Saturdays type SAT For Sundays type SUN

If you wish to cost the line for all seven days you may just enter a \* in the day column. If you wish to cost just Weekdays and Saturdays then you must type the following. Enter WEEK under the day column, then use the direction arrows (left and down) to move to the LINE column. Below the first line number reenter the same line number. Use the right direction arrow to move to the DAY column and enter SAT. Your screen now looks like Figure 10,



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### Figure 10.

IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

If any entry is not in all caps, you must change it now. Just press caps lock, then use the direction keys to move to those entries that must be changed. When the entry is correct, press return twice to move to the next screen. The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

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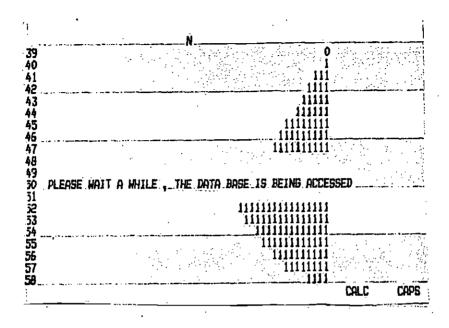
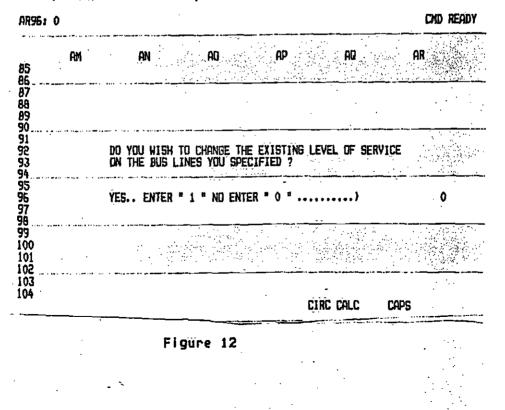
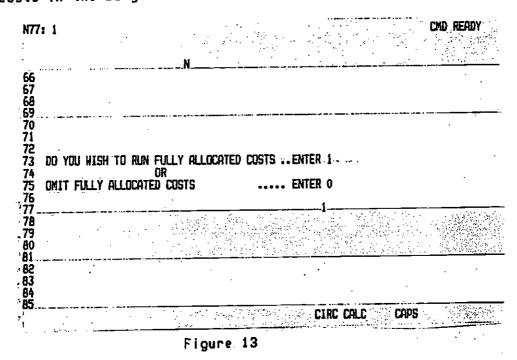


Figure 11.

The next screen (Figure 12) asks you if you wish to change the service on an existing bus line. Since you have just defined the proposed bus lines, you will not use this option. Therefore, enter D.



Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 13.



The program now displays a blank summary screen whilst it calculates the costs. The level of service values for the line are displayed at the base of the summary sheet.

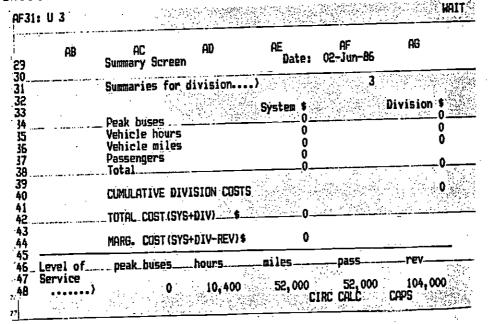


Figure 14

The next screen asks whether you want a printout of the division calculations and the summary sheet. You usually will, so enter a 1 and press return in each case. (Figure 15). Be sure your printer is turned on and that condensed print is on.

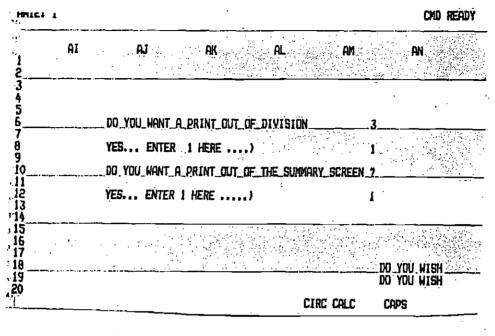


Figure 15.

The model now brings you back to the first screen which contains the bus logo and the master menu. Move the cursor to System to print the system costs and to Print Data to print the data base.

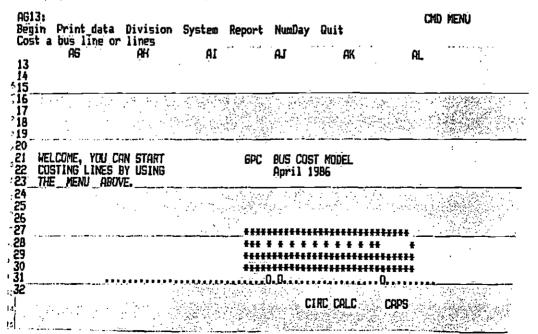


Figure 16.

# HOW TO CHANGE A BUS LINE'S EXISTING LEVEL OF SERVICE

Load the model (/FRBUSCOST) to bring up the first screen. It will look like Figure 1, a cartoon bus which drives quickly across the screen and stops. Notice at the top of the spreadsheet screen is the following menu:

Begin Print data Division System Report Numday Quit Cost a bus line or lines

This is the main menu of the program. Each item is described in the chapter entitled "Menu Options." To cost a new bus line, select the item Begin by moving the cursor to Begin using the direction keys and pressing the return key.

	AG13 Begi	n Pi	rint_data	Division lines	System	Report	NumDay	Quit	CMD MENU
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	13 14 15								
	16 17 18 19		~	•					
	20 21 22 23 23	Welct Costi The	ME, YOU C NG LINES MENU ABO	AN START BY USING VE.		GPC	BUS COS April 1 Version	T MUDEL. 986 1-0	
	25 26 27 28					****	******	******	****
ļ	29 30 31 72		•••		••••••	**** **** ****	******** ******** ]. ()	************ ***********	********
					· · · · · ·			IRC CALC	

Figure 1

The second screen of the bus cost model now appears and asks whether you wish to cost the entire system (all bus lines in the data base). In this case the answer is no, you enter 0 and press return. This screen will look like Figure 2.

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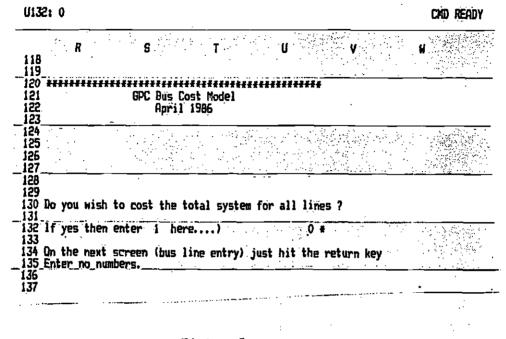
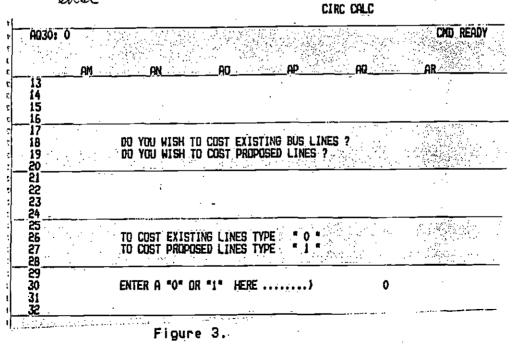


Figure 2.

The next screen asks whether you wish to cost existing bus lines or proposed (new) lines. This screen will appear like Figure 3 below. Since you wish to cost existing lines, 0 and press return.



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The next screen; Figure 4, is the bus line entry area. Enter the lines you wish to cost in this run.

For weekdays type WEEK For Saturdays type SAT For Sundays type SUN

If you wish to cost the line for all seven days you may just enter a \* in the day column. If you wish to cost just Weekdays and Saturdays then you must type the following. Enter WEEK under the day column, then use the direction arrows (left and down) to move to the LINE column. Below the first line number reenter the same line number. Use the right direction arrow to move to the DAY column and enter SAT.

8661	U-1#		· · · · · · · · · · · · · · · · · · ·	CND READY
	BB		BCBDBEBF	BG
2	•	····		
3 4 i	INE	DAY	BUS LINE ENTRY AREA	
5		1 week 2 +		-
ž.	••	•••	To cost a bus line (or lines) ente	r the line
· <u> </u>	•••		number first thên the DAY (WEEK,SA To înclude Weekdays and Saturdays enter a "*" in the DAY column.	and Sundays
10	•••	•••	enter a "*" in the DAY column,	
12 .	••	• <u>•</u> •	You may enter up to 50 bus lines f	or calculation
13	<b></b>	•••	of costs.	•
15 .	••	•••	Note that you must enter the DAY i	n CAPITALS!
<u>.16</u>	••			
18	••	·	When you have finished entering th	e bus line
19 .		• • •	information press return.	
<u>-v</u> ,	## .		CIRC CALC	<u> </u>

#### Figure 4.

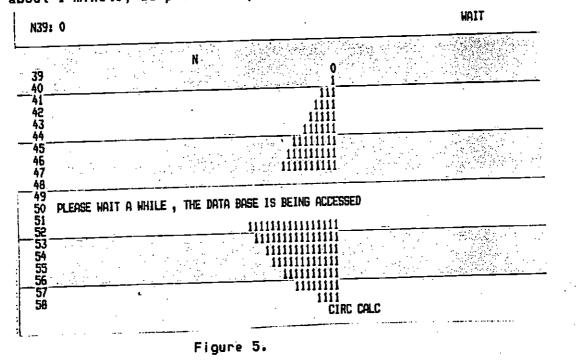
IT IS IMPORTANT TO NOTE THAT YOU NEED TO HAVE THE CAPS LOCK KEY TURNED ON SO THAT THE ENTRIES IN THE DAY COLUMN ARE ALL IN CAPTIALS!!!!!

If any entry is not in all caps, you must change it now. Just press caps lock, then use the direction keys to move to those entries that must be changed. When the entry is correct, press return twice to move to the next screen. The next screen informs you that the data base is being accessed. The program is searching the data base to find the level of service information for the specified Line number and day of week. Because the data base is large this takes about 1 minute, so please be patient.

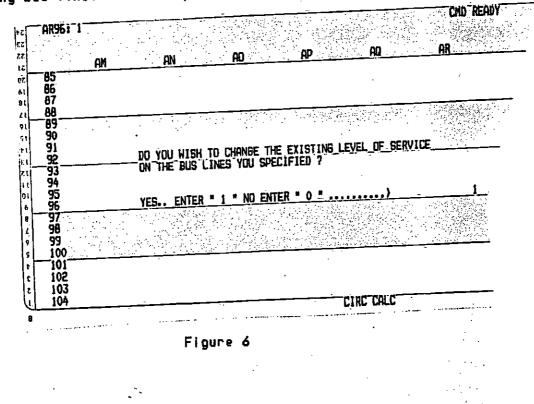
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\$2 The next screen (Figure **1%**) asks you if you wish to change the service on an existing bus line. To do so, enter 1.



The next screen to appear is a table which displays existing levels of service and allows you to enter new data.

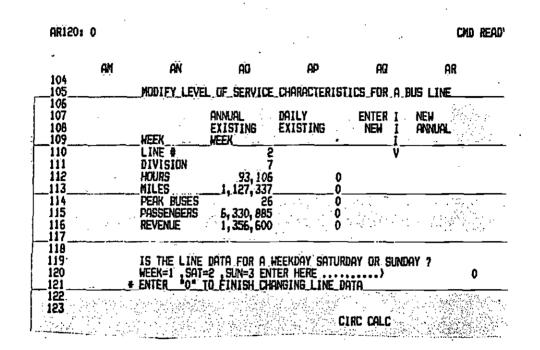


Figure 7.

To perform this function, you must first specify whether the service displayed is for weekdays, Saturdays, or Sundays. Simply read the prompt displayed directly under the label "annual existing" and enter the code number as follows:

WEEK = 1 SAT = 2 SUN = 3 ÷.,

After you have entered the day code (in this example 1 for weekdays); the model automatically calculates the existing daily service levels.

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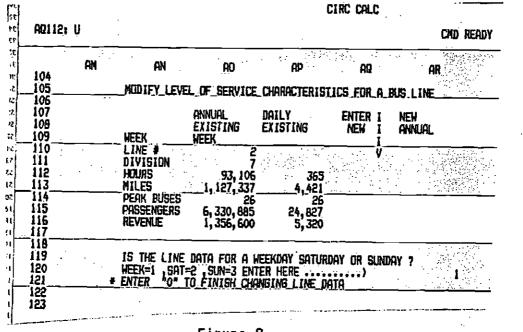


Figure 8.

Now enter the new daily sevice levels in the green data entry area. When the new daily levels have been entered, hit return to calculate the new annual service levels. The model will automatically enter the new data in the speadsheet and return ready for the next service change.

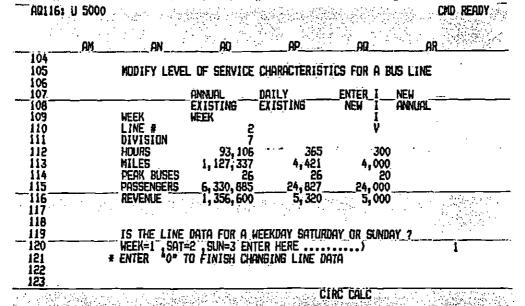
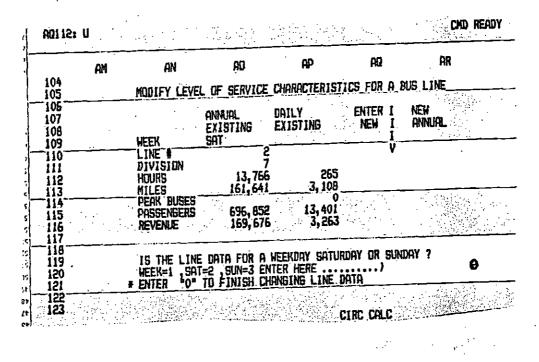


Figure 9.

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When you have made all the desired service changes, enter 0 to continue on with the BUSCOST run.



# Figure 10.

Now the model asks you if you wish to run fully allocated costs. These are the fixed costs in the budget. If you do, enter 1 as in Figure 79. //i

