DRAFT ENVIRONMENTAL IMPACT REPORT OF PROPOSED ADJUSTMENTS IN SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT FARES AND TARIFFS

March 21, 1977

Advance Planning Section
Southern California Rapid Transit District

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I. DESCRIPTION OF THE PROPOSED PROJECT

The project which is the subject of this report is an increase in the fares of the SCRTD sufficient to increase total revenues by $11 million annually, from a current rate of $68 million per year to $79 million during fiscal year 1978. It is proposed to put the fare increase into effect on or about July 1, 1977. The purpose of the fare increase is to allow the District to continue in operation approximately 108 million vehicle miles of service. This is approximately the amount of service District anticipates being in operation as of June 1977. It is somewhat less than the amount which was in effect in January 1977. Between January and June, service reductions designed to reduce cost without seriously impacting the level of passenger service were put into effect. These reductions represented about 4.5 million annual vehicle miles and an annual cost reduction of about $7.5 million.

Now under consideration are several alternative fare structures, which are described and compared in detail in Appendix A. The alternative which is designed to be simply an across-the-board proportional adjustment of existing fare elements would require a 5¢ increase in the base fare from 35¢ to 40¢. The student fare would be increased from 25¢ to 30¢; the senior fare from 10¢ to 20¢. Transfers would remain at 10¢.

Under any of the alternative fare structures being considered for this project, total fare revenues would be increased by about the same amount. For the purpose of impact analysis, it is assumed that the total amount of service operated will be the same (108 million vehicle miles), regardless of the structure chosen to implement the fare increase.

For clarity, the impact of service reductions as an alternative to fare increases is analyzed only as part of the null, or "no project," alternative.

II. DESCRIPTION OF ENVIRONMENTAL SETTING

The environmental setting that may be impacted by the proposal to increase fares includes the City of Los Angeles itself and portions of the Southern California region. For the most part, the description which follows will deal with the Region as a whole, this section of the report will indicate the existing setting and the present conditions that are considered to be relevant.

A. Physical

The description of the physical setting of the District Boundaries includes existing topographic and climatic features as well as land resources.

1. Topography

Within a few miles of the Central City, mountains tower above gently sloping valleys with coastal palisades and wide sandy beaches -- all products of a complex geologic history. Scenery of unrivaled variation is one of the area's principal claims to fame.

2. Climate

Southern California's climate is as famous as is its scenery and is fully as varied. Local travel literature has long made much of the rare combination to be found, i.e. good skiing conditions in the winter and sunny beach weather each less than an hour from the urban center.

Mildness is characteristic of Southern California's coastal areas. In Los Angeles the annual range of temperature (difference between the averages of the coldest and the warmest months) is only 16 degrees. Rainfall is moderate, averaging 15 inches a year, most of it falling in the cooler months. The

temperature range, winter rain, summer drought, and abundant sunshine and freedom from severe storms are typical of the climatic types described as dry sub-tropical or Mediterranean.

3. Land Resources

Most communities are composed predominantly of single family housing on lots of similar size. Since 1945, residential density has averaged about 5 dwellings per acre for single-family housing, about 12 units per acre for two-family housing, and about 39 units per acre for apartments. The overall average density is approximately 9 units per acre. Most new single-family housing and high rise apartments are built for families of above-average income.

The emphasis on the private automobile is the major source of air pollution as well as other problems. Despite the large investments in the many miles of freeways and major streets, traffic congestion remains a serious problem, especially at peak hours. The public transportation system in Los Angeles is presently limited to buses, which compete with the automobile for space. Revenues from fares are insufficient to pay the costs.

4. Air Resources

The occurrence of air pollution is dependent upon a number of conditions, the effects of which are compounded by their co-existence. These conditions may be divided into two major categories, emissions and meteorological factors. When factors in both categories simultaneously aggravate the accumulation of air contaminants, air pollution increases.

Air pollution results when the atmosphere can no longer remove or disperse the

contaminants with which it is continuously being charged. Certain areas can tolerate a far greater relative quantity of emissions to the air than others. This is because contaminants are removed by winds or a diffusion rate far greater than that at which they are introduced. As a result, no accumulation of pollution is possible. When the emission of contaminants put into the air occurs at a rate which exceeds the ability of the air to dispose of them, the contaminants accumulate and objectional effects occur.

a. Emissions

The source of air contaminants can be divided into two basic groups: stationary and mobile. The contaminants can be gases or particulates, organic or inorganic.

In terms of quantities, transportation-oriented emission sources are the most serious. They include gasoline and diesel-powered autos, trucks, and other motor vehicles; ships, railroads, and aircraft. Industrial and commercial sources also contribute to the overall problem.

Motor vehicles are the principal sources of the three main gaseous pollutants -- hydrocarbons, carbon monoxide and oxides of nitrogen. Almost 98% of the carbon monoxide (CO) released into the Los Angeles atmosphere is from gasoline-powered vehicles. On the average, 29 pounds of CO are emitted per ten gallons of gasoline consumed.

b. Meteorological Factors

The meteorological factors most important to the creation of an air pollution problem in the Los Angeles area stem primarily from the frequent occurrences of persistent temperature

inversions. A temperature inversion is formed when the air at some distance above the ground is heated to a higher temperature than the air below it. When this happens, the air is limited in its normally upward movement. Thus, a quantity of emissions which might normally be distributed are confined to within 500 feet of the ground, or even less. As a result, the concentrations of the contaminants are increased by a factor of 10 (all other conditions being equal) because of the smaller volume of "mixing air."

When an inversion exists, wind speeds are also reduced. Wind speed is the most important micro-meteorological or local area determinant of pollution accumulation in a region of ordinary emissions. When wind speeds drop below 8 miles per hour pronounced reductions in visibility occur in urban areas. Decreased wind speeds contribute to the development of higher temperatures as the earth is heated by sunlight irradition, leading to heat accumulation over the area. Thus, the high surface temperatures which frequently occur in late summer and early fall are the direct result of (1) the temperature inversion and (2) low wind speeds at the earth's surface.

B. Social

1. Population Characteristics

The young, the elderly, the handicapped, and all those who cannot afford automobiles or for various reasons are unable to drive, are classed as transit dependent. It is generally assumed that virtually everyone in Los Angeles either has an automobile or has access to one.

This is not the case. 17% of households in Los Angeles County do not own an automobile and 31% have only one. Almost a million and a half people are either totally or partially dependent on public transit. To many, the SCRTD bus system is their primary means of mobility. The transit dependents have traditionally made up the largest percentage of RTD's patrons. Without the bus system, severe mobility restrictions would be experienced by transit dependents.

The following table breaks down the population, as of 1970, by age and racial/ethnic groups:

a. Population by age:

Under 1 Year	2%
1 - 9	15%
10 - 19	17%
20 - 29	16%
30 - 39	12%
40 - 49	12%
50 - 59	11%
60 - 69	8%
70 - 79	5%
80 +	2%
TOTAL	100%

The median age of residents is 30.6 years, with males averaging 29.4 years and females averaging 31.7 years.

The population consists of several racial and ethnic groups, as follows:

b. Population by Race & Ethnic Groups:

White	58.8%
Spanish Surname	18.4%
Negro	17.9%
Indian	.3%
Oriental	3.9%
Other	.7%
TOTAL	100.0%

c. Education

As reported in the 1970 census, most residents have graduated from High School. 62% of persons 25 years and over and the typical urban adult has completed 12.4 years of formal education.

Education is one of the more important elements of any urban area. When the educational system fails, one can anticipate greater unemployment, lower incomes, increased use of welfare, and other somewhat more subtle breakdowns in the social system.

Public transit is a positive force in improving the educational level of a region's population. To the poor and deprived, lack of adequate transportation is an educational disincentive. No person should be deprived of educational opportunities for lack of an automobile. The SCRTD recognizes this and is conscious of the difficulties encountered by the transit dependent segments of our population.

d. Health

Southern California has favorable health statistics. The direct impact of public transportation with respect to a population's health problems is minimal. However, access to hospitals, clinics and other facilities, if restricted, can have serious implications to those who are dependent on public transit.

2. Economics

According to Los Angeles County statistics, Los Angeles Region compares favorably with other urban regions of the nation. Rapid population and industrial growth experienced after World War II has ceased. The economy has levelled off and has begun to consolidate and stabilize. The region has suffered

its share of economic problems experienced by the rest of the nation. Rising costs for goods and services, and high rates of unemployment have aggravated Southern California's transition from the boom years.

Most social problems manifest themselves in the economic realities of daily living. Abstract concepts of value and cultural differences can often be traced to economic class differences. Mobility is directly related to level of income - the higher the economic scale, the greater the mobility. Public transit's primary role in influencing the economy is to provide access to jobs, businesses, recreational centers, and additional facilities.

III. PROBABLE IMPACT OF PROPOSED PROJECT ON THE ENVIRONMENT

With a fare increase of the proposed magnitude, it is estimated that annual patronage for fiscal year 1978 will drop by about 8 million (2.5%) as compared with what patronage would be if the District were able to continue the June 1977 amount of service at present fares. This is equivalent to a reduction of about 25,000-30,000 passenger boardings per average weekday. (As a general rule, annual patronage equals about 300 times average weekday patronage.) Since about one-quarter of the District's passenger boardings are transfers, we may equate this to the loss of about 18,750-22,500 passenger trips per day. As an approximation, we may call this about 20,000 trips per day.

On the basis of past experience with the effects of fare increases, we anticipate that the initial loss of patronage will be closer to 50,000 trips per day. Patronage, however, is expected to recover quickly enough to reduce the annual loss to the 20,000 per weekday level. The primary reason for such recovery of patronage is the overall impact of inflation, raising incomes and increasing the cost of other travel modes, thus reducing the real and relative cost of transit fares.

A. Air Pollution Effects

The air pollution impact of the fare increase is dependent on what happens to those trips not taken on transit. The state of the art is such that we can predict with relative certainty the total number of trips lost to transit. We have very little data to use in predicting which trips or how many of those trips will be foregone and how many diverted to other modes.

We may start with an average of 20,000 trips per weekday (annual average), assume that nearly all are diverted to the auto mode, and divide by the regional average vehicle occupancy of 1.1 passengers/auto. This yields about 18,000 auto trips per day. Multiplying this figure by the regional average of 6.98 miles/trip (all trip purposes) yields 125,000 vehicle miles of travel (VMT) per weekday (annual average) created by the diversion of bus trips to autos.

By assuming that the total vehicle mix will not change, we can compute the quantity of air pollutants caused by the fare increase by multiplying VMT by appropriate figures from Table 1.

Table 1

Air Pollution Emissions by Vehicle Speed

Emissions (by category)	Average Speed 20	30	40
Grams CO per VMT	41.6	33.4	27.6
Grams NO_x per VMT	3.6	3.7	3.8
Grams total hydrocarbons per VMT	6.1	5.5	5.1
Grams reactive hydrocarbons per VMT	5.6	5.0	4.7

Using the factors for an average top speed of 20 mph and assuming weekday VMT increases of 125,000 on an average annual basis and 315,000 on a short term basis yields the following results:

Table 2

Weekday Pollution Increase (Tons/Day)

Emissions (By Category)	Short Term	Annual Average
CO	14.3 tons	5.7 tons
NO_x	1.24	0.50
Hydrocarbons	2.10	0.84
Reactive hydrocarbons	1.93	0.77

By comparison, the total average daily emissions of these substances in Los Angeles County is: CO, 7100 tons, NO_x, 795 tons, and hydrocarbons 692.5 tons. (Source: 1974 Profile of Air Pollution Control, County of Los Angeles Air Pollution Control District).

B. Energy Use Effects:

Once again, we assume a short term increase of 315,000 VMT and an annual average increase of 125,000 VMT, together with an average of 14 miles per gallon (based on the 1977 auto mix). This yields increased gasoline consumption of 22,500 gallons per weekday in the short term and of 8,900 gallons per weekday on an average annual basis.

C. Other Effects

Other less quantifiable impacts may result from the increase in auto travel which results from the proposed fare increase. These include increased auto congestion and longer travel times for both auto and transit users. The average weekday increase of 125,000 VMT (annual basis) is about 0.1% of current daily VMT.

There may be social or economic effects of the fare increase insofar as trips are foregone as a result of the increased cost. The significance of this effect should be mitigated by the fact that trip opportunities on the transportation system will not be reduced. Trips foregone will be voluntary. An individual may reduce his number of trips without eliminating trip making.

IV. PROBABLE ADVERSE EFFECTS WHICH CANNOT BE AVOIDED IF THE PROJECT IS IMPLEMENTED

None of the effects discussed above can be avoided by means of reasonable and feasible measures if the proposed fare increase is implemented.

The project is being proposed, notwithstanding these effects, because the SCRTD does not have the means to raise sufficient additional revenue from other sources and because the alternative of reducing service further will have greater negative effects.

V. MITIGATION MEASURES PROPOSED TO MINIMIZE THE EFFECT OF THE PROJECT

The fare increase is designed to mitigate the effects of reducing service.

No mitigation measures available to the District have been identified.

VI. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

There are no cumulative or long-term effects of the proposed fare increase. If the circumstances which created the necessity for the fare increase should change, or if the apparent desirability of maintaining service should change, the fare increase could be withdrawn at any time.

The fare increase is proposed for implementation now rather than later, because postponement of the increase would create an even more difficult financial situation in which the District would be forced either to raise fares more or to make service cuts more severe.

VII. IRREVERSIBLE ENVIRONMENTAL EFFECTS WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

As discussed above, the proposed fare increase is not an irreversible action nor will it result in irreversible environmental changes.

Except for the increased consumption of fuel by autos, the proposed action will not result in the use of non-renewable resources.

VIII. THE GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

The project will have no significant effect on economic or population growth, either directly or indirectly.

IX. ALTERNATIVES TO THE PROPOSED ACTION

There are two basic alternatives to the proposed fare increase. They are (1) reducing the amount of service operated and (2) increasing revenues from other sources.

A. Increasing Revenues

The District budget already accounts for the District's anticipated revenues from federal operating assistance grants and from state sales tax revenues. These already constitute 50% of the anticipated operating budget.

The District could conceivably divert funds now budgeted to match federal capital grants and use them for operations. $8.65 million is budgeted for this purpose in fiscal year 1978. This would, however, mean the loss of federal funds matched on an 80% federal-20% local basis. Documentation of the need for these projects (including the purchase of new buses), is found in the District's Short Range Transit Plan, and in the regional Transportation Improvement Program of the Southern California Association of Governments. Further documentation of project costs and impacts will be found in individual project Environmental Impact Statements.

Federal operating assistance is apportioned by formula to urbanized areas. The District is located within the Los Angeles-Long Beach urbanized area, which includes the urbanized portions of Los Angeles County, Orange County, and western San Bernardino County. The allocation of funds to transit operators within this area is made by the Southern California

Association of Governments (SCAG). SCAG could increase the District's allocation of this area's federal funds. Such action, however, is not within the jurisdiction of the District acting alone.

Within certain constraints, the allocation of state sales tax revenues to transit operators within Los Angeles County is made by the Los Angeles County Transportation Commission. The District's budget already assumes that the Commission will allocate to the District the maximum amount permitted by state law.

The District budget assumes that no general operating assistance will be received from the County of Los Angeles or from any city in the County. The County and the cities are not required to provide any such assistance and have given no indication that they will provide assistance.

It is not within the SCRTD's jurisdiction to increase revenues from these sources or to increase revenues significantly from any other source except fares.

B. Reducing Service

The null or "no project" alternative available to the District would require that the amount of service operated by reduced. In order to reduce the cost of operation to the level of funds available, it is estimated that the District would have to cut service by about 6½% to a rate of approximately 101 million vehicle miles per year.

The effect of the service cuts would depend to some extent on where cuts were made. While specific service cuts have not yet been identified, it is clear that their impact would have to be much more severe than the impact of those already implemented. Some lines would have headways (time between buses) increased by a degree that would discourage ridership. Others might be eliminated altogether.

is roughly estimated that service cuts
fficient to eliminate the need for a fare
crease would decrease patronage by about
or 16 million passengers per year. Such
rvice cuts would, therefore, have environ-
ntal effects about twice as great as those
a fare increase. This would include
creased air pollution, energy consumption,
affic accidents, and other related effects.

ese effects would not only be twice as great
t would also be longer term effects than
ose caused by the fare increase. Since travel
portunities and the level of overall service
uld be reduced, the same passenger recovery
te would not be expected.

X. CZATIONS CONTACTED

Bing in March, informal discussions with key
smembers of:

- o City of Los Angeles Planning Department,
- o Caltrans,
- o Southern California Association of Governments, and
- o County of Los Angeles Road Department

weld in order to obtain their input for prepa-
r of the Environmental Impact Report concerning
tstrict's proposed fare increase.

APPENDIX A

FARE PLAN ALTERNATIVES FOR FY78

March 21, 1977

FARE PLAN ALTERNATIVES FOR FY78

INTRODUCTION

The tentative budget for the coming fiscal year achieves a balance through a combination of measures; cost triming, an increase in fares, and the hope for some public funding beyond presently committed resources. The cost reductions, announced in January and already underway, amount to about $7.5 million. With fare revenue currently being generated at a rate of $68 million per year, the fare increase must generate an additional $11 million during FY 78.

Whenever the fare must be altered, there arises the opportunity to change the fare structure. Any change in the fare structure should address several objectives:

- yield the desired revenue
- improve equity
- minimize patronage loss
- reduce collection cost
- reduce complexity for the user

This report will first discuss a number of issues associated with these objectives. Then several alternative fare structures will be described and compared. Finally, some conclusions will be drawn. Further details will be provided in supplementary reports, for those who are interested.

BACKGROUND

Some Definitions

Equity. Equity, or fairness, is a very complex concept. For now, we can afford to concentrate on an important but limited aspect of equity, that fares ought to be more consistently related to the cost of providing the service. Simplifying still further, we can say that this means fares more directly related to distance traveled.

Service Type. There is no completely unambiguous way to classify services. For purposes of this discussion of fares, it will suffice to distinguish between three service types:

Local	ordinary surface street operation, with more than two stops per mile.
Limited	also on surface streets, but averaging two or less stops per mile. Stops generally located for connection with intersecting routes.
Flyer	freeway operation. May have on-freeway or off-freeway stops.

These definitions apply to types of service, rather than to lines. Most lines include at least some local service.

Issues

Transit Funding -- Taxes vs. Fares. A very basic issue is whether there is a need for a fare increase at all. While there is general agreement that there should be some public funding of transit, there is no magic formula saying exactly how much. In a time when additional tax resources are very difficult to find, practical necessity dictates relying somewhat more on the transit user for funding. The real choice is between offering service at a higher price or severely curtailing service.

Fare vs. Distance Traveled. The cost of providing for a trip is roughly proportional to the length of the trip, after making allowance for costs of boarding and alighting. At present, the fare varies with distance, but not very much, nor very consistently. Systemwide, the average "mileage rate" is less than 2¢ per mile -- which means that a typical ten mile trip might cost about 10¢ more than a five mile trip.

One reasonable criterion for fare level is that fares should cover the cost of operation when the bus is fully loaded. The "mileage rate" should cover the cost of a full bus in motion (i.e. would not account for costs associated with boarding and alighting). If the mileage rate is only 2¢ per mile, a bus with 50 passengers generates only $1.00 per mile. Only in rare instances would the "rolling" cost be this low. A mileage rate of 5¢ per mile would greatly expand the number of instances where costs could be covered by revenues. This is not to say that lines would become fully self-supporting however, since almost all lines have some trips that are lightly loaded.

For long trips, ride quality becomes a much more important factor in the attractiveness of transit. If the mileage rate is increased to an appropriate level, the resulting higher fares for long distance trips would justify a policy of running only the newer buses on those lines. Such a policy would help to keep present patrons using those services in spite of a significant fare increase.

Peak Period Pricing. Extra costs are imposed by riding that is concentrated in brief periods of the day. One response to this peaking of demand is to charge more during peak periods. The most obvious way of mechanizing peak pricing is to specify higher rates between certain hours, i.e., to use "time breaks."

About ten years ago, RTD did have a peak fare system which used time breaks. It was limited to the elderly, and was described as a reduced off-peak fare. Those who remember the system do not advocate it, even in that limited form, because of the serious problem of fare disputes at each time break.

Without time breaks, an approach which emphasizes matching of fares to travel distance can also achieve the effect of peak period pricing. Long trips occur disproportionately in the peak periods. By offering more express services in these periods, and charging higher fares, people may shift voluntarily to higher fare services.

The case for peak period pricing actually rests on the existence of congestion. Where congestion could be alleviated through redeployment of equipment there is some question as to whether congestion-based charges are appropriate. Where a service is run as a matter of policy and is not congested even during "peak periods," peak pricing is inappropriate. Even where unavoidable congestion exists, the additional charge should be related to the amount of congestion. A simple time-break mechanism is only a very crude approximation of this objective.

Pass Pricing. Many transit operators have introduced the monthly pass since it was introduced in Los Angeles. There is widespread agreement that it is a good element to have in the fare structure. The use of passes jointly benefits riders and the operator:

- ease and simplicity for the rider
- speeded boarding
- elimination of transfer charges and costs of handling
- low fare for short trips
- passenger commitment to transit
- off-peak riding as bonus incentive

On the proper price of the pass there is varied opinion. Traditionally, RTD has priced the pass at 40 times the cash base fare. If the price were increased relative to the base fare, fewer passes would be sold, and the benefits cited above would be lessened accordingly. A relative decrease in price would have the opposite effect. The main argument for raising the pass price is that the pass represents a loss of potential revenue. A strong argument for lowering the relative price is the encouragement of regular riding. A cursory analysis suggests that total fare revenue may be quite insensitive to pass price.

Discounts. The Federal legislation which provided transit operating assistance requires that off-peak fares for seniors must be no more than half the applicable peak period fare.

What seemed to be adequate language at the time can now be seen to have serious shortcomings. Because of the awkwardness of time-breaks (noted under "peak-pricing"), the usual response has been to write off the possibility of any significant revenue from seniors. This approach remains as one alternative.

In view of the pressing need for more fare yield, two other alternatives can be postulated. One would be the strict adherence to the Federal requirement. Seniors would pay the nearest feasible amount that is less or equal to half fare on all services, except during peak periods, when they would pay full fare. Senior passes would be valid for full fare only during off-peak hours.

The other alternative is simply to discount the base fare by half at all times for seniors, but to charge the full zone and transfer charges at all times. Although this trade-off might not literally follow the Federal language, the net effect is a mutual benefit for seniors and for RTD, certainly meeting the intent of the law. The point is that many more seniors are helped by a full time 50% discount on the base fare than would be inconvenienced by the lack of a discount on zone charges. Most expedited services are provided during the peak hours anyway, when the half-fare provision does not apply.

The student cash fare discount is extremely difficult to regulate, and undoubtedly is used often by non-students. Since school travel is generally regular anyway, a discounted monthly pass should be substituted for the student cash fare. Upon purchase and upon boarding, a student I.D. with photograph would be required. Most students carry these already. For those who don't, RTD could furnish cards for a nominal charge.

Simplicity. In April, 1974, RTD switched from a very complex zone system to a very simple flat fare. This greatly simplified things for the riders. It also threw away a great deal of fare revenue which would have come from zones. The current

fare system is a compromise between the two extremes. However, it could be simplified in certain respects, yet yield more revenue from zones.

The conflicting objectives of simplicity and yield are best reconciled by having complexity only where the resulting increment of yield is high. Simplicity from the viewpoint of the rider should be the primary objective. The system also must be simple for the driver, who must explain it to the riders, and must carry out the structure-related tasks.

Findings

Examining the experience with fare structures over the past few years, a number of findings are suggested in light of the issues cited above.

- Trip lengths vary according to service type. For example, limited service offered on a regular line carries trips averaging from one to four miles longer than the associated local service.
- Local lines carry rides averaging three miles. Where local lines cross both boundaries of the "free" zone, few of these short rides actually span both boundaries. RTD thus bears the cost of issuing zone tickets, and making zone checks, with little to show for it. Dispensing with zones for local service would probably cost less than $250,000 per year (lost revenues less cost reduction).
- Expedited services are often regarded as wasteful even when they carry good loads. This view may be due to the fact that fares are low relative to costs.
- Many long trips are taken on expedited services. Many of these are not subject to more than the base fare because they don't cross the two zone boundaries. Stepped fares on each such line,

related to travel on freeways rather than radial orientation toward the CBD, would capture much more of this potential revenue.

- There are many inconsistencies in the existing service nomenclature. For example, a service called "limited" on one line may be just like a service called "express" on another.
- Differentiating fares according to service may actually make the system more comprehensible to the public. It would help to keep local passengers from mistakenly boarding buses in expedited service.
- Having all park/ride service at the same fare may be a pointless simplification. A specific distance-related fare for each park/ride line is just as simple for the normal rider, who habitually rides the same line. Line-specific fares will reduce the disparity on subsidy-per-rider among various lines.
- The average monthly pass is used for almost 90 boardings. Judging from the sharp increase in pass sales which accompanied the raising of the transfer charge from 5¢ to 10¢, many of these 90 boardings are transfer rides.
- We still do not have enough data on pass use to be able to decide how best to set rates. We should find out the distribution of monthly transit expenditure among cash riders.

ALTERNATIVE FARE PLANS

Any feasible fare plan will be based on the combination of a few simple elements:

- base fare
- transfer charge
- zone increment
- surcharge (premium)
- pass
- discount

Alternative fare structures are generally just different combinations and emphases on these basis elements. With the wide range of options available for each of the various fare elements, the number of possible fare structure alternatives is virtually limitless.

Three alternatives are presented here. They are thought to represent the range of alternatives that would be considered feasible, practical and acceptable. If the decision process should lead toward a fourth alternative, its effects could inferred through minor adjustments of one of the three that are given.

Description of Alternatives

Alternative 1 - Proportional Increase. Rather than an alternative fare structure, this alternative is simply an across-the-board proportional adjustment of existing elements. If is based on a 5¢ increase in the base fare, with minor deviations from strict proportionality in order to preserve coinage simplicity.

Alternative 2 - Pass Incentive. The emphasis in this alternative is the encouragement of regular ridership by decreasing the pass/cash fare ratio to 30. Both cash and pass fares would be increased, but cash fares would be raised by a

significantly higher percentage.

The zone system as it exists would be abandoned, but there would be charges added to the base fare for expedited services. There would be a flat premium of 10¢ for limited service and for flyer service running less than seven miles on a freeway. The premium would be 25¢ for flyer service entailing more than seven miles on the freeway. Park/ride lines would have special line fares, computed in increments of 25¢ to approximate 5¢ per mile.

Alternative 3 - Distance Equity. The primary thrust of Alternative 3 is to achieve a more distance-related fare structure. The pass/cash ratio is left at the traditional value of 40 for comparability, although it could well be at some other value within the range of 35 to 45. The issue of distance equity is separate from the issue of encouraging pass use.

Like Alternative 2, Alternative 3 would abandon the existing zones, and have charges added to the base fare for expedited services. To achieve a fare more strongly related to distance, the base fare would be lower and the distance charge increments would be higher. About 30 lines would have two or more distance increments. The distance increments of 20¢ are applied so as to approximate 5¢ per mile of freeway travel.

Alternative 4 - Combined Pass Incentive and Distance Equity. The independence of these two major issues is demonstrated by this alternative, which addresses both. It has the low pass/cash ratio of Alternative 2, but the same basic treatment of distance charges as Alternative 3.

Tables

Alternative Zero is the current fare structure, with the current rate of ridership and revenue yield. Estimates of

Fare Structure Alternatives

Table 1 FARE AMOUNTS (Dollars)

	fare element	alternative 0	1	2	3	4
1	Base fare, regular	.35	.40	.50	.40	.50
2	Base fare, student	.25	.30	—	—	—
3	Base fare, senior	.10	.20	.25	.20	.25
4	Premium, priority	.10	.10	—	—	—
5	Premium, park/ride	.30	.35	—	—	—
6	Surcharge, limited	—	—	.10	.20	.25
7	Zone increment	.35	.40	.25	.20	.25
8	Transfer	.10 .08	.10 .08	.10 .08	.10 .08	.10 .08
9	Pass, regular	14.00 .147	16.00 .169	15.00 .218	16.00 .169	15.00 .218
10	Pass, student	— —	— —	12.00 .174	12.00 .127	12.00 .174
11	Pass, senior	4.00 .057	8.00 .103	7.50 .129	8.00 .103	7.50 .129
12	Pass, park/ride	37.50 1.00	43.00 1.19	45.00 1.20	— —	— —
13	Limited stamp	— —	— —	3.00 .071	— —	— —
14	Zone stamp	11.00 .256	13.00 .297	7.50 .180	8.00 .149	7.50 .180
15	Other	.300	.342	.450	.360	.450

Fare Structure Alternatives

Table 2 ANNUAL BOARDINGS (millions)

	fare element	alternative 0	1	2	3	4
1	Base fare, regular	114.5	112.9	64.2	117.3	64.2
2	Base fare, student	11.4	11.2	—	—	—
3	Base fare, senior	19.0	17.1	9.0	15.2	9.0
4	Premium, priority	(1.0)	(1.0)	—	—	—
5	Premium, park/ride	(0.3)	(0.3)	(0.2)	—	—
6	Surcharge, limited	—	—	(1.6)	(3.0)	(1.6)
7	Zone increment	(3.8)	(3.7)	(2.3)	(11.2)	(8.1)
8	Transfer	56.1	56.1	31.4	54.1	31.4
9	Pass, regular	88.2	86.9	157.1	85.5	157.4
10	Pass, student	—	—	10.5	10.4	10.5
11	Pass, senior	25.8	23.2	34.2	23.8	34.2
12	Pass, park/ride	0.2	0.2	0.3	—	—
13	Limited stamp	—	—	(6.8)	—	—
14	Zone stamp	(3.6)	(3.5)	(7.8)	(19.4)	(27.8)
15	Other	5.4	5.4	3.8	5.3	3.8
	Totals	320.6	313.0	310.5	311.6	310.5

Fare Structure Alternatives

Table 3 ANNUAL REVENUE (millions of dollars)

	fare element	alternative 0	1	2	3	4
1	Base fare, regular	40.3	45.4	32.1	47.2	32.1
2	Base fare, student	2.9	3.4	—	—	—
3	Base fare, senior	1.9	3.4	2.3	3.0	2.3
4	Premium, priority	0.1	0.1	—	—	—
5	Premium, park/ride	0.1	0.1	0.1	—	—
6	Surcharge, limited	—	—	0.2	0.6	0.4
7	Zone increment	1.2	1.3	0.7	2.8	2.1
8	Transfer	4.5	4.5	2.5	4.3	2.5
9	Pass, regular	13.0	14.7	34.2	14.6	34.3
10	Pass, student	—	—	2.4	2.2	2.4
11	Pass, senior	1.5	2.4	4.4	2.5	4.4
12	Pass, park/ride	0.2	0.3	0.2	—	—
13	Limited stamp	—	—	0.5	—	—
14	Zone stamp	0.9	1.0	1.7	2.8	3.4
15	Other	1.6	1.8	1.7	1.9	1.7
		68.0	78.4	83.0	81.9	85.6

ridership and revenue associated with the various fare elements are based on riding checks. Where riding checks do not distinguish among certain categories (like types of passes), judgments based on pass sales and presumed riding patterns were used.

Zone fares are shown incrementally, meaning that the zone increments are separated from the base fares and shown separately, with all base fares being shown on the base fare line. This shows what revenue actually is yielded from the zone and premium increments, for both cash and pass fares. The ridership associated with these increments is shown in parentheses, in order to avoid double counting when summing the riders in each column.

Where a fare element entails a purchase price differing from the average "boarding value," the purchase price is shown in italics. This applies to transfers, passes and zone stamps.

No change was shown in the transfer charges, since it is counterproductive to use them for revenue generation. Rather than lower them to 5¢ however, it might be better to expand the transfer privilege. By allowing unlimited transfers within a specified time limit, additional short trips could be encouraged during the off-peak. These would be quick return trips, of which there are probably very few at present.

In making the calculations, an elasticity (deflection factor) of -0.1 has been used throughout. The usual assumption, a value of approximately -0.25, is related to the immediate impact of a fare change. In these examples, where the concern is for an entire budget year, a recovery factor must be built in, and adjustment of the elasticity is the simplest way to do it.

Comparisons

The tables indicate that all three alternatives are similar in their revenue yield and impact on patronage. The

fact that they are so similar requires a caveat -- that any strong conclusions should not rest entirely on small computed differences in overall impacts. The precision of the calculations would not justify it.

This caution is particularly applicable where a shift between fare elements is anticipated. In alternatives 2 and 4 it must be assumed that there would be a marked shift from coin fares to passes. The calculations are based on the assumption that both boardings and linked revenues can be switched between fare elements prior to calculating patronage deflections due to fare increases. The assumption could lead to an overstatement of revenue, and in any case the potential magnitude of the shift would preclude a high precision forecast.

Although Alternative 3 was designed to have a significant effect on fares for longer distance trips, the fact that these trips are few in proportion to the total means that lack of precision in computing revenue and patronage impacts for the affected trips will not significantly impair the overall reliability of the computations.

In that Alternative 1 is generally the same as the existing structure, it would require the least implementation effort, with alternatives 2, 3 and 4 requiring more, in that order. The continuing cost of maintaining the fare system is another matter, where Alternative 1 would be the most costly.

Alternatives 2 and 4 will strongly encourage regular riding with passes, giving a break to most of those who are truly transit dependent, and encouraging many others to rely more on transit. Like any incentive, it has side effects. In this case the high cash fare will tend to discourage the less frequent rider. Pass use tends to be much lower on the newer suburban lines, probably due to a higher proportion of infrequent riding and more difficult access to pass outlets. Loss of ridership could be expected to be higher on those lines. If passes could be more widely distributed, and if the transferability of the pass would be promoted as a feature to allow "transit sharing," this loss could be alleviated.

Alternatives 2, 3 and 4 will simplify the fare structure for the large majority of riders who use only local service, since the zones would be removed.

The greatest advantage of Alternatives 3 and 4 is that they would help to rectify the lack of distance equity in the present structure. The seeming paradox, that some of RTD's best services from the standpoint of low cost per passenger mile are also highly subsidized, could be largely eliminated. Alternative 2 would generally worsen this situation, in that it entails a high base fare with only a single distance increment.

Looking past the anticipated fare increase, Alternatives 2 and 4 offer the opportunity to gain additional revenue through upward adjustment of the pass price. Alternatives 3 and 4 could bring added revenue through some modest adjustments in service -- switching some local service to limited service, and altering some flyer service to feature longer freeway runs.