Role of Feeder Buses in Supporting Amtrak Services in California

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California's use of feeder buses has contributed significantly to the success of the state-supported Amtrak San Joaquin train route. Before the development of this bus network, the continued operation of the San Joaquin trains was threatened because of an apparent inability to meet state financial productivity standards. Passengers who use buses that connect with these trains now represent nearly 50 percent of the riders and produce more than 60 percent of the revenues. Improved efficiency, attributed primarily to the network of feeder buses, has placed the San Joaquin route in a secure position vis-à-vis the state's productivity standards. The development of the integrated feeder bus network as it relates to the San Joaquin route is described, and how this system contributed to preserving and enhancing San Joaquin service is explained. As the San Joaquin example illustrates, feeder buses can be a low-cost method of increasing Amtrak ridership and generating revenues.

California's involvement with Amtrak services is permitted by Section 403(b) of the Rail Passenger Service Act of 1970. Section 403(b) allows states to contract with Amtrak for services to supplement its basic system of trains. Through its Department of Transportation (Caltrans) California financially supports two Amtrak routes, the San Joaquin and the San Diegan. There are two daily round trips on the San Joaquin route from Oakland to Bakersfield. Caltrans extends financial assistance to three of the seven round-trip San Diegan trains that run from Los Angeles to San Diego (with a round-trip extension to Santa Barbara scheduled to start in October 1987).

Connecting bus service (also referred to as integrated bus-rail service and feeder buses), the subject of this paper, serves two major purposes: it increases service accessibility, and it extends markets. The result can be ridership and revenue growth for the associated train service.

DEVELOPMENT OF THE FEEDER BUS SYSTEM

Growth of the connecting bus service has been dramatic since its inception in 1980 when the state capital, Sacramento, was linked to the San Joaquin route. A dedicated bus, used exclusively to transport Amtrak passengers, traveled approximately 50 mi to meet the train at Stockton. Currently, the network of buses covers more than 1,000 route miles and on an average day provides 400 passengers with better access to trains. See Table 1 for route names and cities served by the various San Joaquin feeder buses.

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San Joaquin Route

The early connecting bus service served only the San Joaquin route. That route was in a precarious condition because it was far below the state's mandated farebox recovery ratio of 55 percent for 403(b) trains. This efficiency criterion measures the ratio of revenues to operating costs. In contrast, San Diegan trains that received funding under the 403(b) program during the same period exceeded the farebox recovery constraint. The use of connecting buses became a key element in Caltrans' strategy to preserve the San Joaquin service.

Southern California Service Extensions

Service to Los Angeles Union Passenger Terminal (LAUPT) in 1981 was a significant addition to the connecting bus system. This service between Bakersfield and Los Angeles gave residents of the Great Central Valley direct Amtrak service to Los Angeles. Moreover, the two largest population centers in California—the Los Angeles Basin and the San Francisco Bay Area—were linked by a second Amtrak route, the Amtrak basic system's Coast Starlight. More detailed discussion of the performance of integrated buses illustrates the profound impact that this extension has had on the once fledgling San Joaquin service.

After opening the Los Angeles market to San Joaquin passengers, Caltrans shifted its attention to improving access for large numbers of people in that vast area. This process began in 1983 with a stop at Van Nuys that serves the San Fernando Valley, a section of Los Angeles with more than 1 million residents.

By transferring from the Los Angeles bus to San Diegan trains at Los Angeles, San Joaquin passengers could further extend their trips southward to Orange and San Diego counties, all the way to the border city of San Diego. To provide access to the large Long Beach market in southwestern Los Angeles County, Caltrans began bus service there in 1985. That year the San Joaquin Los Angeles connector bus also began serving Glendale, a city 6 mi from LAUPT and a stop on the route of the Coast Starlight.

Expansion of San Joaquin service east of Los Angeles began in earnest in 1986. A new bus route went as far east as San Bernardino, 59 mi from LAUPT. This became the longest bus route in the integrated bus-rail system. Travel time from San Bernardino to Bakersfield with intermediate stops at Riverside, Pomona, Pasadena, and Glendale is more than 4 hr.

In the spring of 1987 Caltrans introduced another eastern bus route to connect with San Joaquin trains. This service goes

TABLE 1 SAN JOAQUIN BUS ROUTES

Route Name	Major Cities Served	Train Connection Point	Bus End Point
Sacramento	Sacramento, Davis, and Chico	Stockton	Chico
San Jose	San Jose	Stockton	San Jose
North Bay	Santa Rosa, Napa, and Sonoma	Martinez	Santa Rosa
Tulare County	Visalia and Porterville	Hanford	Porterville
Long Beach	Long Beach, Torrance, and Los Angeles	Bakersfield	Torrance
Los Angeles Airport	Los Angeles, Van Nuys, and Santa Monica	Bakersfield	Los Angeles Int'l Airport
San Bernardino	Glendale, Pasadena, Pomona, Riverside, and San Bernardino	Bakersfield	San Bernardino
Barstow[a]	Mojave, Tehacapi, and Barstow	Bakersfield	Barstow
Los Angeles[b]	Los Angeles	Bakersfield	LAUPT[c]
San Diego	Los Angeles, Long Beach, Santa Ana, Oceanside, and San Diego	Bakersfield	San Diego

[a]Also connects with the Desert Wind in Barstow.
[b]Connects directly with San Diegan trains and allows for connections with the Sunset Limited and the Southwest Chief at LAUPT.
[c]Los Angeles Union Passenger Terminal.

to the high desert and Barstow. Because this route bypasses the congested Los Angeles area, however, it is a trip of only 3 hr 20 min. The Barstow bus connects with San Joaquin trains and the Desert Wind, providing Central Valley residents an easy connection to Las Vegas. Some valley residents also can make a more time-sensitive transfer to the California Zephyr (which originates in Oakland and terminates in Chicago) via the Desert Wind at Salt Lake City, Utah, than by meeting the Zephyr in Martinez.

Early 1987 also marked the extension of the Los Angeles bus to San Diego at late evening or early morning hours when San Diegan trains do not operate. With the addition of the San Diego bus, Bay Area to San Diego service is now available on all San Joaquin routes.

Northern California Service

During this period, new San Joaquin bus extensions were not limited to southern California. In 1984 Caltrans extended the Sacramento bus route 95 mi north to Chico, a college town. A year later Davis, 13 mi west of Sacramento with a University of California campus, became part of the Sacramento bus route. Finally, in 1986 the addition of two routes in the San Francisco Bay Area, one in San Jose and the other in the North Bay area of Sonoma County, gave greater choice and flexibility to San Joaquin riders.

In addition to these extensions, a Tulare County feeder bus began meeting the train at Hanford in 1982. This feeder bus provides easier train access for major population points in this adjacent county. Figures 1 and 2 provide a visual overview of the integrated train and bus system.

FIGURE 1 San Joaquin train and bus system (northern California).

San Diego Route

California applied the concept of an integrated bus-rail system to the San Diegan route in 1985. Service from the new intermodal transportation facility in Santa Ana linked Torrance and Long Beach to Amtrak's second busiest corridor, San Diego to Los Angeles. This route now connects with six of the fourteen San Diegan trains. Because the huge population center north of downtown Los Angeles (where LAUPT is located) is a logical extension of San Diegan service, connecting buses began to serve points as far north as Oxnard, 66 mi from LAUPT. A year later in 1986 this route was extended another 27 mi north to Santa Barbara. This bus route now meets four San Diegan trains in downtown Los Angeles.

Administration of the Integrated Bus Operation

A partnership is responsible for the operation of the dedicated bus links to the 403(b) trains. Caltrans pays 100 percent of the cost of these buses and receives a revenue credit from Amtrak for the bus portion of a passenger's ticket. Amtrak uses competitive bidding to select an operator to provide the service. In addition to assuming an active role in the bus operations, Amtrak provides integrated fares and ticketing procedures and

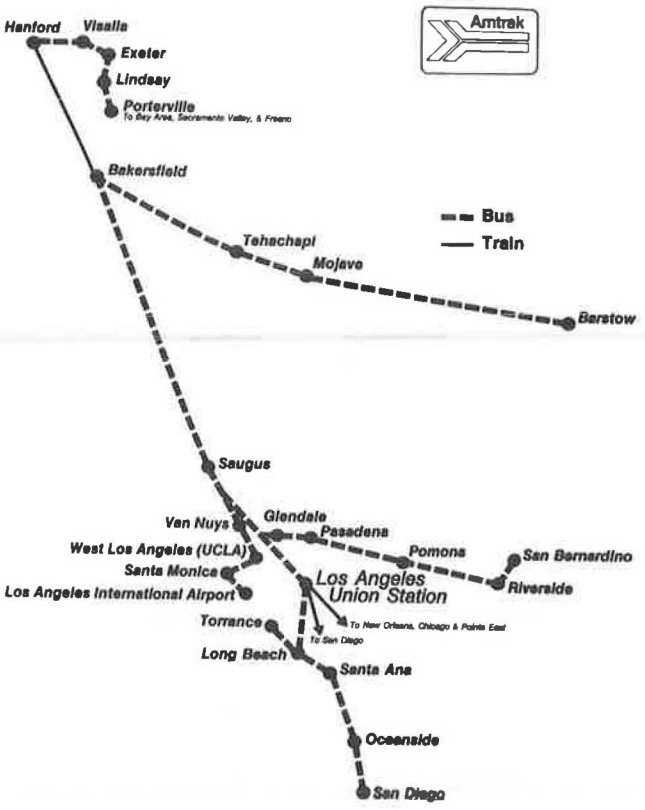

FIGURE 2 San Joaquin train and bus system (southern California).

access to its information and reservation system. The bus aspect of the operation thus becomes an integral part of the route system.

CONNECTOR BUS PERFORMANCE

Performance data will be limited to the San Joaquin route, because the dedicated bus system is considerably more extensive on that line than it is on the San Diegan and it is exclusively a 403(b) service. Also, the San Joaquin experience is an object lesson of a route that, in a relatively short time, was transformed from a marginal financial performer to one that has improved significantly and, moreover, has met state performance standards. The contribution of the feeder buses to this change has been substantial.

Ridership and Revenues

Ridership on the San Joaquin trains in January 1980, about 9 months before the start-up of dedicated bus service, was slightly more than 7,500 a month. A year later with only a small contribution from the sole dedicated bus, the monthly average rose sharply to around 13,000. This large relative jump in ridership resulted from adding the second train in February 1980. However, the number of people who rode the trains exclusively leveled off after the initial effects of the second train, and there was no growth of this group for the next 6 years. Indeed, the number of passengers who rode only the trains declined. Meanwhile, ridership on the San Joaquin route shot up to nearly 24,000 per month by 1986. This growth—over 10,000 per month—was due entirely to passengers who had a combined bus and rail trip.

An increase in the farebox recovery ratio from 32 percent in Fiscal Year 1981 to more than 63 percent today is attributed primarily to ridership growth produced by users of the connecting bus system. The farebox recovery ratio has not only surpassed the state-mandated standard, its margin has made possible the luxury of contemplating seriously service enhancements whose starter costs used to discourage any notions of experimentation.

Before the farebox ratio reached the secure zone, if it appeared that proposed changes could not immediately result in revenue enhancement—a particularly difficult standard—they never left the drawing boards. Now some short-term financial dislocations can be absorbed if the potential for long-term gains looks promising. An example of a major service change made possible by the current farebox ratio is the addition on June 15 of a significantly upgraded level of food service on two of the San Joaquin trains. In addition, Caltrans is in the process of requesting checked baggage service on these trains. Preliminary responses to this inquiry are cause for optimism.

Feeder Buses as Revenue Generators

Viewed in isolation, the cost of feeder bus service, which ranges from $1.28 to $2.20 per bus mile, exceeds the revenues (with the exception of summer and other peak travel months for a couple of the runs) that the service produces directly. (Table 2 gives cost information by route.) This seemingly unsatisfactory condition is acceptable, however, when viewed within a broader context. The average revenue per passenger on the San Joaquin route is around $20, and for those who combine a bus and rail trip it is usually in excess of this figure because of longer average trip lengths. Although it is frequently a losing proposition to transport passengers from a connecting bus to the train, this loss is generally offset by a greater amount of revenue produced by the entire trip. For every dollar spent on the Bakersfield to Los Angeles buses in Fiscal Year 1986, for example, $2.18 in ticket revenue was generated. (Table 3 gives generated-revenue-to-cost ratio by route.) Consequently, the feeder bus operation often enhances the revenue-to-cost ratio, even if, at times, more is spent transporting passengers to and from the train than is received

TABLE 2 SAN JOAQUIN BUS ROUTE COSTS

Route	Rate per Mile ($)	Daily Cost ($)
Sacramento	1.55	1,010.60
San Jose	1.28	407.36
North Bay	1.93	501.00
Tulare County	2.20	480.00
Long Beach[a]	2.18	1,750.00
Los Angeles Airport[b]	2.08	500.00
San Bernardino	1.63	570.00
Barstow	1.54	400.00

[a]Includes San Diego bus costs.
[b]Includes Los Angeles bus costs.

TABLE 3 SAN JOAQUIN REVENUE DATA, FISCAL YEAR 1986

Route	Generated-Revenue-to-Cost Ratio
Sacramento	267.5
San Jose[a,b]	75.0
North Bay[a,b]	225.0
Tulare County	100.3
Los Angeles[c]	218.0

[a]Data for April through June 1987.
[b]Estimate based on ridership reports.
[c]Includes all southern California buses.

for this service. The feeder bus system tends to serve as a revenue generator.

MORE DETAILED EXAMINATION OF THE SYSTEM

California's 403(b) connecting bus system, although a success, is not without some difficulties. Accessibility issues have been raised. These will be discussed later. Although a number of lines have been added, there have been some deletions, too, as indicated in the next paragraph. Service abolishments, however, have been stops, not entire routes or extensions. This could change, however, if some of the underperformers do not show marked improvement within the next 6 months; a small number of marginal routes or route extensions are under close scrutiny.

The Davis stop replaced the Lodi stop, located near Stockton. For 7 months before its abolishment, ridership at the Lodi stop averaged only 2.1 persons each day. Buses that served the Davis stop connected with two of the four San Joaquin trains. Poor performance, amounting to a daily average of only 1.6 riders during 1986, at the Northeast Sacramento and Roseville stops resulted in the substitution of an additional stop at Davis to serve passengers who had previously been picked up at the discontinued stops.

Route Selection

When Caltrans first selected routes only two criteria were used, population density and a history of bus service to pre-Amtrak passenger trains. By far the greatest emphasis was on population density. Although this factor continues to be a major consideration in selecting routes, evidence suggests that population density alone is not always sufficient for success. Experience has demonstrated that the absence of competition from other bus providers is often an important factor in route success, as well as the availability of additional train service. Caltrans has found that highway congestion and bus route configuration are factors to note. A stop at a specific attraction can also be of critical importance.

Selecting a route is an inexact exercise. When considering a prospective route, Caltrans evaluates the criteria mentioned and then, if sanguine about prospects, commences the service and monitors it to determine whether the hunch was correct.

Monitoring the integrated bus service consists of two components. Weekly ridership reports furnished by Amtrak station personnel are reviewed, and the financial data are evaluated to determine whether costs and revenues are in line. Besides this quantitative analysis, employees of Caltrans' Rail Branch periodically ride the service to make qualitative assessments. This on-board evaluation sometimes is supplemented by other employees of the Division of Mass Transportation to provide additional coverage from different perspectives. Close attention is also paid to passenger comments, particularly those in writing, and to the analysis of survey results.

Route Performance

A sharp variation characterizes the performance of the several feeder bus routes. An analysis of factors that appear to affect route performance is included with the route comparisons.

The Los Angeles Basin routes are the strongest performers in terms of ridership and financial impact. To a large extent these routes subsidize some of the others that are underperformers. The strength of the Los Angeles Basin routes, with an average daily ridership of 211, more than any other factor, makes the overall feeder bus system a success. Annual route ridership data are shown in Figures 3–5.

As mentioned, experience indicates that population density is not per se a guarantee of success with these operations; when the population is large, however, as is the case in southern California, it makes failure difficult. The population factor tends to swamp others in such instances. Capturing just a small fraction of the intercity riders to and from this massive market can result in success. Added to the sheer size of this area are the numerous attractions, some out of the ordinary and most available year round, that encourage travel. Too, this service has been around for 6 years so word-of-mouth knowledge, a key factor in developing the service, is in the mature stage.

The Sacramento route, with its Fiscal Year 1985–1986 generated-revenue-to-cost ratio of 267.5 percent, is more efficient in this regard than its southern California counterpart (Los Angeles Basin to Bakersfield). However, the Sacramento route has far fewer passengers than the route to and from Bakersfield. Other reasons make the Sacramento bus less of a successful performer than its ratio of generated revenues to costs implies. Ridership growth on the Sacramento to Stockton portion of the route is insubstantial, whereas the number of passengers on the Bakersfield buses continues to grow at an impressive rate. The Chico extension of the Sacramento bus route has failed to produce the expected ridership, and because it has provided no indication of improved performance it is under critical scrutiny.

The Tulare County feeder bus, with a 100.3 percent generated-revenue-to-cost ratio, is breaking even although this route has the highest per mile cost. The newest routes have a much smaller data base but offer some interesting comparisons. After dismal starts, the North Bay and San Jose buses both demonstrated improvements in ridership and revenue. The North Bay bus generated a revenue-to-cost ratio of 36.1 percent during the first 3 months of service. Now that ratio is more than 225 percent for a comparable period 1 year later. San Jose's growth rate has been impressive, too, but, because it started at such a low percentage, continuation of this service is considerably less secure than is that of the North Bay bus. The first 3 months of service of the San Jose bus produced a

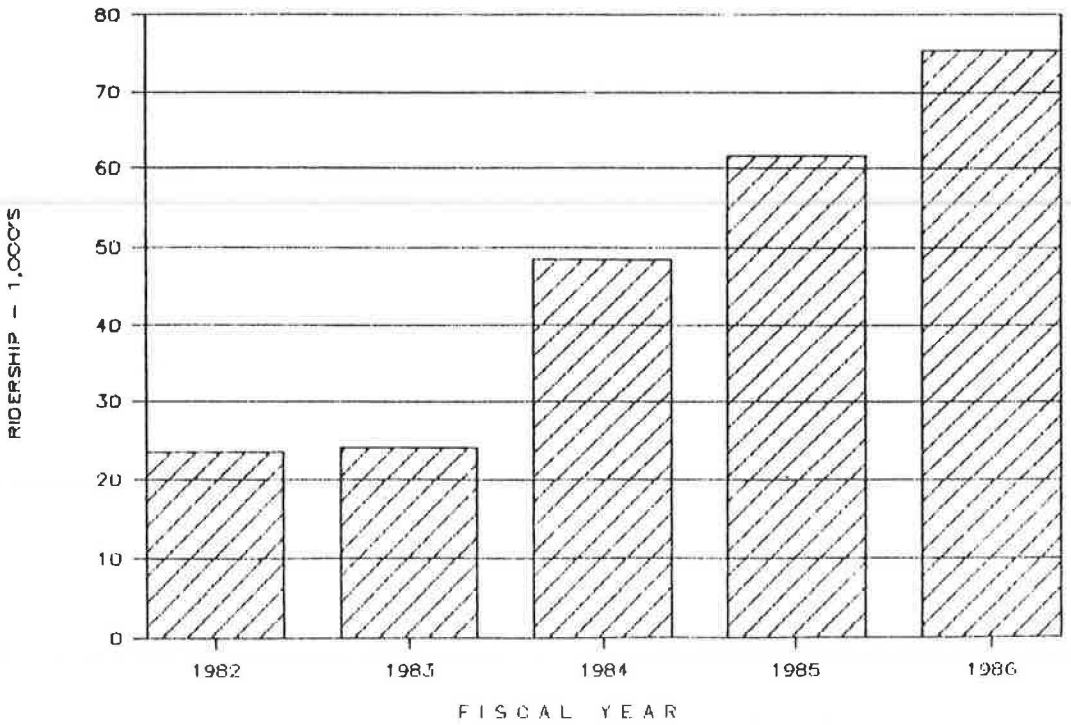

FIGURE 3 Annual ridership—Bakersfield bus.

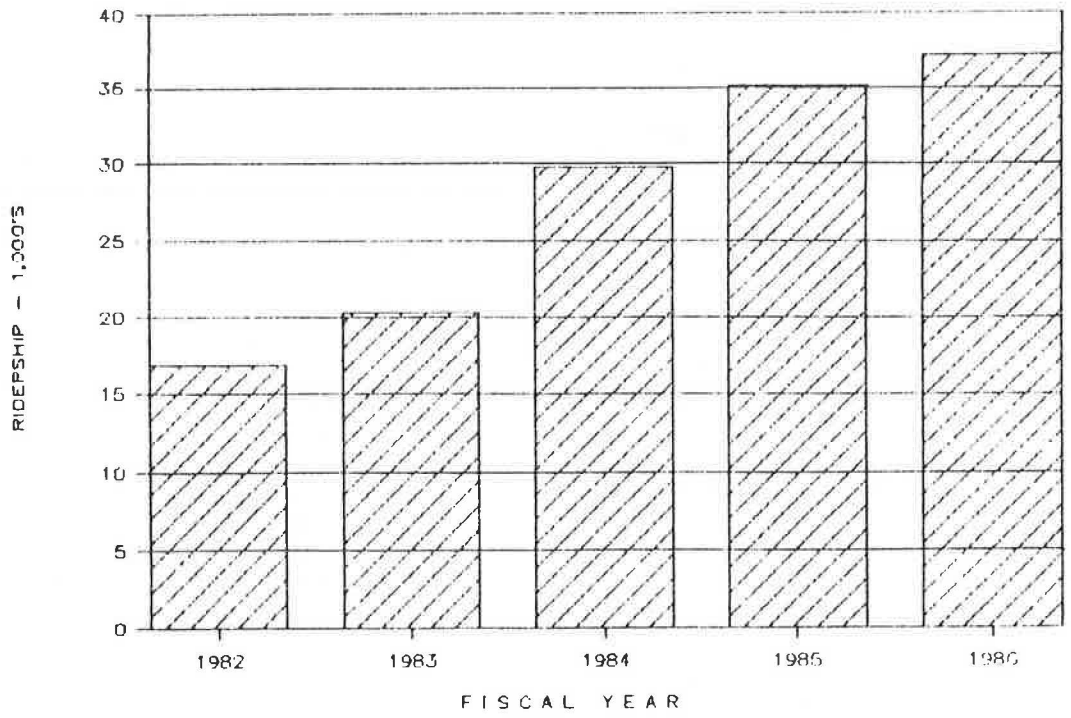

FIGURE 4 Annual ridership—Sacramento bus.

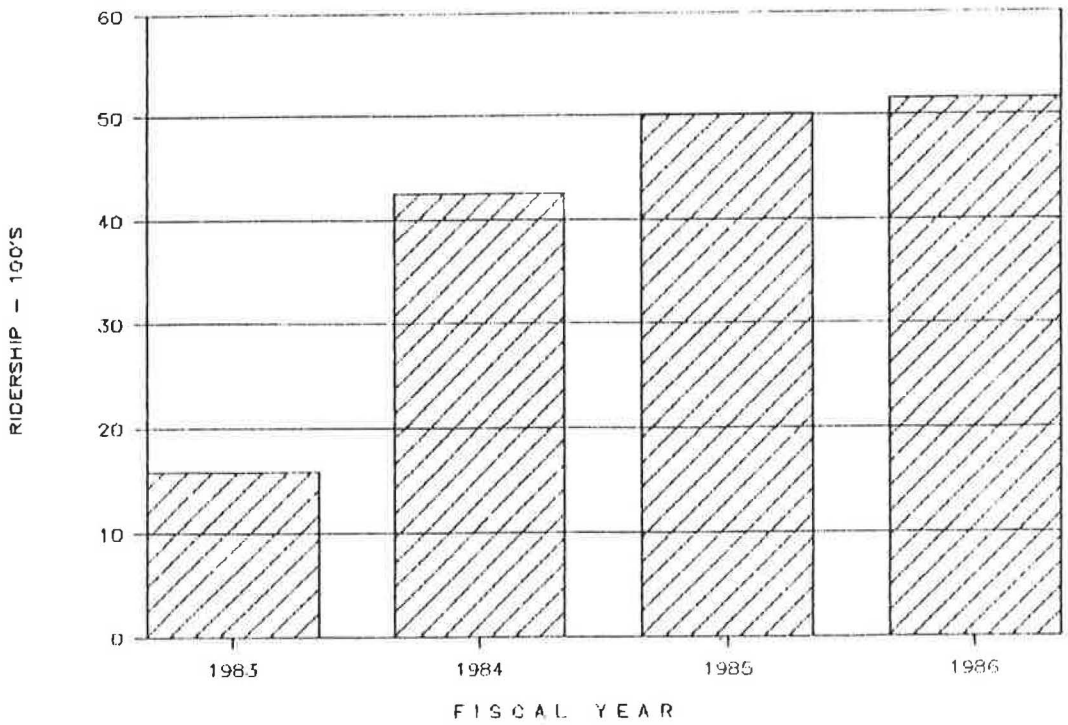

FIGURE 5 Annual ridership—Tulare bus.

generated-revenue-to-cost ratio of only 13.8; currently the service yields a ratio slightly in excess of 75 percent. Further improvement is necessary to warrant the continuation of the San Jose service.

Comparison of the conditions on the San Jose route with those on the North Bay route indicates some major dissimilarities and appears to provide some insight into their unequal performance. The San Jose route has two considerable advantages: a substantially larger population base and at its terminus an Amtrak staffed station, where amenities and information are available. The North Bay route has certain attributes, however, that in combination are conducive to integrated bus-rail ridership. Regularly scheduled intercity bus service from Sonoma County to stops that are also served by San Joaquin trains is much less frequent, requires a transfer, and usually involves greater distances than similar bus services from San Jose. Unlike San Jose, cities on the North Bay route are not served by the Coast Starlight, whose southern terminus is the Los Angeles Basin. Further, the North Bay bus route to the train is more direct than the circuitous one from San Jose.

A major amusement attraction, Marine World/Africa USA, is a stop on the North Bay route, but until April 5, when the Great America Amusement Park was added, there was nothing comparable on the San Jose route. It will be interesting to note whether the addition of the Great America stop in Santa Clara will enable the San Jose route to attain ridership levels equal to or greater than those achieved on the North Bay route. Because promotion of this stop has yet to have much effect, it is too early to discern the viability of the Great America Amusement Park. (Marine World has produced impressive ridership figures whereas the other Vallejo stop has yielded virtually no riders. This is a case of the attractiveness of a site overwhelming the population criterion.)

Uncertainty in Determining Successful Routes

Caltrans does not know enough about the precise impact of the variables described in this paper to formulate a hypothesis capable of predicting a successful feeder bus route. More knowledge of the factors that are present in a successful operation is required before a hypothesis of this kind can be made. Caltrans believes, however, that there is a reasonable chance for success if prospective bus routes are selected in terms of the factors discussed. Although there is still a certain amount of guesswork and reliance on intuition, route planning has gone beyond simply looking at population numbers. Continued analysis of the conditions associated with the most successful routes should enable Caltrans to better gauge the effectiveness of new route proposals.

When a route has been selected, various criteria are used to determine the necessary and desirable features and amenities for the various stops. Those criteria are given in Table 4.

Break from Tradition

Since the inception of the connecting bus program, service has been for the exclusive use of Amtrak passengers. This has not only simplified matters, it has been used as a marketing tool. With the start-up of the Barstow service, exclusivity of this kind is no longer universal. The operator who provides the Barstow service has added the Amtrak connecting bus service to his regular route from Bakersfield to Barstow. The mixing of passengers has resulted in a lower cost of service than

TABLE 4 STANDARDS FOR AMTRAK FEEDER BUS STOPS

Criteria / Standards	1 Comfort and Safety	2 Trip Information and Marketing	3 Tickets	4 Convenience of Stop Location (access)	5 New Location Notice
C. Minimum	Shelter lights	Sign, posted schedule, price, destination	None	Along the route, existing business facility	Temporary sign, map and description posted at old stop and on bus
B. Target	Plus Telephone, seating, and restrooms	Plus Literature large signs	Information on where to buy tickets	Locate at a transportation station	Plus Amtrak Reservation Bureau information and other Amtrak information
A. Ideal	Plus Food, Attendants, shops	Plus Paid advertising, travel agents, yellow pages	Plus Tickets on sale	Plus Pathfinder signs, parking lot	Plus Paid advertising and publicity

otherwise would have been possible. Lower cost was the rationale for the experiment. Caltrans is optimistic, however, that this particular combination of Amtrak bus-rail passengers and regular bus riders will not fail. This outlook is based largely on the attitude of the operator, who appears to be determined to make the service successful, and on the nature of the market. The first 3 months of this service have produced quite acceptable ridership—an average of more than 19 passengers per day. Nevertheless, Caltrans intends to closely monitor, especially in a qualitative manner, this route's performance.

Accessibility Factor

The San Joaquin trains currently use high-level equipment. The trainsets have at least one Superliner coach car that has lower-level seating. With a portable ramp aboard this car, passengers in wheelchairs can access the train. Consequently, there is accessible service on the entire rail portion of the route. Full accessibility is not the case, though, with the feeder buses. None of the feeder buses is equipped with a wheelchair lift.

Caltrans continues efforts to achieve complete San Joaquin route access. So far cost considerations have discouraged the use of any of the various options explored, such as parallel van service and mandatory wheelchair lifts on all feeder buses. In hopes of discovering a much less expensive method of achieving total route accessibility than those examined, Caltrans has recently hired a consultant to inventory all public transportation providers who serve the areas along the San Joaquin route. This activity is designed to determine the totality of available accessible services. The report is due in June 1988.

Until there is resolution of the total route accessibility issue, the feeder bus operations limit participation in the service by a segment of the traveling public. The dilemma facing Caltrans is how to remove this inadequacy without undermining the financial attractiveness of this service.

CONCLUSION

The success of the San Joaquin route owes much to the contribution of the integrated feeder bus network. Primarily because these buses provide almost one-half (when including Amtrak's supported San Francisco to Oakland feeder buses) of the route's riders and yield more than 60 percent of its revenues, in less than 4 years the San Joaquin trains were transformed from a service with a precarious future to one with a solid record of performance. Expanding access to the trains in a cost-effective manner has been the hallmark of the San Joaquin feeder buses.

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