Regional Rail in a Low-Density Context

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Metropolitan Sacramento demonstrates many of the typical characteristics of the U.S. Sunbelt city. Population densities are low, the growing population and employment base is spread over a large area, and the traditional downtown core is relatively weak. Most growth has occurred since World War II. Automobile dependency is high; transit ridership is low—especially outside the old urban core. Commonly accepted indicators of the probable viability of rail transit service all point to a negative conclusion. Yet Sacramento is served by a regional light rail "starter" system that is generally considered to be a success: its ridership exceeds the system's preconstruction final environmental impact statement forecast, its operating costs are low, and its level of public acceptance is high. The system's success can be understood by focusing on the supply and demand aspects of the regional rail concept in the Sunbelt context. A demand for the kind of mobility provided by regional rail does exist in Sunbelt cities. An appropriately scaled regional rail product can be supplied to Sunbelt cities to meet this demand through the use of low-cost light rail technology. The use of low-cost construction and low-cost operation techniques in Sacramento to develop a regional rail product appropriate to the transit market in a low-density city is discussed.

Twenty years ago, rail-based public transportation systems did not appear to have much of a future in the American and Canadian West. West of Chicago, only the San Francisco Bay Area seemed to offer fertile ground for rail transit. There, the San Francisco Municipal Railway's remaining five-line streetcar system was being upgraded, and the Bay Area Rapid Transit (BART) System had begun operations. The Southern Pacific's Peninsula commuter train service was hanging on by a slim thread, under constant threat from a hostile operator on the one hand and an "all-BART" planning vision on the other.

There was no other rail transit service between the Mississippi and the Pacific Coast or, in Canada, west of Toronto. Efforts to establish new BART-inspired systems in Seattle and Los Angeles had faltered. More ominously, the trend of the nation's growth patterns seemed to suggest that conditions conducive to rail transit would never be duplicated outside of the old industrial cities of the Northeast and upper Midwest. Western growth, which was to say American growth, appeared to be concentrated in low-density boomtowns in the West and Southwest, where the automobile-based transportation system enjoyed unchallenged and apparently unchallengeable hegemony.

Some of the nation's most prestigious urban planning schools taught that the automobile-based development paradigm was an unmitigated good; the unparalleled mobility brought about by pervasive automobile ownership, cheap gasoline, and vast freeway projects was said to be the expression in movement of the spirit of American democracy. Proponents of transit and of the land-use patterns that might support the development of transit and especially rail transit systems in newer cities were often dismissed as antidemocratic elitists (T. Matoff, personal communication, Department of City and Regional Planning, University of California, Berkeley). Relatively few voices among urban thinkers were raised on behalf of public transportation, these largely from outside the mainstream of the planning profession (Lewis Mumford and Jane Jacobs come to mind; no doubt there were others).

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Twenty years later, things seem very different. Rail transit systems have been built and are thriving in nine cities in western North America. More are being planned and are probably on the way. Two, Dallas and Denver, are under construction. In addition, rail transit has returned to several older eastern and midwestern cities where it had once been taken as gone for good. The automobile, and the culture it engendered, no longer appears to be taken so readily as the apotheosis of American democracy. Instead, one school of contemporary urban criticism sees the automobile as an agent of social disintegration, the instrument or pathogen that permits the restructuring of the metropolis to "eliminate social mixing." Los Angeles, the American motorist's New Jerusalem, is now seen by some as "Fortress L.A.,"

> where the defense of luxury lifestyles is translated into a proliferation of new repressions in space and movement, undergirded by the ubiquitous "armed response", ... Contemporary urban theory, whether debating the role of electronic technologies in precipitating "postmodern space," or discussing the dispersion of urban functions across poly-centered metropolitan "galaxies," has been strangely silent about the militarization of city life so grimly visible at the street level. Hollywood's pop apocalypses and pulp science fiction have been more realistic, and politically perceptive . . .. Images of carceral inner cities ("Escape from New York," "Running Man"), high-tech police death squads ("Blade Runner"), sentient buildings ("Die Hard"), urban bantustans ("They Live!"), Vietnam-like street wars ("Colors"), and so on, only extrapolate from actually existing trends. (*1*,p.223)

Among other reversals in urban planning dogma has been the successful application of light rail technology to meet regional transit needs in cities where transit is not "supposed" to do much of anything at all. The emergence of the San Diego Trolley in a city of previous transit obscurity is well-known. Less celebrated, but equally worthy of attention for the lessons it can offer, is the remarkable establishment of protoregional light rail service in California's capital, Sacramento.

SACRAMENTO: A SUNBELT ARCHETYPE

Metropolitan Sacramento demonstrates many characteristics typical of the American Sunbelt city. Before the Second World War, the old "streetcar city," which held almost all the urban development of the area, had a population of about 100,000, with a downtown to match: "a calm city of trees, green lawns and government buildings . . . [with] . . . something of the appearance of a southern river town" (*2*).

The city lies in the heart of California's Central Valley (Figure 1). Today, a population of 1 million stretches over 450 mi^2. Al-

FIGURE 1 State of California.

most two-thirds of the population lives outside the boundaries of incorporated Sacramento or any other city. According to the Planning Department of the Sacramento Regional Transit District, annual vehicle miles traveled are 31.5 million.

Sacramento is located at the intersection of two Interstate freeways, I-5 and I-80 and two federal highways, US-50 and US-99, also freeways. These facilities are characterized by growing congestion, a fearful prospect to those who have fled the Los Angeles Basin or the Bay Area only to see the profligacy of American transportation policy about to engulf them once again. There is also a growing understanding that additional freeway capacity can no longer be delivered in the area on a per-capita scale equivalent to that of the "good old" 1950s and 1960s. This is true for two reasons. The first is state and local financial constraints. The second is that Sacramento is an air quality nonattainment area, which faces the threat of federal intervention in air quality planning. Transit is now emerging, albeit slowly, in the region's consciousness as an air quality–friendly means of increasing capacity in major corridors.

Sacramento did have a local streetcar system that disappeared in 1947, but it served only the higher-density, more truly urban inner city that existed before World War II. The celebrated interurban services of the Sacramento Northern Railway connecting Sacramento north to Chico and southwest to San Francisco, and of the Central California Traction Company, connecting Sacramento with the valley cities to the south, disappeared before World War II. The vestigial local transit service has been publicly owned since the mid-1950s, first by the city of Sacramento and more recently by a regional transit district (an independent single-purpose government entity) formed in 1972.

The absence of local financial support for the system, coupled with continuing urban development at low density levels, prevented transit from achieving a significant role in the community. Thus, even though there are large numbers of state office workers, which one would think might readily lead to a fairly high transit market share, the peak-hour share of trips on public transportation to central Sacramento is about 15 percent and the overall market share in the metropolitan area for a typical weekday is only $1^1/_2$ percent.

With relatively few changes, the general description of Sacramento could be that of many Sunbelt "growth" cities of the American West. Thus the remarkable and unexpected arrival of light rail technology in this metropolis is particularly important because it suggests the possibility of a wider applicability of this technology in the growth cities of the Sunbelt. If transit can work in these cities, then it can work throughout the nation. Thus, light rail technology, as an appropriate technology for regional transit trips, can be an important tool in making transit a workable alternative in the United States. The reversal of urban transportation dogma would be complete.

DEVELOPMENT OF SACRAMENTO PROJECT

As the light rail concept is central to this paper, it may be useful first to establish a definition of light rail transit (LRT). The Light Rail Transit Committee of TRB defines it this way:

> Light rail transit is a mode of urban transportation that uses predominantly reserved, but not necessarily grade-separated, rights of way. Electrically propelled rail vehicles operate singly or in trains. Light rail transit provides a wide range of passenger capacities and performance characteristics at moderate costs.
>
> Light rail transit possesses many operating possibilities. A light rail vehicle can be operating in the middle of a busy street in one moment and function as a high-speed rapid transit train moments later. (*3*)

The essence of this definition is the distinction in the first sentence between "predominantly reserved" and "grade-separated" rights of way. The terms "light" and "heavy" as applied to rail do not refer to physical weight; they generally refer to the intensity of the civil infrastructure of the system. It is the predominance of grade-separated and exclusive rights of way that makes heavy rail systems "heavy." One might say that these systems are "heavily" engineered and that their construction carries a "heavy" price. Light rail, on the other hand, uses selective investment and resorts to grade separation only where necessary. That is particularly true in Sacramento and is the key to the low-cost nature of the rail installation in that city.

On the whole, American public transportation systems have not been managed since the 1950s in quite the same environment as a fully commercial enterprise. Heavy reliance on federal grants and, in states such as California, the availability of state funding, has tended to reduce the stricter discipline in the evaluation of capital investment that would be made by a private entity doing business on a purely commercial basis; this is not to deny that this permits (but does not require) other important public values to be considered. Managers, whether drawn from outside or from within the transit industry, do not always engage in the careful balancing of investment and benefit that is the essence of the light rail concept.

The tendency toward intensification of investment in designing rail projects appears both natural and strong. Operations staff usually have in mind the minimization of staff effort and the maximization of chances for a completely successful operation. It is easily understood why they would want to spend "free" money to provide a good operation and avoid both problems and blame. Engineering staffs do not wish to be faulted for underengineering a rail installation. The comparative lack of commercial discipline to link strategic managerial design decisions with investment can leave rail systems open to the evils of overdesign and overinvestment.

This danger had to be avoided, and was successfully avoided, in Sacramento. A low-cost ethic pervaded the entire project from the beginning because of the basic fact that either the system was going to be cheap to build and cheap to operate or it was not going to be built at all. Consequently, the design of the system was not based on a progression from abstract principles of excellence to a perfect rail solution—that is, on the direct application of design criteria of high standard to the development of the project, regardless of cost. Instead, the Sacramento system relied on taking advantage of real-world opportunities to do as much as could be achieved within limited funding capabilities.

The Sacramento light rail project was also not the result of a deliberately structured program of public investment made by governmental agencies. It was, basically, the result of a grass roots citizens' effort that took place at a conjunction of two historic events. One of these was the availability of federal funding for public transportation infrastructure through a program known as the Interstate Transfer Program. The other was the rapid development of North American interest in rail transit, particularly the rapid growth in the redevelopment or rebirth of the light rail idea in the mid-1970s and its strong reception by the administration of California Governor Jerry Brown.

The citizen involvement was initially spurred by the extraordinary opposition that developed in Sacramento to the idea of more freeway construction. Strong citizen hostility to a number of freeways planned for Northeast Sacramento led to a decision by the Sacramento County Board of Supervisors in 1974 to delete those projects from the county's transportation plan and, further, to prevent their rebirth by selling the rights of way that had been reserved for them. Citizens who had come together in the freeway opposition movement coalesced around the idea of recommending alternatives in still other freeway corridors, in particular, the important federal freeway corridor that had been purchased and reserved for a new high-speed bypass for I-80. The Modern Transit Society, which became a potent citizens group, began to advocate the use of that right of way for transit rather than freeway purposes. A coalition of this group with other environmental groups encouraged Sacramento County to establish a study group to evaluate potential transit solutions as alternatives in this corridor.

The Modern Transit Society had originally focused on the possible introduction of a historic trolley loop in the central city of Sacramento, but when evaluating potential reuse of the freeway corridor, it began to advocate light rail instead. This was an important change because it marked a shift in strategy from advocacy of a utopian transit policy to the advocacy of a practical regional transit service concept. That shift was a reflection at the Sacramento level of a broader rebirth of interest in the light rail idea, manifested in the first North American light rail conference sponsored by TRB and held in Philadelphia in 1975. The concept of the light rail idea was transmitted from this conference to Sacramento and, through the advocacy groups, gradually spread. With the support of the state government, which under Governor Brown's administration was looking for alternatives to highway construction, the Interstate highway was at local option deleted from the map under the Interstate Transfer Program and the capital funding authorization was transferred from the federal highway program to the federal transit program. The I-80 highway restudy occurred in 1977, 1978, and 1979, and the freeway was withdrawn in 1979.

Simultaneously, proposals to accommodate additional growth in travel demand were also under study in the Folsom Corridor leading directly east out of central Sacramento. The coalition of public and political support around the light rail idea in the first corridor led to its adoption in the second, as well. By the early 1980s, a formal alternatives analysis, a federal process that is required before federal funding of any rail project can occur had been completed on a project to build an 18-mi light rail line consisting of 9-mi routes in each of the two corridors, I-80 and Folsom, connected by streets running through the central city. Additional analyses and political consensus formation, which is required by the cumbersome federal procedures in the United States, occurred between the completion of the alternatives anal-

ysis in 1981 and 1983. Eventually—despite the determined opposition of the federal government during the Reagan Administration and crucially aided by the spirited lobbying of Sacramento-area congressmen—federal approval was secured. Procurement and construction occurred during 1983–1987. The system opened in two phases in 1987: the northeast I-80 line opened in the spring and the east or Folsom line, in the fall.

IMPLEMENTING LOW-COST APPROACH

The cost of the 18-mi system as completed was $176 million including track, right of way, rolling stock, electrification, signalization, and urban amenities. This gives the Sacramento Light Rail System the lowest cost per mile of any federally funded system in the United States (Figure 2). Only the initial San Diego line, which was built without federal funding in the early 1980s, enjoyed a lower cost than Sacramento's $9.6 million/mi. How was this achieved, particularly when other light rail systems in the United States have required much higher costs per mile? (The Los Angeles–Long Beach Blue Line, for example, approximately 20 mi long, cost more than $700 million, or more than $35 million/mi.) The answer is obvious to anyone who looks at the system, but it has probably been best described by the line's original project manager, John Schumann, in his paper for TRB's 1988 Light Rail Conference (*4*). The key elements cited by Schumann are

- Use of available rights of way,
- Minimum investment for initial operation (the starter line concept),
- Proven off-the-shelf equipment,
- System design for low-cost operation, and
- Efficient service concept.

Available Rights of Way

The Sacramento system made extensive use of available rights of way. These are not in every respect ideally located for the project's market, but a perfect location would have required extensive right of way acquisition and, therefore, costs so high as to kill the project. Instead, as noted, the Sacramento concept was to use available opportunities rather than to proceed from a theoretical notion of the perfect development of a project. The existing rights of way that were available were in reasonable and usable locations and generally could be made to connect properly with most of the existing transit system (Figure 3).

In the northeast corridor, the I-80 bypass freeway right of way was available. This alignment parallels the Overland Mainline of the Southern Pacific Railroad and had several grade-separated highway overpasses in place. In addition, some parts of the bypass freeway had already been constructed. Because they led nowhere, these structures and rights of way could themselves be used and, indeed, made it possible for the northeast rail line to terminate in the center of the main I-80 freeway where the bypass lanes were to have diverged. Consequently, some of the northeast line is actually built on constructed but never used freeway structure, and

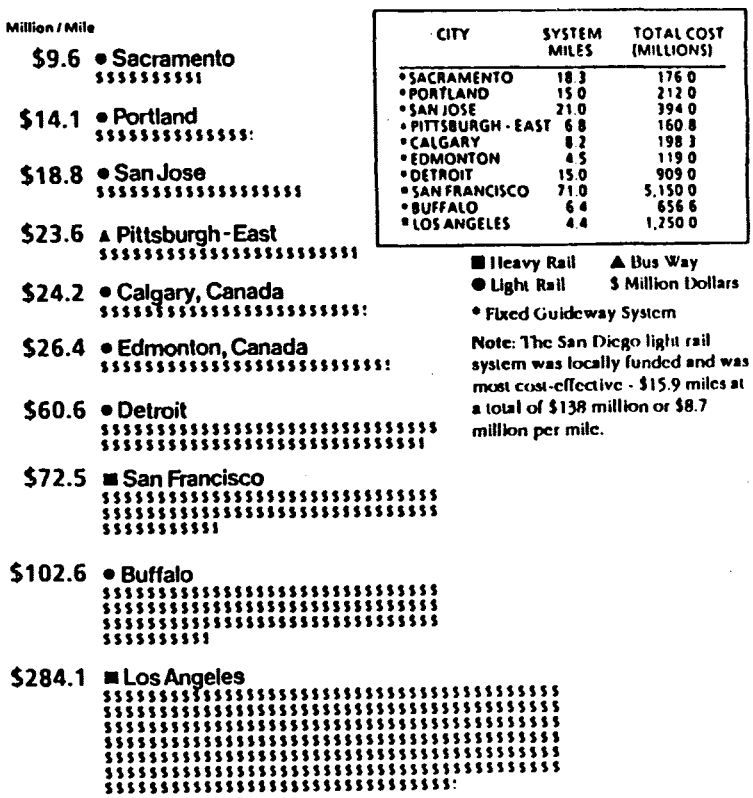


FIGURE 2 Comparison of costs per mile in federally funded public transportation.

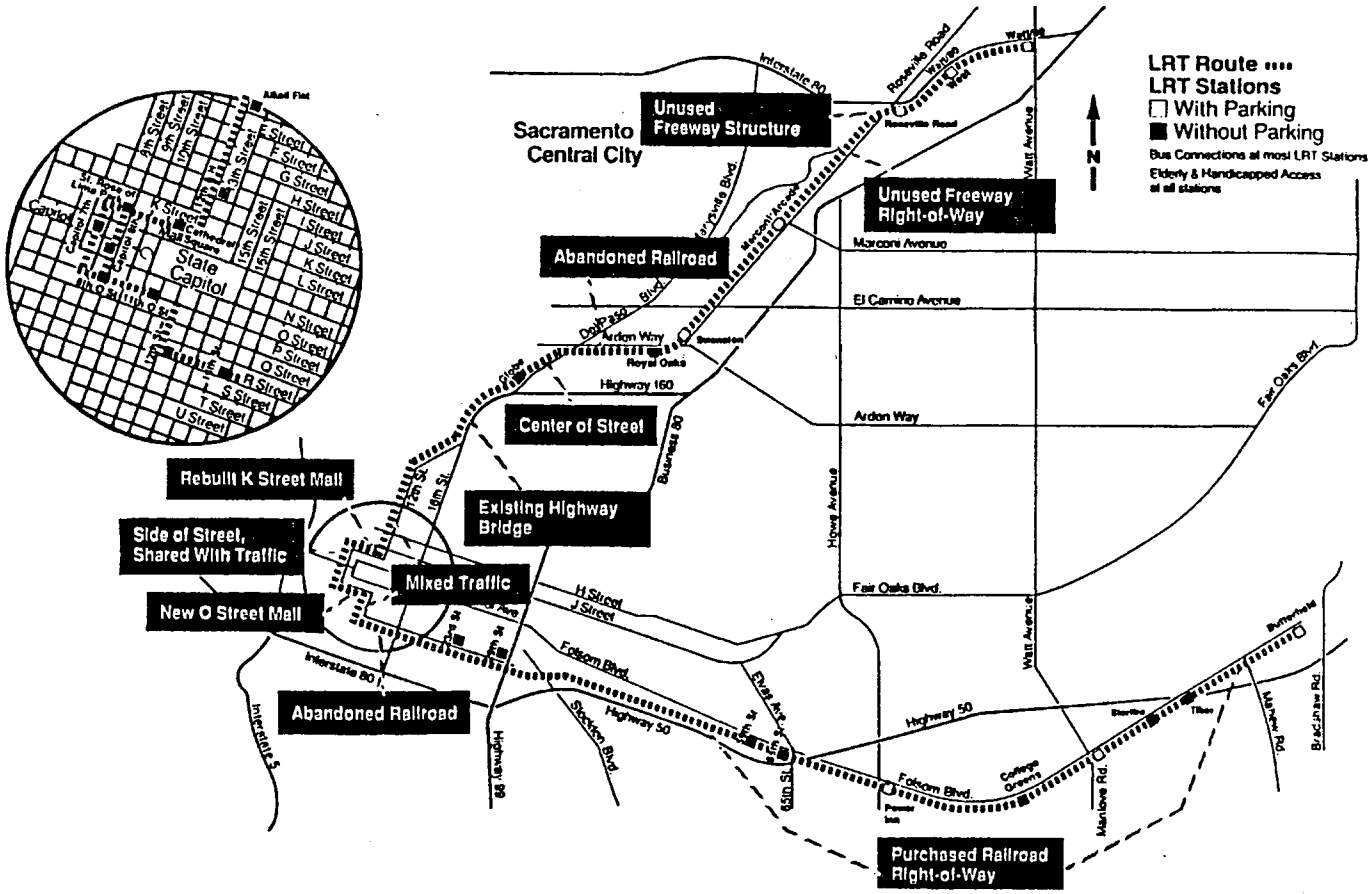


FIGURE 3 Types of right of way.

its terminus, including park-and-ride lots of 2,000 spaces, is located in the center of a very wide freeway. The terminus is well positioned to intercept motorists coming into the central area from the northeast. Four and a half miles of the northeast mainline were made available by the withdrawal of the freeway, the same action that made the funding available for the project. An abandoned railroad branch line and underused bridge and highway space were also available in this corridor.

To the east, available freight railroad branch line rights of way made possible the inexpensive construction of the Folsom line. Most of this line is built on part of the right of way of a light-density freight branch of the Southern Pacific Railroad. A single track remains in use for the railroad in the middle of a wide right of way that was acquired in the 19th century for multiple track operation that never occurred. It was thus possible to obtain a right of way suitable for light rail operation, which was actually well-located relative to the principal travel corridor to the east.

In the central city, it was necessary to interconnect these two radial routes, and a strategy using a variety of private rights of way and city streets was chosen. The resulting alignment through central Sacramento conclusively demonstrates the flexibility of the light rail concept. Entering the central city from the northeast, the line uses city street medians, side-of-the-road private rights of way (both single and double track), mixed operation with traffic in the manner of traditional streetcar operation, and an abandoned rail spur which ran in an alley between two major streets.

Two new pedestrian transit malls were also created. In the 1960s Sacramento, following a then-fashionable trend in city planning, had taken its main commercial street (K Street) and turned it into a pedestrian mall, complete with very large concrete sculptures and fountains, which came to be known as "tank traps." The mall was not successful, and businesses in the central area continued to decline. For its principal route into downtown, the light rail project removed the old K Street Mall and reconstructed five blocks of it (between 7th and 12th Streets) into a combined light rail and pedestrian mall. The concept was based on the Zurich Bahnhofstrasse, which has been cited elsewhere as the quintessential transit pedestrian mall. Along O Street, a second, new rail/pedestrian mall was created on a street that had served principally as a parking street for state office buildings; the advent of light rail resulted in the development of a pleasant, new urban environment on a street that had been reduced to the status of a parking lot.

Minimum Investment in Infrastructure

In almost every aspect, a minimalist approach was used on the starter line. The concept was to build a two-corridor line that made sense in and of itself but that did not provide much more in the way of infrastructure than was necessary to put the line into initial operation. More elaborate amenities and more significant infra-

structure were left to the future in the event that the community should find them necessary.

The line as built was 60 percent single track (Figure 4). Demand analysis and operations simulations demonstrated that a 15-min headway on the 18-mi line would be sufficient to meet initial peak demand and could be sustained with only eight trains. The meeting points of these trains were calculated and double-tracked sections placed at those locations. The downtown segment was double-tracked from the beginning. The single-track, eight-train concept also dictated a small car order. The original starter line required only 26 cars when it was opened.

Whenever possible, existing structures were used. Of 16 major structures on the line, 10 were already in existence. Three new grade separations were constructed and a short new bridge was built over Arcade Creek. The most important additions were two major new viaducts, built to carry the light rail line itself over mainline railroads. These were built as single-track structures to keep costs down.

Standard railroad track, meeting standard American Railway Engineering Association criteria, was used. In this way, the procurement of expensive special work or street rail was avoided. The project employed used tie plates discarded from another railroad. The line is only partly signalized, and there is no automatic train stop. Where it is signalized, standard American railroad practice was used, except for a block indicator system not using vital circuitry that was put in place to govern entrance into single-track segments where low-speed operation is the rule.

Stations are simple (Figure 5). Taking advantage of Sacramento's mild climate, the stations consist of simple platforms and structures that are not significantly more elaborate than bus shelters. The treatment of the two pedestrian malls was also relatively inexpensive. No granite or marble was used. The malls are paved with pleasant and attractive but inexpensive, mass-produced, interlocking concrete pavers. Local opportunities for stations were used where they were available. At Eighth Street and Capitol Avenue, the California Employment Development Division building, which crosses over the street, was used a shelter for a station. At 29th Street, the I-80 freeway structure itself forms a shelter for the station.

The operations and maintenance facility is extremely modest. The building provides maintenance facilities, work areas for maintenance of way, parts storage, and the basic facilities and offices. There are no frills. The site of the facility and yard is within the abandoned interstate freeway right of way and the initial storage yard was laid out for the 26-car fleet. No superfluous trackage was provided, although space was reserved for more track to accommodate a larger fleet in the future. To keep the facility down to its $4 million budget, there were some sacrifices, including a body repair bay and paint booth that are only now being added. A new maintenance-of-way building and paint booth is also being added. Double track is now 50 percent for future capacity.

Off-the-Shelf Equipment

The project emphasized the use of proven off-the-shelf equipment. There is nothing dramatically new in the technical aspects of the system. The light rail vehicles are Siemens Duewag U-2-type cars, with some modifications (Figure 6). The project could not afford to experiment with new and exotic forms of rolling stock. Today with a total fleet of 36 cars, 32 are regularly scheduled in each peak. Failure, for mechanical reasons, to make pull-out is almost unknown, and the cars regularly operate 100,000 mi between mechanical failures.

In the area of traction electrification, the substations are domestically available, off-the-shelf units identical to those of San Diego's Trolley and manufactured by Control Power Corporation. The overhead contact wire system is standard Ohio Brass overhead of a kind that can be found in other North American cities; like the substations, it is of domestic manufacture.

Design for Low-Cost Operation

Economy in operation was itself an important design principle. The system was designed with long platforms for long peak trains. The platforms are 320 ft long so that four 80-ft cars can be used in rush-hour trains. The system is therefore designed for long trains rather than short headways. The standard, all-day 15-min headway on the system is maintained through the peak period, and additional capacity is handled by lengthening the trains instead of putting more trains into operation (Figure 7). In this way, fewer operators need to be hired and less double track is required. Single-car trains are operated at night and on weekends and two-car trains during the day on weekdays.

The proof-of-payment fare collection system is used on the system (Figure 8). A four-car train is thus staffed by only one train operator; there is no conductor and there are no attendants in the other cars or in the stations. The system is derived from the European fare collection practice, which was first used in the United States in San Diego and has been found to be successful in North America.

Control of the system is handled by simple two-way radio. There is no mimic board; there is no remote control of switches; indeed, there is not even remote control of substations. This system is inexpensive and, although more gadgets might make life more pleasant for the operating staff, the system is simple and inexpensive and appears to work about as well as its more sophisticated counterparts.

Efficient Service Concept

Finally, the entire concept of the line was as a trunk system that would replace the line haul segments of bus routes linking the central city with outlying areas (Figure 9). As a result, with the rail system in place, bus routes that formerly ran through to the downtown area now operate as connecting lines at major rail system stations. These stations are also de facto timed-transfer focal points for the bus service. The number of buses coming to downtown from the two corridors now served by the rail system has been reduced drastically in comparison with the number previously operated through to the central business district (CBD).

Some aspects of this service concept are worthy of special notice. It is sometimes asserted that this arrangement is undesirable because it forces a transfer between modes and thus depresses ridership in comparison with the through express line concept. Actually, the evidence appears to suggest the opposite. Some loss in patronage may occur in one relatively small market, but this loss is apparently more than compensated for by increases that result from the superior network connectivity produced by concentrating transit connections at principal stations.

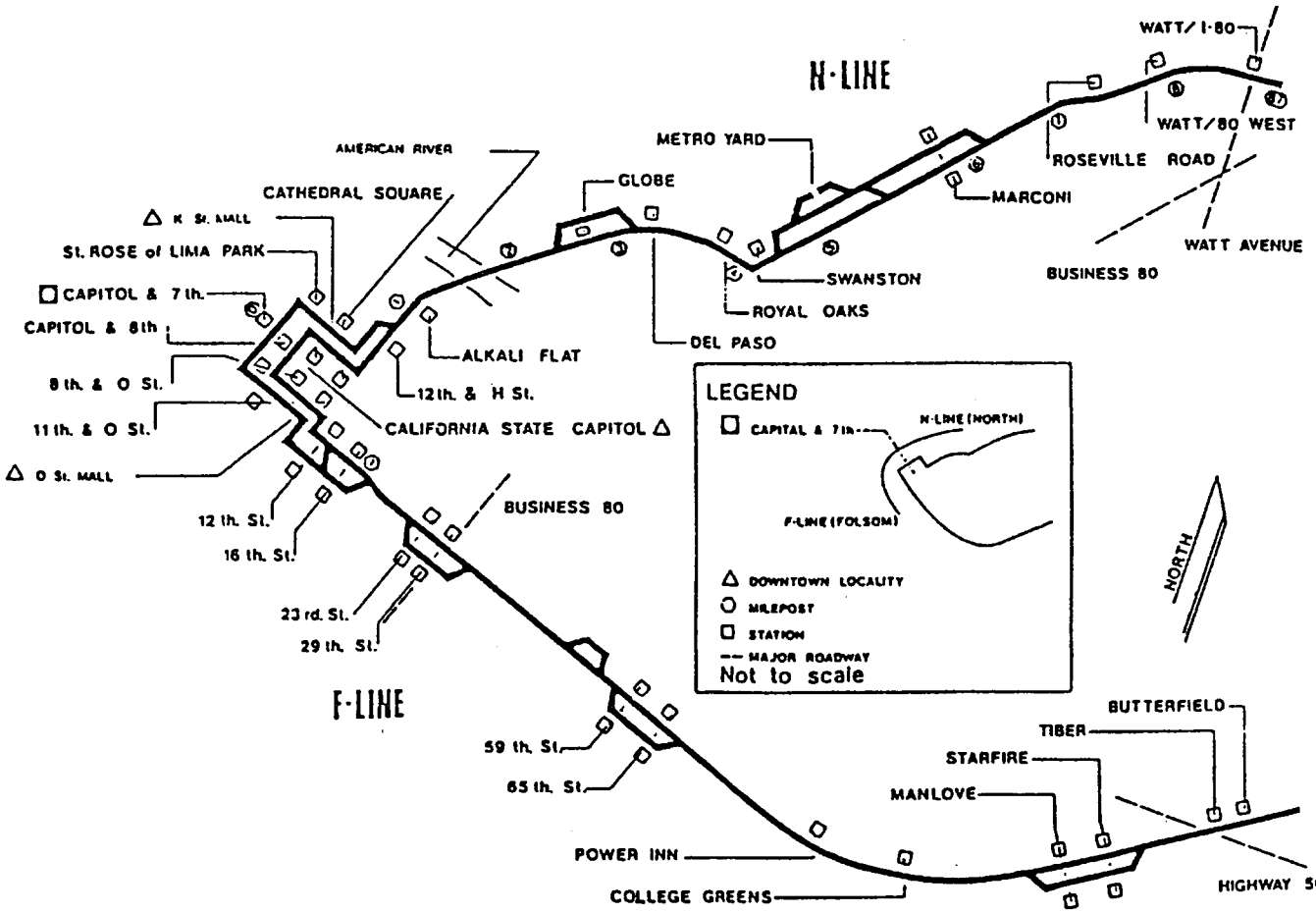
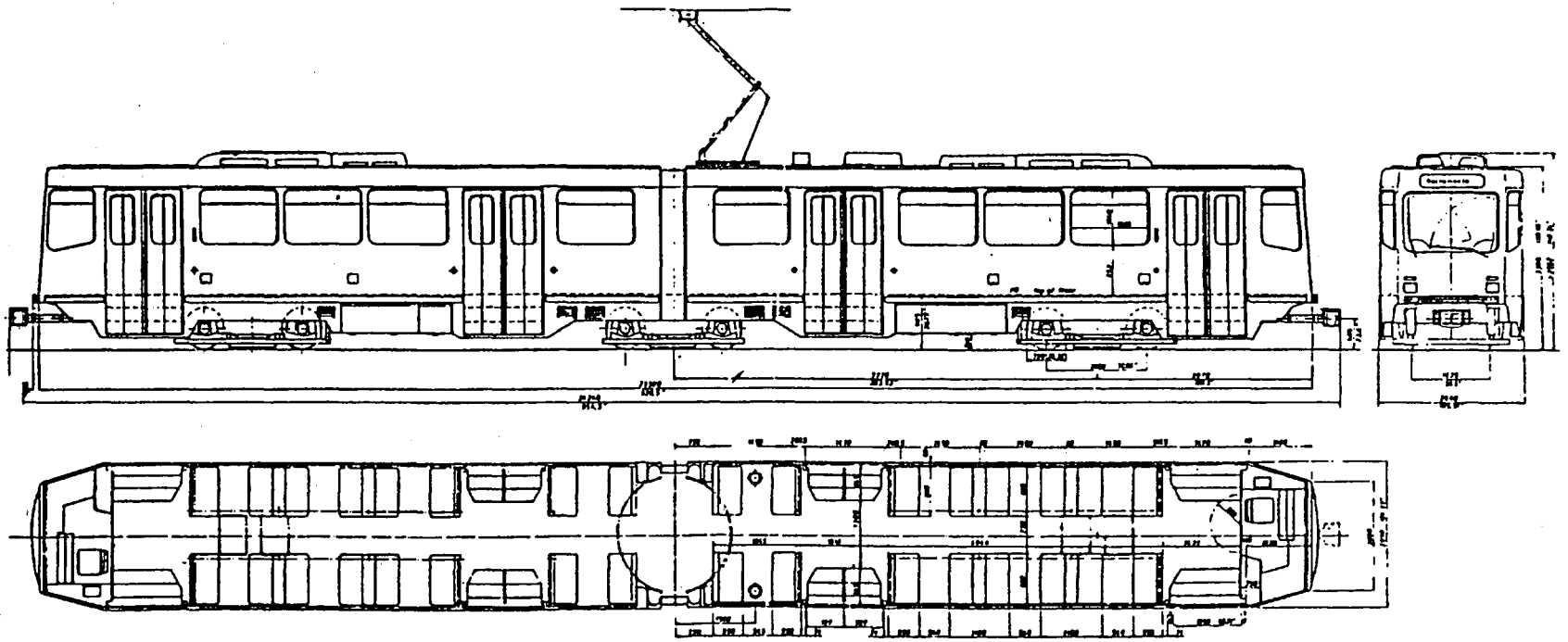


FIGURE 4 Rapid transit metro track schematic.

FIGURE 5 Typical station shelter, Alkali Flat Station.



MANUFACTURER: Siemens-Allis/Duewag
MODEL: U2A (air conditioned, tinted windows)
HEIGHT: with pantograph down 12.6FT
WIDTH: exterior 8.7FT

LENGTH: including couplers 79.6FT
WEIGHT: empty 77,800LBS
SPEED: maximum permitted.....50MPH
CAPACITY: 64 seated, 175 standing

FIGURE 6 Sacramento light rail vehicle.

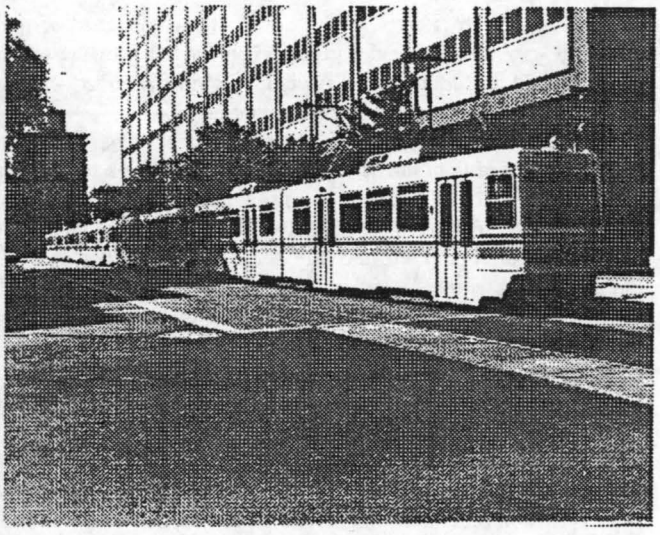


FIGURE 7 Four-car rush-hour train.

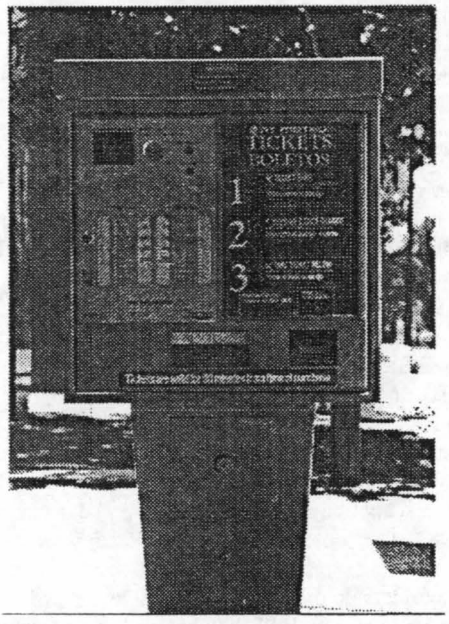


FIGURE 8 Ticket vending machine.

Express buses may serve one market well—typically, a ''one neighborhood to the CBD in the peak hour'' market—but they cannot provide the ubiquitous service that is more consistent with contemporary ''everywhere-to-everywhere'' transportation patterns, especially those of Sunbelt cities. Thus, it appears that the introduction of regional rail trunk routes and their associated bus networks may have the ironic effect of improving the quality of non-CBD transit trips. Obviously, this is a very important consideration given the dispersed nature of travel patterns in American cities. This may explain the otherwise counterintuitive phenomenon that per-capita ridership on North American transit systems seems to be positively correlated with the transfer ratio (*5*,p.381). In other words, on a systemwide basis, high patronage appears to be associated with heavy transfer traffic and with frequent local service rather than infrequent peak-hour CBD ''one-seat ride'' express buses. In this context, the introduction of transfer opportunities and the by-product of enhanced network connectivity can be seen to be a progressive service design strategy.

RESULTS

The improvement of connecting service reliability, bus-to-bus as well as bus-to-LRT, at LRT station/transit centers, has made the entire regional transit system more attractive. Total boardings increased from 13.8 million to 22.6 million, or more than 60 percent, between the last year of all-bus operations (1986–1987) and the most recent full year (1991–1992): about a 10 percent per year compounded rate of growth. Service on Sacramento's light

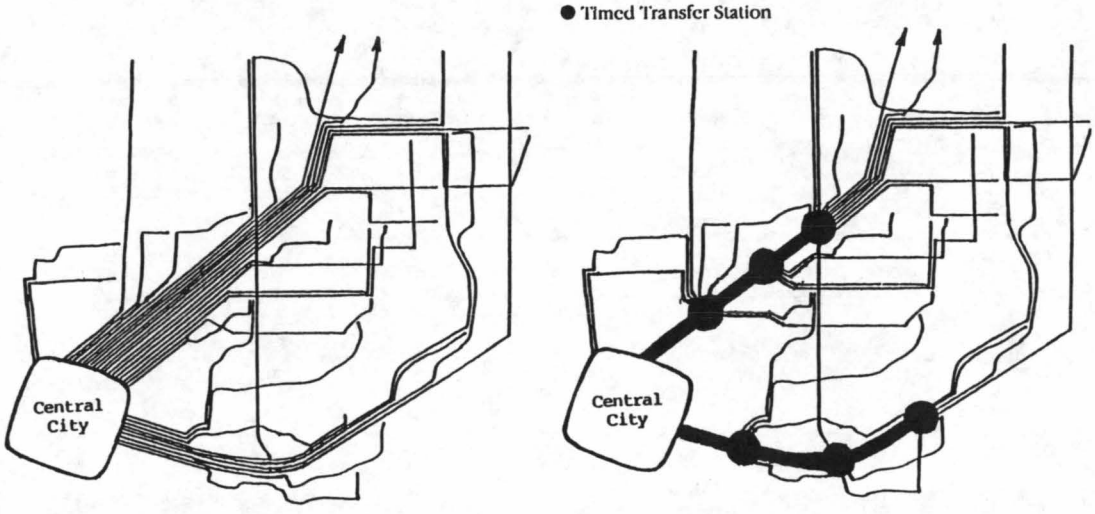


FIGURE 9 Bus/LRT service concept; northeast and east bus services before and after introduction of LRT (*courtesy of John Schumann*).

rail system was introduced in phases. The Northeast Line from Watt Avenue/I-80 Station to downtown was opened in March 1987; trains began running through to Butterfield Station on the Folsom Corridor line that September. The length of the service day was somewhat limited for the first year, and shorter service days at 30-min headways were operated on weekends. Rail/bus integration was only partly implemented.

Later, in 1988, weekend schedules were standardized and connections improved. Ridership figures in the first year fell short of the 20,500 projected in the final environmental impact statement, a fact that delighted some anti-rail groups and was quoted in reports that the Sacramento Regional Transit District still finds itself having to refute publicly.

With the final increments of service put into place in April 1989, the system reached full operational status. With the network concept in place that had been used to make the ridership projections in the first place, the line had achieved 18,000 boardings per weekday on school days and 16,000 per weekday during the summer of 1989. The projected ridership of 20,500 was achieved by 1990.

Weekday ridership on the light rail system peaked at an average of 24,500 in February 1992 but has declined somewhat in the wave of the recession and a July 1992 fare increase. In July 1993 average daily boards were 22,800, still roughly 10 percent above the final environmental impact statement projections—and this during the traditional summer patronage "trough."

The entire LRT operation is staffed by 114 people, which includes light rail administration, the Light Rail Transportation Department (train operators and supervisors), the vehicle maintenance staff, the maintenance-of-way function, and fare inspection. If the rail system were an independent operation, another 9 or 10 positions might be assigned to it, but in any event it is notable that the system carries more than one-fourth of the passenger load of the district and one-third of the passengers miles, with approximately one-sixth of the staff.

The operating budget of the system for fiscal year 1993–1994 is $7.6 million, representing approximately 13.3 percent of the budget of the district as a whole. Some of the overhead of the system is carried in other departments, but in terms of the work accomplished for the district, it is definitely more productive than the other segments of the district's operations (*6*).

Finally, in terms of public acceptance, there can be no doubt that the advent of light rail service has greatly enhanced the public acceptability of transit in Sacramento. As noted, metropolitan Sacramento has represented a superficially unfriendly environment for public transportation. Until recently, there was no local source of funding for public transportation. Parking is pervasive and usually free. Attempts to establish local tax support to maintain and enhance the transit system in the past were rebuffed by the voters. However, in November 1988 the voters of metropolitan Sacramento approved a small sales tax for the support of public transportation; this has made possible some enhancements to the system. The advent of regional light rail service in Sacramento is unquestionably a principal contribution to that public acceptance and expression of support and is the factor that has made public transportation a serious component of regional transportation planning and policy.

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