Title
Public Perceptions, Fiscal Realities, and Freeway Planning: The California Case

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The California Case

Brian D. Taylor

Focusing on plans and planning debates can obscure the critical role that public finance plays in shaping planning outcomes. This paper explores the important role of finance by examining the relationship between freeway finance and freeway planning in California since 1959. Popular perception holds that a groundswell of public opposition led politicians to abandon ambitious freeway plans in the 1970s. In California, this antifreeway movement is said to have culminated in 1975 when the state formally renounced the 1959 Freeway Plan and adopted a new "multi-modal" stance. A careful review of freeway finance, however, reveals that the freeway program was in serious decline nearly a decade before the adoption of a new state transportation policy, because California had simply run out of money to pay for an increasingly expensive freeway program.

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> I am . . . firmly convinced that the demand for good roads will not end. In fact, I expect a resurgence of freeway building in the years ahead. . . . [O]ur freeway program will have to be expanded—and soon.
>
> James A. Moe, Director of the California Department of Transportation, 1973 (Moe 1973, II-7)

> This Administration has no intention of participating in the construction of any more Cadillac-commuter systems that have very little chance of providing adequate benefits. . . . As for starting new freeways, I just do not see that happening.
>
> Donald E. Burns, California Secretary of Business and Transportation, 1975 (Quoted in Hebert 1975, I-1)

The planning and construction of metropolitan freeway systems in the 1950s and 1960s is a frequently cited example of the rational-comprehensive planning model gone awry (Lupo, Colcord, and Fowler 1971; Gakenheimer 1976; Christopher 1977; Pill 1979; Baumbach and Borah 1981; Zamora 1989). Critics point to a process where insulated and indifferent planners, concerned more with traffic flow than with communities, carved up cities with little regard for the negative social, psychological, and aesthetic effects of freeways. Many freeway projects in cities around the country engendered "freeway revolts:" intense community opposition to specific freeways that resulted, ultimately, in the "opening up" of the transportation planning process[1] (Altshuler, Womack, and Pucher 1981; Black 1990; Weiner 1992).

Because freeway revolts and increased citizen participation in the planning process resulted in the deletion of specific freeway routes and

the adoption of more multi-modal metropolitan transportation plans in the 1970s, those actions are often credited (or blamed) for dramatically curtailing freeway development. Such is the case in California, where there remains a widespread, but largely erroneous, belief that the state's freeway program was shelved by policy changes in the mid-1970s.

This perception, held by many policy makers, journalists, and planners, is that worsening air pollution, fuel shortages, and community opposition to particular freeway projects combined in the 1970s to stop freeway development in California; this antifreeway movement is said to have culminated in 1975 when the state formally renounced the 1959 *California Freeway System* plan and adopted a new "multi-modal" stance. Although state freeway plans were significantly scaled back in 1975, the idea that this planning change in and of itself stopped freeway development in California ignores the critical role of finance. The principle reason California stopped building freeways was that the freeway program began running out of money in the 1960s. The highway finance program established during the 1950s to fund ambitious plans for freeways could not keep pace with either the rapid escalation of freeway costs or the growth in vehicle travel. In addition, by choosing to ignore the incipient fiscal woes of the freeway program in the 1960s, the state legislature predetermined the outcome of subsequent debates over the merits of the *California Freeway System* plan.

This paper presents a case history of financial politics leading the planning process, by showing how freeway planning in California was halted not by policy pronouncements, but by fiscal reality. First we look at popular perceptions, and then at underlying financial facts. The following section reviews California freeway planning during the 1970s, particularly with respect to the shift in the mid-1970s from a state commitment to completing the 1959 *California Freeway System* plan, to the multimodal policies of the administration of Governor Jerry Brown. The timing of policy changes is juxtaposed, in the second section, with the trends of freeway costs and revenues from 1960 to 1990; these trends reveal a cost/revenue squeeze that curtailed new freeway development in the mid-1960s and that continues, in spite of recent increases in highway user taxes, in the 1990s.

California Repudiates Its Freeways in the 1970s

The enormous financial commitment to freeways and the widespread belief in the early 1960s that the planned freeway systems were fully funded helped found the popular perception that the rapid decline of freeway development in the late 1960s and early 1970s was due largely to shifts in policy. In California, these shifts are commonly attributed to Jerry Brown, the Democratic governor, and his Department of Transportation (Caltrans) Director Adriana Gianturco. Indeed, blaming Brown and Gianturco for the state's traffic congestion problems has become California lore. For example, 1986 reports by the California State Automobile Association on the California highway program assert that "... the state, under the Brown Administration, virtually halted its highway construction program in the as yet unfulfilled hope that mass transit would solve our urban traffic problems" (California State Automobile Association 1986, 5). "Under Governor Brown's Caltrans Director, Adriana Gianturco," the Automobile Association reports, "California abandoned planned freeways and cut back on construction. Efforts were invested in trains and high technology while the highway system languished" (Patton 1986, 29).

In the same vein, the *San Francisco Chronicle* concluded that Brown and Gianturco were largely to blame for the state's worsening traffic congestion. California's "traffic mess," the *Chronicle* claimed, was the result of "... an anti-freeway movement that reached its peak when then-governor Jerry Brown and his transportation director, Adriana Gianturco, crippled the state's freeway construction program. Californians today are paying the price for these politicians' arrogant—and naive—view that drivers could be forced out of their cars by simply not building any more freeways (*San Francisco Chronicle* 1986, P-1).

Figure 1, which juxtaposes annual freeway miles constructed and related political and planning events, reveals such interpretations of history to be more histrionic than factual. The Brown administration did in fact issue "a major policy statement" in March 1975 announcing a shift in state transportation priorities from the construction of new freeways to operational improvements of the existing freeway system and the expansion of urban public transit (Hebert 1975). But Figure 1 clearly shows that freeway development in California began a precipitous decline in 1967, seven years before Brown's election as governor and eight years before the formal shift in state transportation policy. In other words, California had stopped building freeways years before the state announced its intent to stop building freeways.

The causes of the decline of freeway construction in the 1960s, as we will see below, were primarily financial. Funding to build many new freeways simply did not exist, and the 1975 pronouncement by the Brown administration brought freeway policy and planning in line with this financial reality.

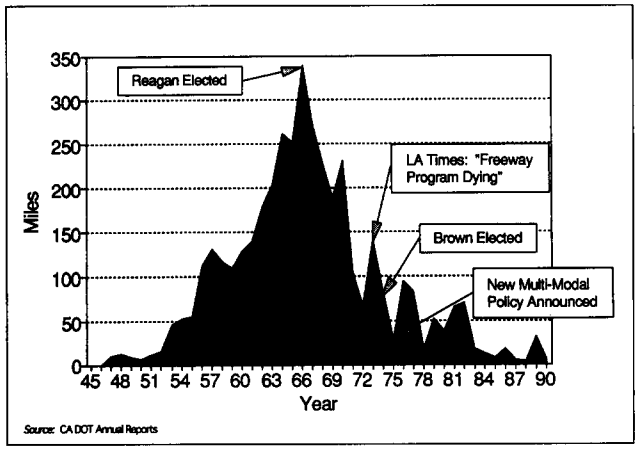

FIGURE 1. Centerline miles of freeway constructed in California

Even if the Brown Administration had announced in 1975 that the state remained committed to the 1959 freeway plan, it is unlikely that any additional miles of freeway would have been built. As we will see, to substantially reverse the decline of freeway construction in 1975 would have required an extraordinary new financial commitment to freeways; for the cost/revenue squeeze on freeway development was so severe by 1975 that even a doubling of highway revenues in the mid-1970s would not have restored freeway construction to the levels of the early 1960s.

Two years before Brown took office, the *Los Angeles Times* proclaimed the "southland's freeway program [to be] slowly dying" (Hebert 1973, I-3). Yet, despite the indisputable winding down of the California freeway program between 1966 and 1974, Brown's "balanced transportation" policies and his appointment of an urban planner (Gianturco) to implement them were the subject of ongoing partisan attacks and media criticism for having unilaterally stopped freeway development in California.

Gianturco's stormy tenure as Caltrans chief, in particular, is an example of the paradigmatic conflict between urban planning and highway engineering that has shaped metropolitan freeway development since the 1930s. Like all other state highway departments around the country, the California Division of Highways (Caltrans' predecessor agency) was created to improve the state's highway system; the Division was first and foremost a highway building organization. Its mission was narrowly drawn and its goals were product-oriented: to improve the quality and supply of highways, given the growing demand for travel. The *California Freeway System* plan had become the organization's *raison d'être* by 1959, and even as freeway funding ran short in the mid-1960s and construction was scaled back, the Division of Highways remained focused on its primary product: freeway construction.

The appointment of Adriana Gianturco—a planner and a woman—as Caltrans director was a shock to the Caltrans organizational culture, dominated by white male engineers steeped in the public works tradition of civil engineering.[2] Gianturco was an urban planner by training and trade; she had begun her career as a community development planner for an antipoverty agency in Boston and had been Director of Planning for the Massachusetts Office of Planning and Management in the early 1970s. She was at Harvard working on a PhD in urban and regional planning when Brown asked her to join his administration in 1975 (Liebert 1976).

Interestingly, critics of Gianturco's appointment seized on her urban planning credentials as evidence of her unfitness for the position. Randolph Collier, the venerable chair of the California Senate Transportation Committee, publicly opposed Gianturco's nomination on the grounds that her planning background disqualified her as state transportation director, saying "... she is not competent in this field because she is a planner...." (*Los Angeles Times* 1976, II-5).

Highway lobbyists, quite naturally, were similarly concerned about Gianturco's planning credentials. Unnamed sources told the *San Francisco Chronicle* that Gianturco was "an environmentalist who hates freeways" (Liebert 1976, 8), and a *Los Angeles Times* source concluded: "A planner is the worst kind of a person to head a state department. Their heads are in the clouds. They lack the necessary practical experience" (Gillam 1976, I-16).

Two of Gianturco's more notable critics were State Senator George Deukmejian and Mayor Pete Wilson of San Diego, the two men who later succeeded Brown as governor. On the eve of Gianturco's appointment as Caltrans Director, for example, Deukmejian expressed concern over her planning background: "Obviously, there is some concern about her ... experience, what she has or hasn't done, what she has advocated or been against" (Gillam 1976, I-16). Wilson was less cautious; in 1976 the current California governor charged that "... Ms. Gianturco has either failed to recognize the need for improved freeways or 'arrogantly' disregarded them" (*Los Angeles Times* 1977, I-3).

When George Deukmejian replaced Brown as governor in 1983, he promised that the state would return to a profreeway policy. Indeed, the California State Automobile Association claimed in 1986 that "... the state's [freeway] construction program has been resurrected under current Governor George Deukmejian...." (Patton 1986, 29). In spite of this new

profreeway policy and a renewed commitment to the *California Freeway System* plan, however, the cost/revenue squeeze in freeway finance continued and freeway construction did not rebound. In fact, more than twice as many new miles of freeway were built during the eight years of the "antifreeway" Brown administration (291 miles) as during the eight years of the "profreeway" Deukmejian administration (103 miles) (derived from California Department of Transportation 1974–1983 and California Department of Transportation 1983–1991); with no increase in funding, Deukmejian's new profreeway policies were all but irrelevant.

The intent here is neither to vindicate Brown and Gianturco, nor to imply that Ronald Reagan (Brown's predecessor) or George Deukmejian (Brown's successor) was responsible for halting freeway construction; the intent is to show that freeways were not stopped by policy shifts, by urban planners heading highway departments, or by changed plans. Freeway construction was stopped by rising costs and lagging revenues that financially squeezed the freeway program, both in California and around the country. The causes and dimensions of this financial squeeze are the subject of the next section.

The Collapse Of Freeway Finance Beginning In The 1960s

This section traces the trends of highway user taxation, freeway revenues, and freeway expenditures in California over time. First, the evolution of highway user taxes is summarized to show that the regular pattern of post-World War Two tax increases ended in 1961, when freeway plans were thought to be fully funded; no further freeway-related tax increases were enacted until the 1980s. Second, the factors contributing to rising freeway development costs are outlined. The causes of lagging revenues are then detailed, to complete the picture of the cost/revenue squeeze in freeway finance between 1960 and 1990.

Highway User Taxation in California[3]

The creation of the Highway Trust Fund in 1956 was the most significant freeway funding legislation of the 1950s, but the entire freeway funding package for California was gradually assembled, first in Sacramento and later in Washington, between 1947 and 1961. By 1961, an enormous combined state and federal financial commitment to freeways had been made. Inflation-adjusted revenues for state highways in California rose over 400 percent between 1947 and 1961, to the 1990 equivalent of over $3.5 billion per year (derived from U.S. Federal Highway Administration 1948–1962).

When the last of the freeway-related tax increases was adopted as part of the Federal Highway Act of 1961, freeway funding appeared set. The freeway system in California was growing by over 150 miles per year (nationally, freeway growth was over 2,500 miles per year) (Zettel and Shuldiner 1959; U.S. Federal Highway Administration 1959), and it appeared that the federal/state financial program of fuel taxes, vehicle fees, and other taxes was sufficient to complete both the Interstate Freeway System and the California Freeway System by 1980 (Congressional Quarterly 1964; Zettel 1959). So widespread was the belief that California freeways were adequately funded, that the only highway tax increase in California during the 1960s was made to redress the relative lack of state support for city and county roads during the 1950s. In 1963, when the state gas tax was raised by $0.01 per gallon (and most other vehicle fees by about 15 percent), *none* of the additional revenues went to the state highway program, because "... it was widely felt that balance would be restored to the total highway program by accelerated financing of local facilities" (Zettel 1980, II-8).

At first glance, such views appear well founded. While the construction of new freeways fell off in the late 1960s and 1970s, highway revenues and highway expenditures continued to rise. Figure 2 shows that the trend of revenues available for highways in California and nationwide has followed a steady upward trend since World War Two. The figure also shows that revenues for highways have been growing at an increasing rate; in California and the nation as a whole, highway revenues doubled during the 1980s. In absolute terms, revenues for highways increased more during the 1980s than during any previous decade.

The information in Figure 2 viewed alone, however, presents a misleading picture of highway finance

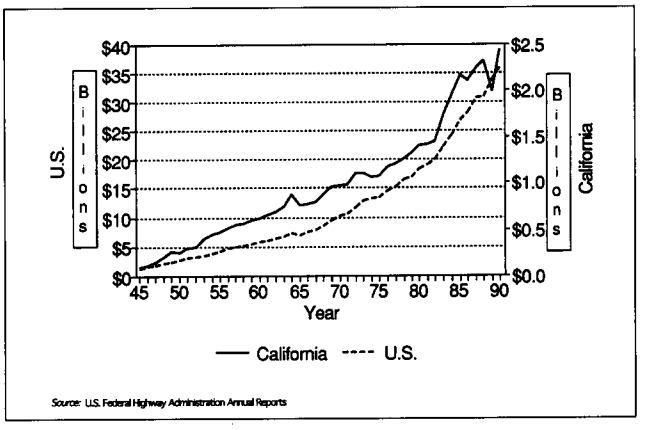

FIGURE 2. The trend of revenues for highways in unadjusted dollars: 1945 to 1990

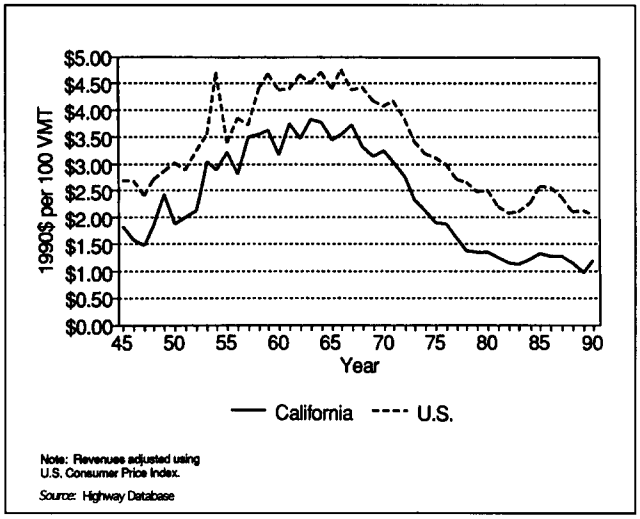

FIGURE 3. State highway revenues in 1990 dollars per 100 VMT

since 1965. It does not account for freeway revenues *vis-à-vis* those for other streets and roads; it does not account for the rising costs of highway construction and maintenance; and it does not account for the explosive growth in vehicle travel. When each of these factors is controlled for, a far different picture of highway finance emerges.

Figure 3 shows the trend of revenues for state highway programs in (CPI-adjusted) 1990 dollars per 100 vehicle-miles of travel (VMT). In contrast to Figure 2, this figure shows that adjusted state highway revenues per 100 VMT declined nationally by two-thirds between the mid-1960s and the late 1970s; in California during that period, adjusted state highway revenues dropped by three-fourths. Figure 3 also shows that adjusted state highway revenues in California have been below the national average for every year since 1945. Further, Figure 3 shows that since 1975, adjusted revenues for the state highway program in California have run at about half of the national average.

Turning to expenditures, Figure 4 shows the trend of state highway construction expenditures per 100 vehicle-miles of travel in 1990 dollars.[4] This figure shows that, in real terms, highway construction expenditures peaked nationally in 1959 and in California in 1961. Adjusted nationwide highway construction expenditures began a steady fifteen-year decline in 1964; since 1979 expenditures have remained fairly stable at about $1.00 per 100 VMT, about one-third of the 1959 peak. Figure 4 also shows that adjusted highway construction expenditures in California were substantially higher than the national average in the 1960s, then experienced a much sharper drop in the 1970s, and leveled out at a much lower level during the 1980s. California highway construction expenditures remained at or near peak levels of roughly $3.50 per 100 VMT for nearly fifteen years from 1954 to 1968; but, beginning in 1968, expenditures went into a decade-long free fall. In 1978, adjusted expenditures leveled off at about $0.50 per 100 VMT, less than one-eighth the 1961 peak and less than half the national average. In the mid-1960s, the trends shown in Figures 3 and 4 diverged from the trend in Figure 2, as rising costs and lagging revenues began to take their toll.

Rising Freeway Costs

The principal cause of the decline of freeway development was the dramatic rise in construction and maintenance costs during the 1960s, 1970s, and 1980s. Between 1960 and 1990, freeway development costs nationwide grew much faster than the general rate of inflation; freeway costs rose faster in California than in the nation as a whole, and faster in cities than in rural areas. The rapid escalation of freeway costs had four principal causes:

1. the general rise in construction and maintenance costs
2. the significant upscaling of freeway designs
3. rising urban land values that caused right-of-way costs to skyrocket
4. environmental and community concerns that increased administrative and planning costs.

Increasing Construction and Maintenance Costs. Construction costs of all kinds rose faster than the general rate of inflation between 1960 and 1990, and highway

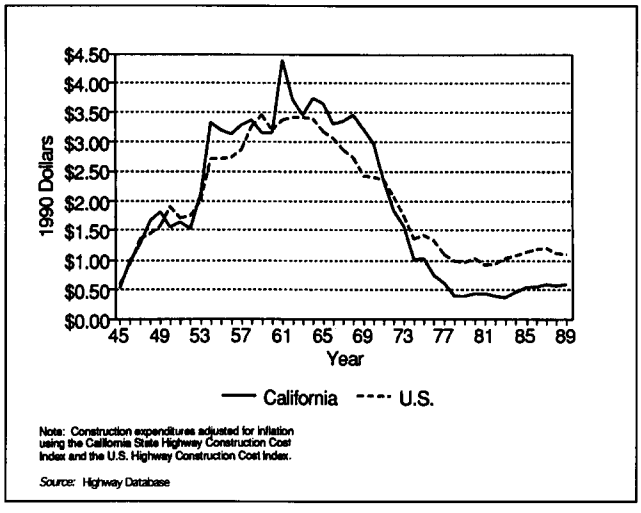

FIGURE 4. State highway construction expenditures in 1990 dollars per VMT

construction costs were no exception. The Federal Highway Administration compiles highway construction, maintenance, and operation costs into annual highway cost indices. The indices, which have been published annually for over fifty years, are calculated by averaging contractor bid prices for an "average" highway project (U.S. Federal Highway Administration 1946–1991). These indices—one for construction and one for maintenance and operations—indicate unit cost changes in construction, maintenance, or operating costs only; they do not reflect per-mile cost increases due to facility upscaling, increased right-of-way costs, or increased project planning and engineering costs. They do, however, reveal a significant increase in highway construction and maintenance costs between the 1950s and the three decades that followed. Figure 5 shows that highway construction unit costs were essentially flat during the 1950s. These inflation-free cost trends were what informed the financial planning of freeways in the late 1950s and led analysts to assume in their calculations that there would be little or no escalation in construction costs between 1959 and 1980 (Zettel 1959).

Figure 5 further shows that, beginning in the early 1960s, highway construction unit costs began to rise significantly. From the mid-1960s to the present day, highway construction unit costs nationwide have risen faster than the general rate of inflation (measured by the U.S. Consumer Price Index), and in California the rise in highway construction costs has been even more dramatic.

The reasons for the rapid increase in highway construction unit costs are the same as for the increase in all construction costs during the same period: high levels of demand for construction services, strong demand for construction materials and equipment, and high levels of unionization resulting in rapidly climbing compensation rates. Yet the rapid growth of construction unit costs was only part of the picture; only 26 percent of the increase in California freeway construction costs during the 1960s was due to increasing construction costs (California Division of Highways 1970).

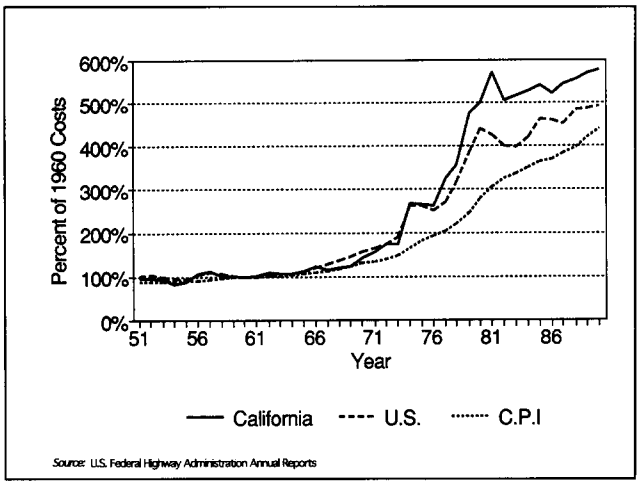

FIGURE 5. The trend of highway construction cost indices between 1950 and 1990

There was a similar, albeit more consistent, increase in maintenance and operating costs between 1960 and 1990 (derived from U.S. Federal Highway Administration 1961–1991). National highway maintenance and operating costs (no separate index is calculated for California) rose faster than the general rate of inflation, especially in the 1980s; in fact, throughout that decade maintenance and operating costs increased at a much faster rate than highway construction costs did. These increases are particularly important because maintenance costs constitute a growing proportion of total highway costs. In recent years, freeway maintenance has come to mean much more than landscaping and lane striping; as the freeways built in the 1950s reach the end of their thirty-year design lives, they require major repaving and reconstruction (Jones and Taylor 1987).

The Upscaling of Freeway Designs. Nearly half (46 percent) of the increased freeway development costs during the 1960s and 1970s was due to the upscaling of designs (California Division of Highways 1970). There were several reasons for the upscaling of freeway designs. First, the trend was toward uniform design standards. From its inception, the federal Bureau of Public Roads had encouraged states to adopt uniform standards for highways; highway safety research had repeatedly shown that consistent signage, lane striping, and roadway geometry reduced accidents. By the 1950s, the desirability of uniform design standards was a belief inculcated in the highway engineering profession; uniform standards for freeways was the adopted position of the American Association of Highway Officials and was a requirement for all facilities in the Interstate System (Gifford 1984).

The earliest freeways in Los Angeles and San Francisco were built with 55-miles-per-hour design speeds, but nearly all freeways on the Interstate system and eventually all new freeways in the California freeway system were built for 70-miles-per-hour design speeds. Because these uniform, high design speeds required substantially more right-of-way to accommodate sweeping, high-speed curves, it was more difficult to shoehorn urban freeways into built up areas without substantial displacement (Schaeffer 1992). Table 1 shows some of the orders of magnitude increases in minimum design standards for California freeways.

Most of the design standard changes were intended to improve safety, and indeed, freeways are by

TABLE 1. Some examples of the upscaling of freeway design standards

Design Feature	1955 Minimum	1985 Minimum	Difference
Left Freeway Shoulder Width	2 feet	10 feet	+400%
Right Freeway Shoulder Width	8 feet	30 feet	+275%
Urban Freeway Curve Radius	1,100 feet	3,000 feet	+173%
Left Bridge Shoulder Width	2 feet	5 feet	+150%
Rural Freeway Curve Radius	2,200 feet	5,000 feet	+127%
Right Bridge Shoulder Width	8 feet	10 feet	+25%

Source: Pivetti 1992; Schaeffer 1992.

far the safest roadways. In 1950 there were about 10 deaths per 100 million freeway miles of travel; by 1965 the fatality rate had been cut in half, to 5 per 100 million, and by 1980 it was halved again to about 2.5 per 100 million (Pivetti 1992). These improvements are dramatic and commendable, but they significantly increased the size and cost of freeways.

Other design changes, unrelated to safety, also increased the scale and cost of freeways. Cities regularly pressured the California Division of Highways to increase the number of interchanges in urban areas, to better integrate freeways with local street systems and to distribute traffic more evenly. In addition, cities also pushed the Division to add more street over- and under-crossings to allow a freer flow of traffic across freeway rights-of-way. In response, the Division reluctantly added additional interchanges and over- and under-crossings, which substantially increased project costs (Schaeffer 1992).

The slowing pace of new freeway development also encouraged the upscaling of freeway designs. As it became apparent that the extensive freeway plans developed during the 1950s might never be completed, state highway departments tried to design more and more capacity into the few remaining new routes. Design changes to improve traffic flow—more lanes, more elaborate interchanges, separated weaving sections—all increased traffic capacity and drove costs up further (Schaeffer 1992).

Skyrocketing Right-of-Way Costs. From the outset, the highway problem in cities has been largely a right-of-way problem. Virtually every early urban traffic study and transportation plan addressed the difficulty and expense of constructing or expanding urban roads in congested areas. (See, for example, McClintock 1936; Olmstead, Bartholomew, and Cheney 1924). The problem is that freeways, particularly on the urban fringe, make adjacent land more accessible and hence more valuable. Increased accessibility encourages development, which attracts traffic and raises land values further. Eventually the adjacent development reaches a density at which the freeway becomes chronically congested. Expanding the freeway, however, is extremely expensive, because the additional right-of-way required to widen a freeway is orders-of-magnitude more expensive than that acquired when the first freeway was built. As early as 1932, for example, studies showed that up to 94 percent of the cost of street widening was the purchase of additional right-of-way (McClintock 1932).

In addition, right-of-way costs for freeways built in advance of urban expansion are significantly lower than for freeways built in already developed areas. For this reason, plans for metropolitan expressways and freeways have long stressed the importance of advanced right-of-way acquisition as a cost containment strategy (Transportation Engineering Board 1939; Interregional Highway Committee 1944).

The need to purchase right-of-way in advance of development is what could be termed the freeway planners' dilemma: Metropolitan land values appreciate in anticipation of future freeway development, which in turn drives up freeway right-of-way costs. Metropolitan freeways, in other words, become victims of their own success. In the early decades of this century, metropolitan highways and arterials in California were financed largely with property taxes and special assessments. But with the collapse of financing from property taxes and special assessment districts during the Great Depression, highway planners turned exclusively to the fuel tax and other vehicle user fees for funding (Jones 1989). This user-based finance schema divorced highway finance from property-based taxation. Thus, no mechanism exists today for freeways to recover any of the appreciation they cause in suburban land values.

The right-of-way problem for freeways was confined primarily to urban and suburban areas; in rural areas, right-of-way costs were normally less than 10 percent of total project costs, but in urban areas they frequently were over half (California Division of Highways 1970). Because much of the freeway system was to be built in rapidly growing metropolitan areas, California devoted a very high proportion of the state

highway budget in the 1950s and 1960s to right-of-way acquisition (Figure 6). In 1974, for example, 69 percent of Caltrans' right-of-way acquisition expenditures were in the Los Angeles, San Diego, and San Francisco metropolitan areas alone (California Department of Transportation, Highway Planning and Research Division 1975).

Despite concerted efforts to secure freeway rights-of-way in advance of construction, right-of-way costs grew much faster than revenues did. During the 1960s, right-of-way unit costs were increasing 7 percent per year statewide, and even faster in urban areas. Fully 26 percent of all freeway development cost increases in California were due to rising right-of-way costs (California Division of Highways 1970). As funds began to run short in the early 1960s, the state chose to spend them to construct freeways on rights-of-way already in hand. The first piece of the freeway program to be cut was advance right-of-way acquisition. Beginning in 1964, California's right-of-way expenditures dropped from twice the national average per vehicle-mile of travel to slightly less than the national average in less than ten years (U.S. Federal Highway Administration 1953 to 1990). In doing that, the state abandoned its strategy of right-of-way cost containment, and future metropolitan freeway development was all but foreclosed.

New Environmental Planning Costs. Construction crews have recently completed work on the interchange between the Harbor and Century Freeways south of downtown Los Angeles. These two freeways—one built during the 1950s and the other just completed—represent the polar extremes of community and environmental planning in metropolitan freeway development.

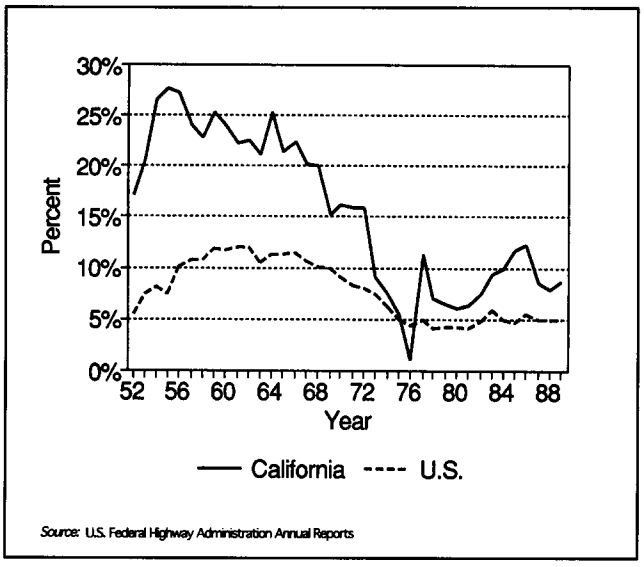

FIGURE 6. The role of right-of-way acquisition in total state highway expenditures

The Harbor Freeway connects the Pasadena Freeway in downtown Los Angeles with Los Angeles Harbor in San Pedro, twenty-three miles to the south. Construction began in the late 1940s, and the main portion of the Harbor Freeway opened to traffic in 1952 (Brodsly 1981). Construction of the freeway required substantial clearing and relocation of homes and businesses, particularly just south of downtown. Once the routing and design of the freeway were in final form, a condemnation resolution was prepared and filed with the court to allow the Division of Highways to take private property in the freeway's path and compensate the owners through the powers of eminent domain. The condemnation resolution for the Harbor Freeway was approved by the court *the day after it was filed* by the state. The following day—just two days after the resolution was filed—every piece of property on the Harbor Freeway right-of-way was posted with a fifteen-day notice to vacate. And less than three weeks after the filing of the condemnation resolution, the Division of Highways began clearing the condemned property in preparation for construction (Pivetti 1992).

In contrast to the experience with the Harbor Freeway, acquiring and clearing the land for the Century Freeway took nearly twenty years. The seventeen-mile Century Freeway runs perpendicular to the Harbor Freeway, from the Los Angeles International Airport in the west to the City of Norwalk in the east. The process of acquiring the right-of-way for the Century Freeway was nearly complete in 1972, when a coalition of area residents, environmentalists, and civil rights organizations filed suit against the state for failing to comply with environmental and relocation laws and regulations (Zamora 1989; DiMento, Baker, van Hengel, Hestermann, and Nordenstam 1991). After nearly ten years of litigation, the parties of the suit agreed to a consent decree in 1981 whereby Caltrans would, among many other things, implement a $300 million program to rebuild, relocate, or rehabilitate over half of the residential dwellings cleared for the freeway; with this agreement, the state was not merely compensating owners for the taking of property, but was assuming responsibility for directly providing displaced residents with 3,700 homes and apartments (Heppenheimer 1991).

The Century Freeway is the extreme example of cost escalation from increased environmental requirements and public participation; the delays, legal costs, additional relocation expenses, and added design requirements are estimated to have increased the project

cost from $502 million in 1977 to $2.5 billion in 1993 (Zamora 1989). Even when the effects of inflation are controlled for, the cost of the Century Freeway increased 131 percent, to nearly $150 million per mile in 1990 dollars. On most earlier projects, however, the added environmental costs were a far smaller proportion of increased costs. Most of the cost increases attributable to the new environmental requirements during the 1970s were actually due to construction delays; the environmental documentation and approval process lengthened the time required to plan a new freeway, which proved costly during periods of inflation (Pivetti 1992).

Summary of Rising Costs. In concert, these four factors—rising construction and maintenance costs, the upscaling of designs, rapidly increasing land costs, and new environmental requirements and community participation—combined to increase freeway costs dramatically between 1960 and 1980. During the 1960s, freeway development costs in California increased an average of 8.2 percent per year, which was 3.5 times the average annual inflation rate of 2.4 percent (derived from California Division of Highways 1970 and U.S. Federal Highway Administration 1961–1971). In the 1970s, partly because of the much higher rates of inflation, costs rose even faster. State highway construction expenditures in California rose from $4.1 million per mile in 1970 to $16.7 million per mile in 1980; this was an average annual increase of 12.1 percent, which was well ahead of the average 1970s inflation rate of 8.7 percent (derived from U.S. Federal Highway Administration 1981–1991).

Even when inflation rates slowed in the 1980s, freeway construction costs, particularly in urban areas, continued to rise. Figure 7, which shows the trend of construction expenditures per new mile of urban freeway, reveals an extraordinary increase: during the 1980s, freeway construction expenditures, *in constant dollars,* increased eight-fold in California (and six-fold nationally). Besides the cost escalation factors discussed above, these cost increases were due to the fact that very few urban freeway miles were being added; the few miles built in the 1980s tended to be small, expensive projects to close gaps in existing metropolitan freeway networks (Pivetti 1992).

Lagging Revenues

The increasing costs of freeway development would not necessarily have been a problem if revenues had grown proportionally. But revenues for freeway development have lagged behind increasing costs since the mid-1960s, for three principal reasons:

1. Most highway tax instruments, and particularly the gas tax, are not indexed to rising costs.

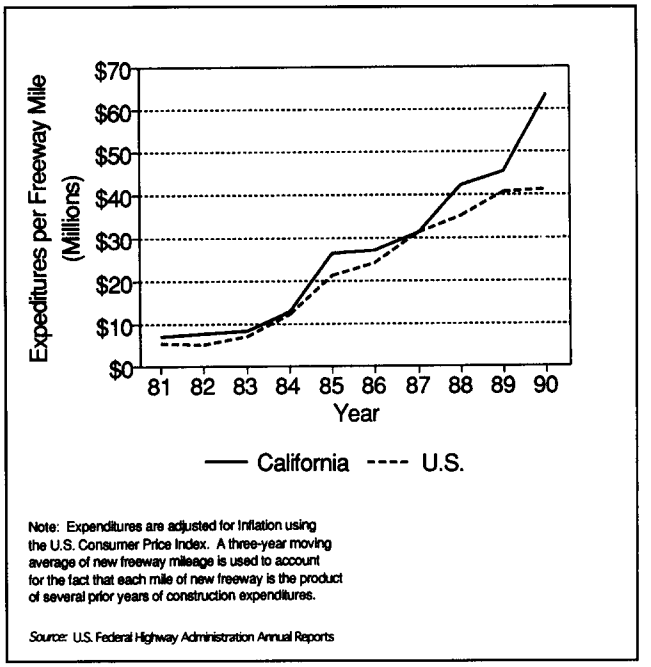

FIGURE 7. Urban freeway capital expenditures in 1990 $ per mile of new urban freeway

2. Densely populated states like California do not receive all of the federal highway revenues they generate in those states.
3. Increasing vehicle fuel efficiency has caused gas tax revenues to lag behind the growth in vehicle travel.

Taxes Fail to Pace Increasing Costs. Most taxes, such as those on income, property, and sales, produce increasing revenues during periods of high inflation. This is not the case, however, for motor fuel taxes, whose revenues increase or decrease only with the volume of fuel sold. To keep pace with rising costs, per-gallon fuel taxes must be increased periodically. In California, periodic increases were the norm from the initiation of the fuel tax in 1923 through the early 1960s. Between 1947 and 1963, the state gas tax was increased six times and the federal gas tax three times, a total of nine tax increases during an era of relatively low inflation. After 1963, however, neither the state nor the federal gas tax was changed for almost twenty years, until in 1982 the federal tax was raised a nickel and the state tax two cents (U.S. Federal Highway Administration 1986b).

Since 1970, the state gas tax in California has fallen well below the national average, and particularly so during the 1980s. Despite his stated profreeway policy stance, Governor Deukmejian steadfastly opposed legislative proposals to increase the gas tax during his two terms in office, and by 1990 the California gas tax had fallen to just 56 percent of the national

average. California voters approved a nickel increase in 1990, with an additional penny increase each year for the following four years. Even with this substantial increase, however, the current (1994) state gas tax is still 17 percent below the weighted national average.

The result of having no gas tax increases in an era of rapidly increasing costs is shown in Figure 8, which compares the small growth in the combined federal/state gas tax in California between 1960 and 1990 with the extraordinary increases in highway construction unit costs over the same period. This figure is a stark demonstration that the rapid inflation of the 1970s caused the per-gallon gas tax to fail as a reliable mechanism for financing highways. Without some mechanism to index revenues to rising costs—such as a special sales tax on fuel or a per-gallon tax rate indexed to consumer or highway construction prices—it would have taken substantial annual increases in the gas tax throughout the 1970s to maintain the 1960s pace of new freeway construction.

Rapidly increasing highway construction costs during the 1970s were not unique to California, and some states restructured gas taxes in the late 1970s and early 1980s to try to link them more closely to rising costs. Between 1977 and 1985, eleven states and the District of Columbia each adopted some form of variable rate mechanism for the state gas tax (U.S. Federal Highway Administration 1986b).[5] Eight of the twelve variable-rate states replaced the per-gallon gas tax with a special sales tax earmarked for highway expenditures; two states indexed the per-gallon tax to the combined U.S. Highway Construction and Maintenance Cost Indices; one linked the per-gallon tax to the Consumer Price Index; and one state adjusted the per-gallon tax to a combination of fuel sale prices and the highway cost index (Bowman and Mikesell 1985).

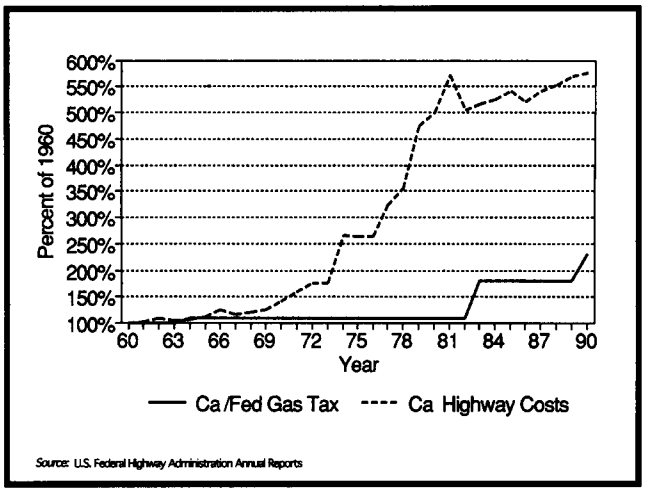

FIGURE 8. Growth of highway construction costs and the combined gas tax in California

Although the indexed fuel taxes have raised highway revenues in proportion to rising costs, they have not been popular with voters. Thus, despite their obvious advantages, four of the twelve jurisdictions—Arizona, Indiana, New Mexico, and Washington—have repealed them and returned to a standard per-gallon tax (U.S. Federal Highway Administration 1991). The unpopularity of "automatic tax increases" has discouraged other states, such as California, from adopting indexed fuel taxes; no new indexed state gas taxes have been adopted since 1985.

Rural Bias of the Federal Highway Program. The rural, intercity emphasis of the federal highway program means that federal highway taxes are collected disproportionally in urban areas and expended disproportionally in rural areas. Thus, relatively urbanized states with high levels of vehicle use—such as California—contribute more in federal highway user revenues than they receive in federal highway appropriations. Largely rural states like Montana, on the other hand, receive far more in federal highway funds than highway users in the state contribute in federal taxes. Since the Highway Trust Fund was created in 1956, highway users in Montana have paid $1.0 billion into the fund, while the state has received $2.6 billion in federal highway appropriations (derived from U. S. Federal Highway Administration 1957–1991).

California, on the other hand, is by far the largest "donor" state to the federal highway program. Over the years, California has received about $0.89 in federal highway appropriations for every $1.00 in federal taxes paid by the state's highway users, a differential that amounted to $2.7 billion between 1956 and 1990 (derived from U.S. Federal Highway Administration 1957–1991). This differential is larger than the entire 35-year cost of the federal highway program in Montana.

Although the proportion of federal highway taxes "donated" by California to other states has declined somewhat over the years, California still has benefited the least of all states from its participation in the federal highway program, contributing more per dollar of federal highway appropriations than any other state has.

The Vehicle Travel/Fuel Use Gap. Since 1960, vehicle travel both in California and around the country has more than tripled. But this trend in vehicle travel contrasts sharply with the trends in motor fuel consumption during the same period. During the 1950s, when state and federal freeway financing began, motor fuel consumption was increasing at an annual rate of just under 5 percent nationally, and about 5.5 percent per

year in California (derived from U.S. Federal Highway Administration 1951–1961). But in the 1970s, two fuel shortages broke the long post-World War Two pattern of increased fuel consumption, and gas tax revenues fell accordingly. Motor fuel tax revenues declined as a result of the fuel shocks; however, those declines were matched—in the short term—by corresponding declines in travel.

Perhaps the most significant effect of the 1970s fuel shortages was to prompt consumers to look for more fuel-efficient vehicles and to spur the passage of the Energy Policy and Conservation Act of 1975, which required that the fuel efficiency of each automobile company's fleet of new cars increase from 14.2 miles per gallon in 1974 to 27.5 miles per gallon by 1985. In the early 1970s, vehicles in California and around the United States averaged about 12 miles per gallon. Since then, the average national fleet mileage has increased to over 16 miles per gallon. The fuel efficiency of California's vehicle fleet, however, has improved more than that of the nation as a whole; by 1990, the vehicle fleet in California averaged about a mile and a half more per gallon (17.4) than the fifty-state average (16.1) (derived from U.S. Federal Highway Administration 1967–1991).[6]

As a result of these federally mandated improvements in fuel economy, the rise in fuel consumption tapered off considerably during the 1980s. Moreover, because the California vehicle fleet is more fuel efficient than the national average, the divergence of actual fuel consumption from early freeway finance projections has been even more pronounced in California. Figure 9 compares the difference between actual motor fuel consumption during the 1970s and 1980s, and the levels of fuel consumption projected for these decades by the Bureau of Public Roads in 1955 and the California Division of Highways in 1958. The figure shows that the compound effect of these projections was a significant overestimate of fuel consumption during the 1980s; by 1990, actual fuel use in California was about half of the 1959 projections.

The diverging trends of vehicle travel and of fuel use have created a widening revenue gap both nationally and in California. Because vehicle fuel efficiency is higher in California, however, the gap between vehicle travel and fuel use is wider there. This vehicle travel/fuel use gap has serious implications for highway finance, since it means the gas tax no longer keeps pace with the growth in vehicle travel. Thus, just as freeway costs were skyrocketing during the 1970s, gas tax revenues, which were about half of all highway revenues, began to falter.

The Cost/Revenue Squeeze. These, then, are the components of the cost/revenue squeeze in freeway finance. Rising construction unit costs, upscaling of freeway designs, rapidly inflating right-of-way costs, increasing maintenance load, and expanding environmental costs have been squeezed by revenue sources not indexed to rising costs. Furthermore, California's status as a "donor state" in federal highway finance, combined with the growing vehicle travel/fuel use gap in the 1970s, brought freeway development to a virtual halt in California.

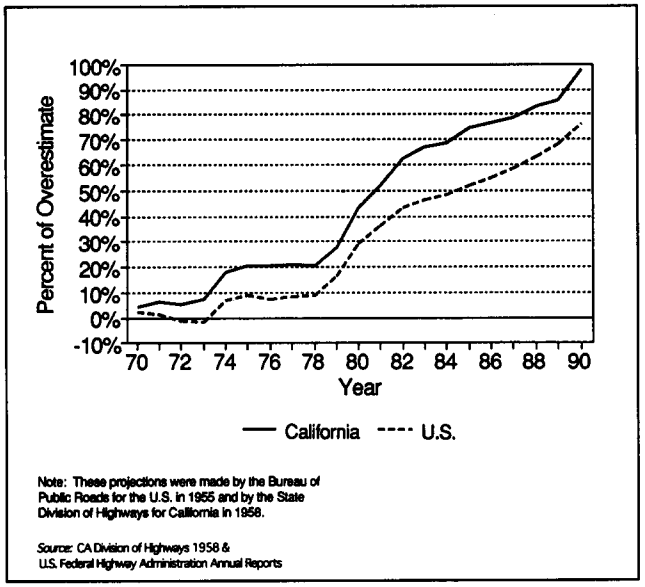

FIGURE 9. Difference between projected and actual fuel consumption: 1970–1990

Conclusion

Individual freeway revolts and debates over the *California Freeway System* plan attracted substantial public attention in the 1970s, but they were not principally responsible for curtailing freeway construction in California. Annulment of the *California Freeway System* plan had occurred several years earlier when the governor and state legislature chose to ignore the collapse of the freeway finance program and instead to adopt a large new subsidy program for public transit. In 1971, California created the largest state transit subsidy program in the country, dedicating 0.25 percent of the state sales tax to public transportation (Taylor 1991).

This dramatic shift in fiscal priorities in 1971—from freeways to public transit—was not accompanied, at the time, by a shift in state freeway plans. But by neglecting the fiscal woes of the freeway program beginning in the mid-1960s, the governor and the state legislature effectively killed the 1959 *California Freeway System* plan and rendered moot any subsequent debates over freeway policy and planning. In

other words, financial politics led the freeway planning process. Even if the Brown administration had announced in 1975 that the state remained committed to implementing the 1959 *California Freeway System* plan, it is likely that few, if any, additional miles of freeway would have been built. To substantially reverse the decline of freeway construction in 1975 would have required an extraordinary new financial commitment to freeways; by then the cost/revenue squeeze on freeway development was so severe that even a doubling of highway revenues would not have restored freeway construction to the levels of the early 1960s.

From the very beginning, urban freeway projects that displaced homes and businesses provoked controversy and local opposition (Zettel and Shuldiner 1959). And as metropolitan freeway development expanded in the 1960s, the level of popular opposition to specific freeway projects increased. By the early 1970s in California, the State Transportation Commission was periodically deleting controversial route segments from the state freeway plan. It is unlikely, however, that the deletion of controversial freeways—such as the Beverly Hills Freeway in Los Angeles or the Pacific Coast Freeway in San Francisco—reduced the total mileage of freeways eventually constructed. Only 7 percent of the unconstructed freeway routes that remained in the *California Freeway System* plan in 1975 were actually built by 1990 (derived from California Division of Highways 1958; California Department of Transportation, Highway Planning and Research Division 1975; California Department of Transportation 1991).

While the scale of public transit subsidy adopted in 1971 was far smaller than what would have been needed to appreciably revive freeway construction in California, it did divert legislative attention and largesse from restructuring highway finance. Freeways were left to make do on a finance package that had appeared generous in the 1950s, but that proved to be inadequate just a few years later.

In June 1990, however, the voters of California agreed to raise the state gas tax nine cents per gallon by 1994, to support new freeway construction and improved road maintenance. The day after the election, the *Los Angeles Times* declared that "California voters, often trend-setters for the nation, have sent a new message with their decision to double the state gasoline taxes—they now are willing to raise certain taxes to remedy a critical problem" (Ellis and Redburn 1990, I-1).

Voter intent may be clear, but it is unlikely, given the magnitude of the cost/revenue squeeze in freeway finance, that a nine-cent-per-gallon increase in the state gas tax will "remedy" the "critical problem" of urban traffic congestion in California.[7] The additional funds will be used to close some gaps in the existing freeway system and to expand the capacity of some aging freeways, but no major new freeway projects are on the horizon in California.

Overlooking the central role that finance plays in shaping planning outcomes is particularly common in historical analyses of urban transportation policy (Jones 1985; Cohen 1991). The consequences of this underemphasis are critical, not just for planning historians, but for all planners. Effective planning and policymaking depends in part on a clear understanding of past planning and policymaking. For example, if metropolitan freeway development in California had simply been curtailed by a policy shift in the 1970s, then it could be restored with another policy shift in the 1990s. If, however, metropolitan freeway finance is structurally problematic independent of popular opposition to freeways, then the option of freeway-oriented policy shift as a strategy to reduce metropolitan traffic congestion may be foreclosed. Short of road pricing, toll financing, or some other radical restructuring of highway finance, planners in the 1990s must rely on those transportation improvements—such as improved traffic flow on streets and arterials, land uses and facilities that ease bicycling and walking, and increased management and pricing of parking—that are both less dramatic and less costly than the immense metropolitan freeway plans of the 1950s.

NOTES

1. Freeway revolts have erupted in a wide array of cities over the years, including Atlanta, Boston, Denver, Los Angeles, Miami, New Orleans, New York, Portland, Reno, San Francisco, and Tucson.
2. Gianturco's tenure as Caltrans chief was a shock to the Caltrans organizational culture that remained years after her departure. For example, funding shortfalls forced Caltrans to begin laying off engineers in 1970, and by the time of Gianturco's arrival in 1976, the department's engineering staff had already been reduced to one-third of the 1968 peak of over 9,000 engineers. From this 1976 low point, the size of the engineering staff *increased* by half (to over 4,000 engineers) during Gianturco's directorship. Yet, despite the fact that the layoffs preceded Gianturco's arrival by six years and that staffing actually increased during her tenure, a 1986 survey of over 2,000 Caltrans engineers found that many blamed Gianturco for slowing freeway development by reducing the size of the Caltrans workforce (Jones and Taylor 1987).
3. The Federal Highway Administration has compiled ex-

tensive highway data in the annual *Highway Statistics* report, but the data are organized by funding program (such as Federal Aid Primary, Interstate, state highways, county roads, and so on) and not by highway facility type (such as freeways, other highways, local streets, etc.). Extensive data are available on the freeway-only Interstate System, but Interstates comprise only a portion of all freeway mileage; in California, for example, over 40 percent of the freeway mileage is not part of the Interstate System.

Where complete freeway data are not available, state highway department data are used as a proxy. Such data provide a fair indicator of freeway development activity, because nearly all urban and rural freeways in the U.S. were designed and built by state highway departments, and eighty to ninety percent of highway department activity during the 1950s and 1960s was devoted to constructing freeways (Schaeffer 1992).

4. In this analysis, construction expenditures are adjusted using the U.S. and California Highway Construction Cost Indices published, respectively, by the Federal Highway Administration and Caltrans.
5. The eleven states adopting indexed fuel taxes were Arizona, Indiana, Kansas, Kentucky, Massachusetts, Nebraska, New Mexico, Ohio, Rhode Island, Washington, and Wisconsin.
6. Total fleetwide mileage is substantially lower than federal mandates for a number of reasons: It takes several years for higher-mileage vehicles to phase into the vehicle fleet; vehicles actually perform more poorly than the initial EPA estimates predict; trucks and buses pull down fleetwide averages; and fuel is lost to in-vehicle evaporation.
7. Contrary to common perception, the Intermodal Surface Transportation and Efficiency Act of 1991 (ISTEA) does not appreciably increase federal funding for transportation. The significant piece of federal transportation legislation of the 1990s, the ISTEA does substantially increase state and regional discretion in the use of federal funds earmarked for transportation, but does little to alter the sources and amounts of transportation revenues.

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