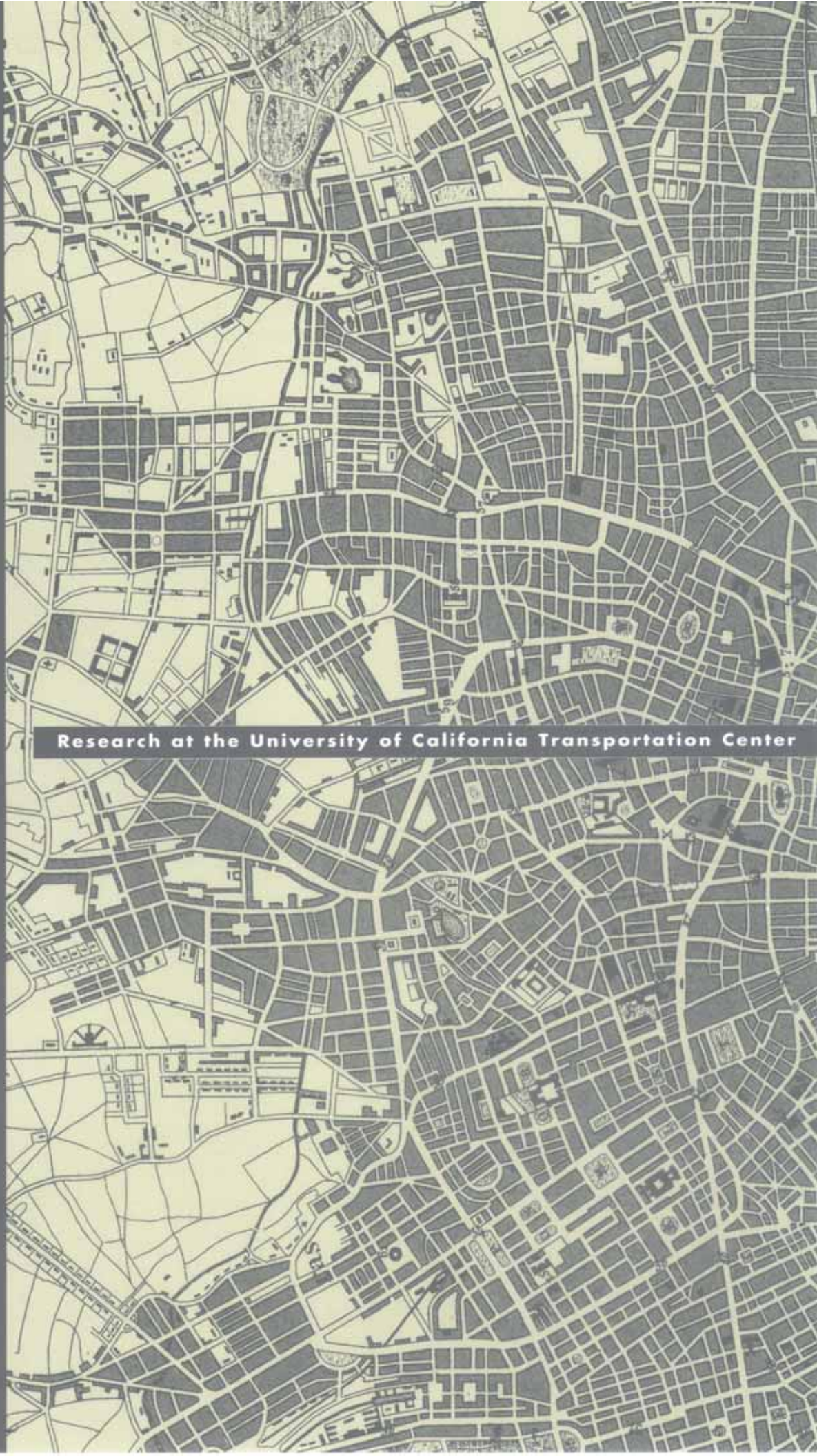


TRANSPORTATION



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Several years ago, I commuted to work on BART, traveling from Oakland's Rockridge station to downtown San Francisco. Although I could have used another station closer to my Berkeley home, I preferred Rockridge, with its bustling commerce, well-lit sidewalks, and village-like atmosphere. It seemed that the neighborhood's residents had easy access to everything: a variety of restaurants, a library, supermarkets and specialty gourmet shops, health clubs, bookstores, professional offices, and, perhaps most significantly, buses and BART.

I know Rockridge isn't perfect, but it seems to exemplify how a community can benefit from proximity to transportation facilities. Indeed, many planners believe that the ramifications of building a transit line in one area may extend far beyond providing transportation service. They say a transit stop may stimulate construction of housing and retail and office buildings, ultimately boosting the local economy and invigorating civic activity. For people without cars, the availability of transit can transform their lives, if it supplies their means of accessing schools, jobs, and basic necessities.

Transportation systems seem to do more than just move people from one place to another. Some say an ideal transportation system can generate new land use patterns, revitalize urban centers, and create vibrant, pedestrian-oriented neighborhoods like Rockridge. Transforming our inner cities in those ways would raise the living standards of low-income urban dwellers.

But if transportation infrastructure can accomplish these feats, why have so many well-intended efforts failed?

Anastasia Loukaitou-Sideris and Tridib Banerjee contemplate this question after examining the Blue Line route between Long Beach and downtown Los Angeles. Planners had expected the light-rail line to trigger upscale urban development around stations. But the researchers instead found empty fields, dilapidated buildings, and classical inner-city urban decay. So, they ask, what went wrong? Their review seeks to identify the missing elements that prevent transit-based development.

In a parallel review of LA's Century Freeway, Joseph DiMento, Drusilla van Hengel, and Sherry Ryan looked at the effects of a public-interest lawsuit on the road's three-decade-long development process. The litigation required state and local officials to submit detailed environmental impact reports and required highway builders to construct housing for those displaced by the freeway. Today, construction of transportation infrastructure requires consideration of affected residents' civil rights, which should minimize potential harm to poor, often powerless, communities.

Undeterred by past failures, Michael Bernick explores the prospects for rail-induced subcenters at BART station sites — "tran-

sit villages," he calls them — especially at an inner-city Oakland station. He acknowledges that BART has so far failed to fulfill its promise to induce such transit villages. The lesson to be learned, he suggests, is that active institutional engagement must accompany increased access for the land market to respond.

Recognizing the link between transportation and access to food, Robert Gottlieb and Andrew Fisher propose using transit services as a means to help low-income residents obtain adequate nutrition. They say that both grocers and transportation agencies can improve living standards for those without cars, by bringing shoppers to stores and delivering groceries to homes. Once again, they demonstrate that good transportation is both essential to urban life and a critical contributor to human welfare.

Restating a question that Peter Hall and Adib Kanafani asked in a debate in the Spring 1994 edition of *ACCESS*, David Levinson asks whether high-speed trains can compete with airlines in California's intermetropolitan corridor. He and his Berkeley colleagues conducted a detailed analysis of the various costs associated with the competing modes and conclude that the train can't beat the plane, either in speed or economics. However systematic and rigorous their analysis, their findings alone won't resolve the continuing debates surrounding high-speed rail. But they must surely be accounted in those deliberations.

While most transportation improvements generate heated debate, the Freeway Service Patrol in California — a fleet of 270 tow trucks that patrol roadways and clear traffic incidents — has so far enjoyed unanimous praise. Robert L. Bertini reports on this state- and municipal-sponsored program that effectively aids motorists — free of charge. The tow trucks are so effective in reducing incident-caused delay that they've been dubbed the Guardian Angels of the Freeways.

Between 1960 and 1990, the number of US households without cars declined to only 9.2 percent. Richard Crepeau and Charles Lave seek to identify the typical carless household and to learn how well its members get around. They find that the mobility of people without cars relates to their location, employment, income, sex, education, and especially age. Overall, people without cars are substantially less mobile: 46 percent of all adults in carless households took no trips on a sample day, compared with 21 percent in the general population.

Their findings suggest to me that, if transit villages or Rockridge centers really can happen, perhaps they'd offer people without cars the easiest access to desired destinations. Perhaps they'd provide satisfying homesites for those who are housebound — as well as for people like me.

— *Luci Yamamoto*
Editor



THERE'S NO THERE THERE

*Or Why Neighborhoods
Don't Readily Develop Near
Light-Rail Transit Stations*

BY ANASTASIA LOUKAITOU-SIDERIS
AND TRIDIB BANERJEE

In 1990 Los Angeles inaugurated the Blue Line amidst much fanfare as the first increment of a long-awaited light-rail system. The rail line connects downtown Los Angeles to Long Beach, traversing twenty-two miles of the poorest and most neglected neighborhoods in South Central Los Angeles. After six years, ridership has risen significantly, but areas around stations remain unchanged — disinvested, forsaken, and decaying — denying planners' dreams of transit villages and depriving surrounding communities of their hopes for a better economic future.

Gertrude Stein's cutting line about the lack of "there" in Oakland is even more appropriate to the Blue Line corridor. Four essential ingredients are missing: the sheer presence of people and activities near stations, a robust local economy, sustained institutional and political commitment, and neighborhood amenities that might entice investors to locate here. The absence of these attributes reflects the widening chasm between romantic visions of New Urbanism and the messy realities of inner-city life and politics.

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Transit Corridor Planning

A fundamental tradeoff in metropolitan rail transit planning pits cost versus ridership. To locate a rail line through existing concentrations of activities and populations may make for numerous riders, but it also makes for higher costs of easements and capital improvements. It may also mean slower speeds, if trains must run on city streets regulated by traffic signals. So transit planners tend to select existing railroad lines, preferably abandoned ones, usually at the margins of built-up areas and away from activity centers. They can thus reduce cost and duration of construction and afford longer routes, while keeping travel times competitive with other alternative modes. But old rail alignments no longer match current riders' origins and destinations or come near contemporary concentrations of people and activities, especially in Los Angeles. Unlike cities of the East, LA's land use patterns are the legacy of automobile-based, not railroad-based, transportation systems. Hence they are marked by spatial dispersion and comparatively fewer subcenters.

In the short run, old railroad rights-of-way may be financially feasible and politically expedient. But at present, developments there are unlikely to improve the mobility or accessibility of those who most need services. In the absence of sustained public investment, they are also unlikely to turn transit systems into catalysts for economic development and neighborhood improvement.

Blue Line's location is a case in point. The alignment was chosen by the political leaders of the county and city of Los Angeles. They saw linking the downtowns of Los Angeles and Long Beach as an important first step toward a region-wide rail-transit network throughout the Los Angeles metropolis. Once voters

approved Proposition A in 1980, rail-transit advocates sought to get a rail project built as cheaply and quickly as possible. They hoped thus to become a legitimate candidate for future federal and state funds, and to show that Los Angeles can deliver rail transit.

The existing Pacific Electric track that ran through the industrial corridor between Los Angeles and Long Beach provided a golden opportunity from the standpoint of economy and expediency. Paradoxically, however, the alignment was incompatible with the Centers Concept Plan, the only extant policy directive for Los Angeles's future growth. LA's answer to critics of its dispersed urban form was to try to induce a hierarchy of urban subcenters connected and induced by transit links (See Figure 1).

It seemed not to matter that Pacific Electric's alignment had seen its day long ago and that it now passed through vast segments of "urban wilderness," abandoned areas that contain only industrial warehouses, toxic waste dumps, industrial backlots, storage yards, and the like. Although improving access, mobility, and the economic potential of inner-city poor people drove much of the rhetoric underlying Blue Line planning, the rail has so far delivered very little to these groups. During the past six years there has been almost no visible improvement or development in the neighborhoods around most stations. The prospect of station neighborhoods with a mix of residential and commercial services remains a dream. >

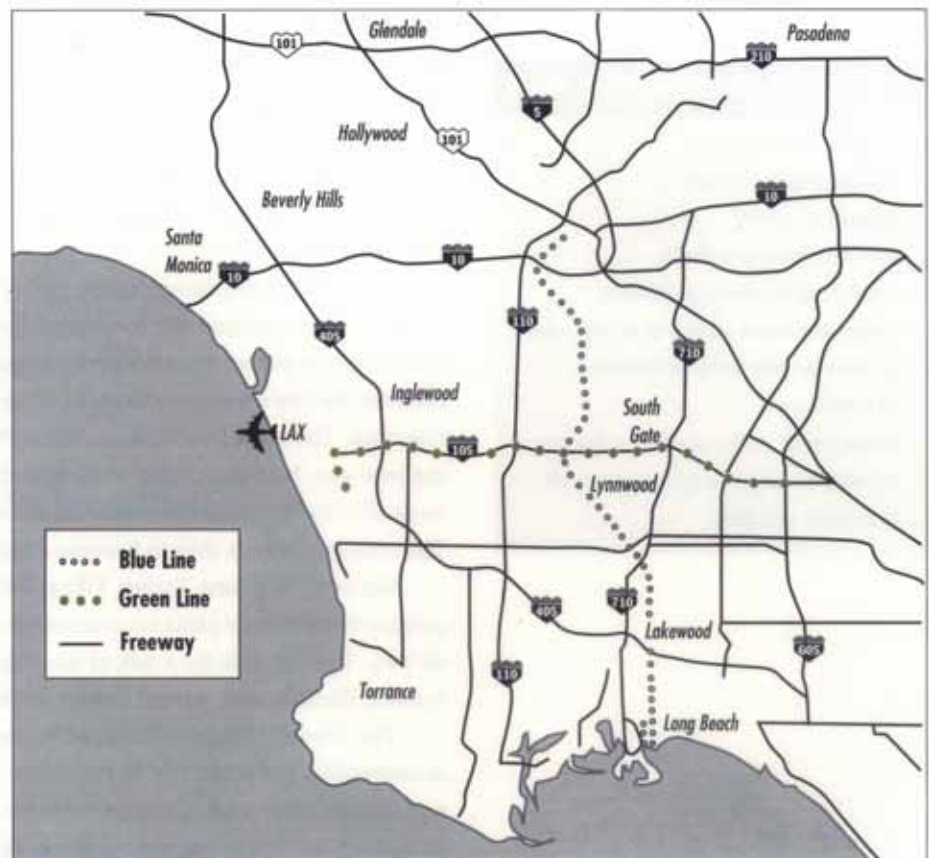


FIGURE 1
Major Freeways and Light-Rail Transit Lines in Los Angeles

“While the elementary school was the focus of Clarence Perry’s classic neighborhood unit plan of the 1930s, the rail-transit stop is expected to become the new symbolic and geographic center.”

LAND USE-TRANSPORTATION POLICY GOALS

- enhance transit options
- increase transit ridership
- improve air quality
- distribute housing equitably
- expand employment opportunities
- concentrate future growth at station areas
- promote private-sector development at station areas
- design transit station areas as pedestrian-oriented, mixed-use neighborhoods with open-space amenities

Popular Notions of Transit Village and New Urbanism

In recent years city planners and transit officials have promoted the idea of using rail-transit stations as instruments of development. Since 1990, much-touted design guidelines have sought to shape transit-oriented development in the city of San Diego and in Sacramento County. Other cities have followed suit. In 1993 the city of Los Angeles and the Metropolitan Transit Authority formulated guiding principles for station-area development. In 1994 the California Legislature enacted a Transit Village Bill promoting such planning efforts.

A transit-oriented-development (TOD), as defined by Peter Calthorpe, a leading proponent of New Urbanism, is a mixed-use community, typically within a quarter-mile radius of a rail station and its adjacent commercial neighbors. The design, configuration, and mix of buildings and activities emphasize pedestrian-oriented environments and encourage use of public transportation, while accepting the presence of automobiles. While the elementary school was the focus of Clarence Perry’s classic neighborhood unit plan of the 1930s, the rail-transit stop is expected to become the new symbolic and geographic center.

New Urbanism advertises an alternative to automobile-generated urban sprawl by promoting compact city settings and lifestyles that are not dependent solely on cars. TOD policies envision villages surrounding transit stops with mixed-use commercial areas containing retail shops and offices. Larger core areas might combine major supermarkets, restaurants, entertainment outlets, and light-industry factories. A variety of housing types — small-lot single-family homes, townhouses, condominiums, and apartments — should promote denser neighborhoods than in typical suburban settings. Urban open spaces should furnish focal points for community activity. Streets should be settings for social interaction and active community life, not just means for efficient circulation of cars. Transit centers should have wide sidewalks, street trees, and seating. Building frontages, setbacks, and entries should shelter and augment pedestrian-friendly settings.

The Land Use-Transportation Policy formally adopted by the Los Angeles City Council centers around the concept of Transit-Oriented Districts. Planners and politicians hope to attract transit-friendly populations to areas around stations and to concentrate the city’s new growth there, in hopes of improving these areas and increasing ridership. The Land Use-Transportation Policy states a long-term strategy for integrating land use, housing, transportation, and environmental policies toward the development of a city form that complements and maximizes use of the region’s transit system. The transit system is thus to become a major instrument for civic betterment.

Similarly, the State Transit Village Bill authorizes California cities and counties to prepare transit village plans encompassing areas within a quarter-mile radius of each transit stop. The Bill calls for a mix of housing types and other land uses, such as day-care centers, libraries, and a retail district oriented to each transit station.

The Transit Village is designed to support a socially amicable neighborhood that is convenient and attractive to residents, workers, shoppers, and visitors. Pedestrian and bicycle links to transit stops are to be supplemented by connections to other public and private transportation services. The Bill’s authors expect transit-village development to be especially appropriate for depressed inner-city neighborhoods.

Blue Line Station Neighborhoods

Despite all these well-intended proposals for station-area development, residents in the Blue Line's environs have yet to enjoy economic growth or physical improvement. It is certainly plausible to attribute market nonresponse to economic recession, downturn in the real estate market, the 1992 riots, or other external causes. However, our analysis leads us to conclude that the problem is more fundamental than that.

First, the station areas are basically devoid of any significant concentration of population or activities. Density at some stations increases as one moves away from transit stops.

Second, most station areas lack any of the minimal physical amenities intrinsic to neighborhood livability. Parks, playgrounds, convenience stores, specialty businesses, and restaurants are conspicuously absent. Inner-city residents instead must endure the presence of unwanted elements such as billboards, liquor stores, electric transmission lines, and other obtrusive features in their residential areas.

Third, station areas show signs of abandonment and disinvestment. Public infrastructure is poorly maintained or serviced. Images of barbed-wire, chain-link fences, trash, and graffiti dominate the urban landscape, reflecting what some call the "broken window syndrome."

Fourth, the above conditions are exacerbated (if not partly caused) by high crime rates and negative perceptions of these areas. A broken window left unrepaired sends a signal that social services are inadequate, making it more likely for potential criminals to prey on residents and properties.

Fifth, in addition to — and despite — poor market appeal, the property value around stations and in South Central Los Angeles remains relatively high. This paradox, which contributes to the absence of investors, is the likely consequence of transportation improvements recently completed or forthcoming in this area: the 105 Freeway, the Green Line, double-decking of the the 110 Freeway, and the proposed Alameda Corridor development. Paralleling our own research, two other studies commissioned by the MTA

and the Los Angeles Planning Department are pessimistic about development near transit stations, at least in the short run.

The first study reports three types of feasibility gaps: (1) projects located near Blue Line stations fail to "pencil out" because projected revenues will not sustain an acceptable rate of return; (2) it is extremely difficult and costly to assemble lots for a project site because the corridor includes a multitude of small lots and absentee land owners; and (3) prospective house buyers often cannot meet credit requirements stipulated by most housing programs.

The second study finds that even assuming improved market conditions the rates of return on private investment fail to compete with other investment opportunities. Projected returns improve, however, with below-market interest and land writedown, in combination with fee mitigation and expedited approvals.

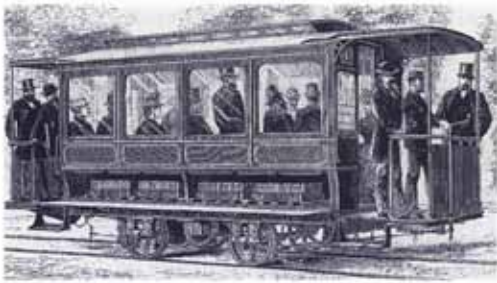
Weak Public Initiative

It is reasonable to conclude, then, that investors are unlikely to invest in redeveloping these decaying districts unless enticed by incentives. As with the early urban renewal programs, government must assume a proactive role if transit-oriented developments are to emerge. Among potentially effective public actions, we suggest land assembly by transit or redevelopment agencies, financial subsidies and incentives such as low-interest loans, tax-exempt financing, land writedowns, financing of improvements, and rent subsidies.

Are rail transit agencies willing to invest in risky inner-city projects? So far, the answer for the Blue Line is clearly no. Strong public initiatives and commitments for restructuring development patterns at stations have been absent. >



A Blue Line station's neighbor.



Initiatives by localities have been lukewarm at best. The responsible transit agency has not been able to pursue an aggressive policy of land purchasing or development around the stations. As a result, it now holds only thirty acres in station areas. Prospects of village-type developments remain dubious, given MTA's limited land holdings and its reluctance or inability to undertake large-scale ventures given its current fiscal constraints. The agency's priorities have been guided by the political exigency of developing other lines in the metropolitan region rather than trying to make this one work better.

The Fallacy of Visions

The presumption of transit-induced development — deeply rooted in many planners' visions of ideal community form and in the legacy of streetcar suburbs — does not seem to apply to inner-city neighborhoods. The New Urbanists' romantic image of a transformed inner city stands in stark contrast with the decay, unemployment, poverty, and crime that characterize these neighborhoods.

A transit system cannot by its mere presence catalyze miracles in the inner city. In that sense the notion of the modern transit village will remain a bourgeois utopia unless strong political and institutional commitments are made.

It takes more than urban-design guidelines and rail lines to create an inner-city transit neighborhood. It takes sustained institutional commitment, political will, a viable local economy, community participation, and substantial financial support to override the major obstacles that confront development there. Unfortunately for the Blue Line's low-income neighborhoods, those necessary qualities are not yet there there. ♦

FURTHER READING

Tridib Banerjee and William Baer, *Beyond the Neighborhood Unit: Residential Environments and Public Policy* (New York: Plenum, 1964).

Michael Bernick and Jason Munkres, "Designing Transit Based Communities," (Berkeley: Institute of Urban and Regional Development, Working Paper 581, 1992).

Peter Calthorpe and Associates, *Design Guidelines/Final Public Review Draft for Sacramento County Planning Community Development Department*, 1990.

City of Los Angeles Planning Department, *Land Use/Transportation Policy for the City of Los Angeles and the Los Angeles County Metropolitan Transportation Authority*, 1993.

Cordoba Corporation, *Land Use/Transportation Policy Feasibility Analysis and Recommendations for Implementation* (prepared for Los Angeles Metropolitan Transportation Authority and City of Los Angeles Planning Department), 1993.

Anastasia Loukaitou-Sideris and Tridib Banerjee, "Form Follows Transit? The Blue Line Corridor's Development Potentials," 1994. UCTC No. 259.

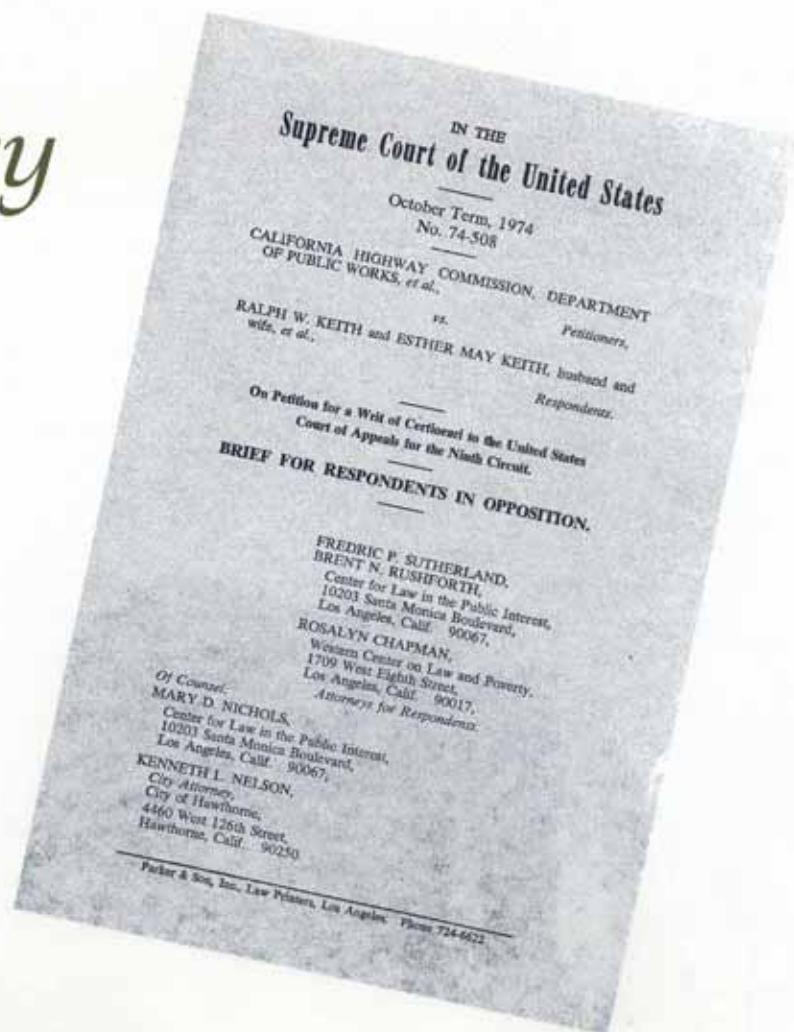
Meza and Madrid Development, Inc., *Blue Line Affordable Housing Study* (prepared for Los Angeles Metropolitan Transportation Authority), 1991.

James Q. Wilson and J.Q. Kelling, "Broken Windows: The Police and Neighborhood Safety," *Atlantic Monthly*, Vol. 29, 1993.

The Century Freeway:

Design by
Court Decree

BY JOSEPH DIMENTO,
DRUSILLA VAN HENGEL,
AND SHERRY RYAN



When the Century Freeway opened in October 1993 after three decades in the making — the product of intensive civic conflict, and advertized as the world's most costly road at over \$100 million per mile — it was indeed an achievement of the century. Ultimately it was far more than a mere road. It also became a community development enterprise, an environmental improvement program, a housing project, and a legal precedent that may well shape all future freeway construction. To assess its significance we've been examining the record and interviewing the participants, and we will now summarize our findings. >

Joseph DiMento is professor of urban and regional planning; Drusilla van Hengel is a post-doctoral researcher in social ecology; Sherry Ryan is a graduate student in transportation science; all at the University of California, Irvine, CA 92717 (jfdiment@uci.edu).



EVOLUTION OF THE CENTURY FREEWAY

As originally planned, the Century Freeway was to run east to west from San Bernardino to the then-proposed Pacific Coast Freeway west of the Los Angeles International Airport (LAX). It was to be another link within a grid-like automobile network across LA, designed to assure that no Angeleno would live more than three miles from a freeway (see map on page 3).

In 1959 engineers deleted the eastern thirty-four miles of the route in favor of a seventeen-mile stretch from LAX to the San Gabriel Freeway. Originally the freeway was to be a ten-lane facility of mixed flow lanes with twenty interchanges serving ten municipalities. The project was to be completed by 1977 after a five-year construction period. But little went as planned. It was dubbed at various stages as the "last urban freeway" and the "world's most expensive road."

EARLY OPPOSITION

Almost from inception, the Century was controversial. It resembled other freeways conceived, planned, or built during that time — a turbulent era of social activism and revolutionary regulatory law, including statutes mandating environmental protection. Highway agencies, such as the venerable California Department of Transportation (Caltrans), were troubled by the Arab oil embargo, high inflation, and the resulting volatile gasoline prices, reduced investments in state highway construction, and departmental personnel cutbacks.

Opposition to the Century came almost immediately. The city of Norwalk fought successfully to eliminate 1.5 miles of roadway east to the Santa Ana Freeway (I-5), which many transportation planners considered a natural junction. At the other end of the proposed freeway, Inglewood succeeded in having the western portion of the freeway moved to its south to bisect the central business district of Hawthorne. Then Hawthorne authorities refused to sign a freeway agreement for this route, forcing realignment to skirt both cities' borders.

As the concept of environmental impact assessment emerged, officials in 1969 engaged Gruen Associates to identify the adopted freeway alignment's effects on the surrounding community. But by the early 1970s — despite a successful referendum opposing the road sponsored by the "Freeway Fighters," an activist group in Hawthorne, and other protests — most cities had executed freeway agreements.

CIVIL RIGHTS AND ENVIRONMENTAL OBSTACLES

On March 3, 1970, Esther Keith, a resident of the corridor, locked her front door and refused to let the right-of-way agent

from the Division of Highways enter her home. Her attitude reflected many other residents' and foreshadowed a significant change in the freeway construction process.

One month before the scheduled groundbreaking in February 1972, the Center for Law in the Public Interest filed a federal lawsuit on behalf of the Keiths, three other couples living within the proposed right-of-way, and several national civil rights and environmental organizations. This suit, *Keith v. Volpe*, sought an injunction to prevent the state from acquiring property until environmental impact statements were approved. The complaint also alleged inadequate relocation assistance, denial of equal protection to minorities and low-income corridor residents, inadequate public hearings, and violation of due process.

US District Court Judge Harry Pregerson ordered the government to refrain from evicting anyone living along the route of the proposed freeway and from instituting any new acquisition proceedings other than those involving volunteer relocation or those necessary to protect public health and safety. By then 55 percent of the needed parcels had been acquired and 35 percent had been cleared. This ruling halted freeway construction for the next seven years, inducing deterioration in abandoned neighborhoods.

Further uncertainty followed changes in political administration. In December 1975, Governor Jerry Brown suggested that the facility be reduced to four lanes, reinforcing his opposition to major new freeways in Los Angeles. President Carter issued his Urban and Regional Policy, which defined transportation as an incentive program to leverage public and private urban revitalization for economic, environmental, and social goals. Against this backdrop, those who opposed the Century Freeway's existing plan had an advantage. But the corridor cities themselves insisted that the full ten-lane facility be constructed.

In 1979 the plaintiffs and Caltrans reached an initial agreement recorded in a consent decree. But the Century remained in controversy because the parties had different definitions of a consent decree (a judicially-sanctioned agreement that contains elements of both contract and injunction) and because it was unclear whether the decree derived its force from the original court ruling or from the agreement between the parties themselves. In this case, the decree reflected a strong federal court judge's persistent efforts to implement the freeway in the best interests of corridor residents.

The consent decree, a very unusual approach to freeway implementation, has been closely followed as a means of incorporating community and environmental considerations in highway building elsewhere. It provided for participation by the >

Center for Law in the Public Interest, a federal judge, an affirmative action watchdog committee, a designated advocate for displaced residents, the state housing agency, Caltrans, and FHWA.

Two and a half years later, the court and parties approved an amended consent decree, stating that the project would have six lanes for general traffic; two HOV lanes; a median busway not wider than 64 feet, convertible to light rail; metered ramps; and new construction of 3700 housing units.

The decree mandated several innovative, unprecedented elements for an interstate highway project. First, it established an Office of the Advocate for Corridor Residents responsible for representing persons displaced by the freeway.

Second, it created an ambitious housing program headed by the State Department of Housing and Community Development, with 4200 units planned. By the time 50 percent of freeway construction contracts were awarded, at least 30 percent of the housing units were to be available for occupancy. For the first time, a project used federal

highway funds to assist not only people actually displaced by the freeway, but also to restock the supply in communities that lost housing through right-of-way acquisition.

Third, the decree formed a 60-member Housing Advisory Committee that consulted and assisted the Project Director and held public hearings on the Housing Plan.

Fourth, it began the Century Freeway Affirmative Action Committee, a group comprising community activists and the parties, which monitored and enforced affirmative action requirements. It set employment goals for minorities and women and oversaw contractor compliance and an apprenticeship program for prospective construction workers.

The consent decree saved the Century from the fate of other urban freeways that were terminated during this period: the Westway, the I-40 through Overton Park, the Vieux Carre. Some think it accomplished even more by encouraging enlightened transportation planning, implementing a freeway in response to the needs of all relevant par-

ties. An October 14, 1979, *Los Angeles Times* editorial opined: "The benefits, we think, eventually will extend well beyond the narrow Century corridor to all highway and transportation projects around the country. The real meaning of the Century project is that the good old ways are gone."

But other observers believe the Century experience should never be repeated — that the consent decree process made it the most expensive urban freeway of the time. (The Boston Artery probably holds that dubious distinction today.) Critics say the suit and consent decree allowed for meddling in transportation affairs by people who, despite good intentions, crippled the project. Indeed, a decade later the *Times* published an extensive expose on how the sensitive project was actually not very sensitively implemented.

THE CENTURY'S BENEFITS AND COSTS

With the important exception of local elected officials, the majority of officials interviewed think that the Century's benefits outweigh its costs.

TABLE 1
Evolution of Century Freeway Project:
Actual Project versus EIR-based
and Comparison Projects

	1974 EIR	1977 EIR	COMPARISON	ACTUAL
Year of Groundbreaking	1975	1978	1979	1982
Number of Construction Projects	*	"	~20	>80
Year Route to Open	1980	1985	1987	1993
Bell Shape in Hawthorne	No	Yes	Yes	Yes
Number of Mixed Flow Lanes	10	8	8	6
Number of HOV Lanes	0	2	2	2
Mass Transit	Yes (future busway)	Yes (future busway)	Yes (future busway)	Yes (concurrent rail)
Number of Interchanges	>20	"	16	10
Median Width	64'	40'	84'	64'
Cost	-\$579 million	\$611 million	"	\$2.04 billion

* Indicates this issue was not addressed.

But were benefits superior to what they may have been without the extraordinary legal resolution? To determine the impact of the consent decree on the project, we created an alternative development scenario (Comparison Project in Table 1) in the absence of the consent decree that accounted for the period's major changes in environmental law and transportation regulation.

PERCEPTIONS OF OFFICIALS: COSTS AND BENEFITS BY CATEGORY

State transportation officials perceived that both the actual and the alternative project would have net positive environmental impacts. Local officials perceived both projects to have net negative environmental impacts.

The two levels of government also viewed the housing programs differently: Local officials regarded the actual freeway's housing program as the lesser of two evils. They thought both the actual and alternative projects diminished affordable housing supply and local housing supply and did not adequately mitigate the loss of units taken in the right-of-way acquisition. The goals of the consent decree — to avoid depleting the housing stock in affected communities — did not satisfy them.

Caltrans officials perceived the actual freeway as positively affecting local housing supply and local affordable-housing supply, and viewed the alternative project as having negative effects.

Both local officials and Caltrans officials were generally dissatisfied with the consent decree's transportation effects. They judged congestion on parallel arterials, other area freeways, and other surface streets, and the overall movement of goods and people through the corridor as worse under the actual project.

Still, most of the Caltrans staff we interviewed, while disapproving any reduction in lanes and local interchanges, perceived the construction of the freeway mandated by the consent decree to be good public policy. The decree allowed the road to be constructed. Caltrans officials predicted inadequate service associated with downscaling the freeway but concluded that "six lanes are better than nothing."

Local officials believed that the relatively small number of local interchanges limited opportunities for economic growth at subcenters near interchanges. Although the decree required access to LAX, there remains no direct link to the airport. Travelers use other roads or take a bus.

In contrast, all groups surveyed unanimously acknowledged the positive effects of the consent decree for all intended beneficiaries of the affirmative action provisions.

Many Caltrans officials, who initially viewed the consent decree as a threat to the department's autonomy, appear to have eventually acknowledged the decree's value. Local officials, on the other hand, perhaps because they were neither official parties to the lawsuit nor active participants in crafting the decree, rejected the notion that the consent decree was a necessary key to building a "sensitive freeway."

CORRIDOR RESIDENTS: USERS AND NON USERS

Ultimately the true measure of a transportation system's success is reflected in its actual use. It's no surprise that the Century is widely used: ADT is 162,000 to 200,000 on the eastern portion; 215,000 in the center; and 110,000 to 168,000 in the west. The Green Line, a light-rail system that runs for twenty miles along the freeway median, averages 15,000 trips on week days and half that number on weekends. >



Century Freeway with Green Line and station in the median.

Nonetheless, many more people initially intended to use the facility than do so today. Before and after the Century Freeway opened, we surveyed corridor residents about their travel behavior. Seventy-six percent of those who intended to use the mixed-flow lanes for nonwork trips actually use the lanes. Of the very small number of those who intended to use the carpool lanes for work trips, only a quarter of them are actually doing so.

A notable number of respondents have changed their route, destination, or mode choice. Almost 35 percent said they changed their route to work after the freeway opened; 8 percent changed their shopping location; and just over one in ten now carpools on the Century Freeway.

Why have so many chosen not to use the facility? The three most commonly cited reasons:

- (1) It does not go where people normally go for work and for other trips.
- (2) There are alternative means for reaching a destination.
- (3) People are concerned about crime on the Green Line transit system.

Regarding transit crime, over half of those who have actually used the Green Line found it free from crime and assessed its safety much more positively than those who did not use the line. Still, the number of actual users is small: 80 percent of corridor respondents reported that they never use the Green Line.

For nonwork trips, mean travel time did not change but the change for work trips was rather dramatic. Although we can say little about carpoolers since so few participated in our study, solo drivers cut their travel time by four minutes. However, South Central residents who live in the least favorable economic and social conditions in the corridor, did not share the travel-time savings realized by their neighbors to the east and west.

MUNICIPALITIES: LAND USE POLICY INFLUENCE

Anticipating booming development around interchanges and transit stations predicted by some experts, a few cities had big plans linked to the Century, including mammoth entertainment, sports, and mixed-use complexes. But our interviews and analyses of plans and zoning found the Century's overall influence on land use policy to be modest. Cities recognize possible future benefits from the facility: Their general plans discuss related policy tools, such as redevelopment powers or zoning ordinance changes, in fostering corridor development. But general plan statements about the Century remain broad and overarching, suggesting that policymakers prefer watchful waiting.

Zoning changes were mixed. Within one mile of the Century, four cities deintensified their zoning, two cities intensified zoning, and one city made no change. Of all the zoning changes that did occur in that vicinity, about a third involved new residential designations.

CONCLUSION

The Century Freeway emerged from conflict-ridden beginnings to become one of the first freeways governed by a consent decree. Today the policymakers who conceived it, the engineers who designed it, the people displaced by it, and the drivers who use it, have reached different verdicts on its benefits and costs.

Certain differences will no doubt recede into history. Opponents of the Century will recognize its usefulness; proponents will see its failure to deliver all benefits promised. People will try the Green Line and adapt to rail travel. Interfreeway HOVs will become less intimidating — and more attractive as ADT builds. Modest additional transit-oriented development may sprout up. Debates over housing types and affirmative-action beneficiaries will be forgotten. The lavish landscape mitigation requirements will become commonplace.

But when the decision-making process involves a wide range of parties, like those involved with the Century, full consensus will remain elusive. Any urban freeway will only emphasize divergent versions of ideal community development in the United States. ♦

FURTHER READING

Joseph DiMento, Jace Baker, Robert Detlefson, Drusilla van Hengel, Dean Hestermann, and Brenda Nordenstam, "Court Intervention, the Consent Decree, and The Century Freeway," Research Technical Agreement, Caltrans, No. F89CN62, RTA-54J273, 1991.

Joseph DiMento, Brenda Nordenstam, Dean Hestermann, and Drusilla van Hengel, "Regional Projects/Local Concerns: Urban Freeways, Citizen Participation and Community," Final Report, Haynes Foundation, University of California, Irvine, 1992.

Dean Hestermann, Joseph F. DiMento, Drusilla van Hengel, and Brenda Nordenstam, "Impacts of a Consent Decree on 'The Last Urban Freeway': Interstate 105 in Los Angeles County," *Transportation Research A*, Vol. 27A, No. 4, 1993, pp. 299-313.

Drusilla van Hengel, "Citizens Near the Path of Least Resistance: Travel Behavior of Century Freeway Corridor Residents," Ph.D. Dissertation, University of California, Irvine, 1996.

Transit Villages:

Tools for Revitalizing the Inner City

BY MICHAEL BERNICK



The Bay Area Rapid Transit system (BART) helped pioneer the development of metropolitan rail transit around the country. But did it accomplish all original goals? The initial 1956 plan primarily aimed to save old city centers and reorganize sprawling suburbs by inducing subcenters there. Spaced about 2.5 miles apart, station stops were to become points of high accessibility that would attract high-density residences, retail shops, and office employers. By reshaping the land market through transit-induced access, BART's planners sought to reshape the metropolis and to eliminate traffic congestion.

It's now been twenty-four years since BART began carrying passengers. Downtown San Francisco has been expanding, no doubt nurtured by four busy stations under Market Street; and downtown Oakland has held its own, with two subway stations at the system's transept. But the suburbs and urban areas outside central business districts have not changed very much. Despite huge public investment in enhanced accessibility at specific suburban station sites, improvements have been minimal. And traffic congestion remains as troublesome as before.

Part of the reason for suburban recalcitrance lies in the high-level of accessibility provided by the auto-highway system.

BART's added access represents only a small proportional addition, even where congestion is severe. The linear geometry of the rail lines means that few origins and destinations are near stations, so most people continue to use autos. Several local neighborhood groups opposed multi-family housing near stations. Aggressive governmental programs were absent in most towns along the lines. Equally important, BART managers saw themselves as railroad people, not land developers, and thus did little to encourage private-sector construction near stations.

Until recent years, BART officers focused on getting the railroad to run on time. Now that the machinery is working well, >

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**Parking lots and empty streets
around Fruitvale station.**



the Board of Directors and staff are turning their attention to the neighborhoods surrounding rail-transit stations. They have already successfully encouraged builders to construct medium-density housing at some stations. Now they are seeking to use BART as the key instrument for redeveloping a deteriorating inner-city station site by creating a viable transit village there.

The Fruitvale Transit Village

BART's routes radiate out from the city centers in San Francisco and Oakland through inner-city districts that are experiencing the familiar patterns of demographic change and physical deterioration. En route to the suburban stations between San Leandro and Fremont, BART runs through East Oakland's older neighborhoods, including Fruitvale, with its ethnically diverse population, many with low incomes.

Ever since the area was settled over a hundred years ago, East Oakland's main transport and retail corridor has been East 14th Street. During the 1950s and even up through the 1960s its junction with the Fruitvale Avenue was the site of a vibrant commercial center. It was therefore a natural choice for a BART station stop.

However, in a classic case of urban economic decline, East Bay malls then opened in suburban San Leandro and Hayward and drew consumers away from East 14th Street and the Fruitvale center. Various anti-poverty plans were devised to revitalize the area, with no serious results. As Clyde Brewer, a Fruitvale store owner for eighteen years, recently stated, "You and I and twenty of our friends could retire on the money that has been spent studying this area — with no visible effect."

By 1993, the Fruitvale station area had become a series of parking lots and dilapidated buildings. The BART station is immediately surrounded by two surface parking lots. Most of the view from the station toward East 14th Street displays the backs of buildings. Nearby on East 14th Street, there are two discount shoe stores, a Mexican fast-food restaurant, a discount furniture store, and several empty storefronts.

In 1991 the Spanish-Speaking Unity Council (SSUC), a local community group headed by a former HUD official, Arabella Martinez, called for a neighborhood revitalization effort. Using Fruitvale's main asset, the nearby BART station, as their primary tool,



Designer's vision for the Fruitvale transit village.

they sought to spur new development. To jump-start the process, they staged a design symposium. Five prominent Bay Area architectural firms volunteered to collaborate with local residents in preparing and presenting different concepts for station-area improvement.

They jointly concluded that conditions commonly viewed as liabilities — sterile parking lots, dilapidated buildings, vacant parcels — can over time be turned into economic assets. They debated whether housing should be concentrated in one sector or spread throughout the area. They considered whether parking should be placed between BART and East 14th Street as inducement to shopping along the commercial street. They devoted much attention to finding ways of rebuilding the business base of East 14th Street and the immediate station area.

The Council then engaged Ernesto Vasquez of the Costa Mesa-based firm of McLarand-Vasquez as site designer. During the next two years Vasquez met with the stakeholders: existing business owners on nearby East 14th Street, Fruitvale residents, and officials from BART and the city of Oakland, the two largest landowners in the area. Their collaboration has produced a transit-village plan that pursues several social goals, including promoting local entrepreneurship, employment of local residents, greater home-ownership, and increased BART patronage.

Housing will be the main component of the transit village. More than 500 units will be built in the area, primarily as second and third floor flats above shops. The spatial distribution of housing should create a 24-hour presence, avoiding an empty plaza after business hours.

Small shops in an open-air mercado will bring both commuters and local residents to the shopping center, marked by a Hispanic theme.

Cultural and entertainment elements, including a Mexican Museum and a Latin-American library, will attract Hispanic residents and encourage multiethnic participation.

Open space, a public plaza, and a walkway lined with palm trees along East 14th Street will provide a venue for public events.

Public safety will be assured by encouraging "eyes on the street" and by locating a police station within the transit village. >

Beyond these elements, the envisioned Fruitvale transit village includes a child-care center, a health-care center, a senior center, and senior housing. The entire development will cost an estimated \$100 million. So far, Ms. Martinez has raised \$23 million from a variety of public sources (FTA, HUD, HHS) and private foundations (Hewlett, Irvine, Ford). Construction on the first phase, the 68-unit senior-housing project and a day-care center, will start by the end of this year.

Transit and Inner City Revitalization

Fruitvale may be the most extensive inner-city transit-village effort going forward in the United States, but another project is underway in San Diego. There, the Barrio Logan station has become the site of a mixed-land-use project centered on the station. The project includes the Mercado Apartments, 144 units built in 1992, and the 100,000 square foot Mercado Commercial Center, a mix of specialty retail and vendor carts. Additionally, the project may include a Mexican-American museum and an extension of the local community college.

These transit-village efforts differ from previous anti-poverty and land redevelopment efforts in essentially three ways:

1. Emphasis on the Private Sector

Contemporary ideas for transit villages represent an intellectual and policy departure from the traditional concept that viewed government as landlord/owner/employer in inner cities. Through the 1960s and the 1970s, public policy treated declining inner-city areas with massive urban renewal under the stewardship and control of public agencies. Wide swaths of established neighborhoods were bulldozed and replaced by high-rise public housing. Social service agencies replaced local businesses as employers, and urban renewal programs themselves became major sources of jobs.

The transit village stands in contrast to that big-government approach. Village-size in scale, it relies on local entrepreneurs and the skills and abilities of local residents. At Fruitvale, the redevelopment project is limited to the quarter-mile ring around the station. The transit village is being designed for households having varied incomes and backgrounds, not just the poor. Public money is being used to leverage private investment. Fruitvale area residents are not passive observers, but direct participants in village development and business ownership.

There remains an important first-stage financing role for government, however. A critical mass of new housing and public infrastructure (plaza, police station) is needed before the Fruitvale project will attract very much private capital — and this financing is coming from public-sector sources. However, the goal is a community in which ownership of businesses, housing, and civic establishments is in private hands, and most jobs are with private employers.

2. Value-added of Transit

Transit-village elements noted above — local scale, mixes of incomes and land uses, pedestrian orientation — all are elements of the “urban village” movement of the 1980s. Yet, it is the transit link that makes the transit village more economically viable than most urban village designs.

The retail elements benefit from the thousands of daily commuters coming to and from the station. The office and other commercial elements benefit from the additional mobility option offered by the transit link — a benefit proportional to the degree of regional traffic congestion. Both the retail and commercial elements are further strengthened by the civic spaces and increased public safety of the transit village.

Of course, the transit link is not sufficient to guarantee private-sector growth. It only encourages private-sector efforts and increases the potential for new urban growth.

3. Implementation

Development at Fruitvale differs from that at other BART stations by having strong sponsors within both the BART Board of Directors and the local community. Twenty-odd years ago, planners expected that the market would respond spontaneously to the added accessibility brought by BART's arrival. But we now know that's not enough. If subcenters are to emerge at rapid-transit stations they will be the product of concerted entrepreneurship.

To be sure, they will also rely on the active participation of the transit agencies and local governments, as well as federal recognition in Section 3 "rail-start decisions." These revised federal criteria give increased emphasis to land use planning in federal transit funding. Previously, land use was a low priority among other funding criteria and cost ratios, but under the new criteria issued this year, station area planning is given prominence. This change, combined with FTA's Livable Communities Initiative, will be important in supporting local efforts.

Emerging transit-based development in the US (for example, Pleasant Hill near San Francisco and Ballston near Washington, DC) are demonstrating the importance of transit-agency leadership. Each of these started with a market-based site and phasing plan for a quarter-mile radius. Each required proactive measures in land assembly, infrastructure investment, shared parking, expedited permits and reviews, write-down of land costs/lease payments (in return for project revenue participation), and direct financial participation (issuance of tax-exempt bonds, loan guarantees, equity participation).

Additionally, each has shown the importance of a project champion — an elected or appointed official or a neighborhood activist — who persists in pushing the project and keeping it on course amidst inevitable obstacles and delays. Fruitvale has Ms. Arabella Martinez, who has assumed this role for six years. At the Pleasant Hill BART station area, a local county supervisor, Ms. Sunne McPeak, pushed the project for fourteen years, from initial planning to the current state of 60 percent build-out.

At BART headquarters, a transit-based development program is now firmly established. A Joint Development Subcommittee of the Board of Directors oversees station-area efforts, and several board members are involved in individual station-area plans. A three-person staff negotiates with private developers and with local municipalities, both for development on BART-owned land and on the surrounding land one-quarter mile around the station. Direct revenue to BART is only a secondary goal. Increased ridership, station-area security, and station-area attractiveness are among the primary goals.

The transit-village concept has become an organizing principle, not only for regional transportation but also for community development. By linking inner-city transit services with community-development efforts, both gain in the uphill battle to restore inner-city areas. ♦



FURTHER READING

Michael Bernick and Robert Cervero, *Transit Villages for the 21st Century* (New York: McGraw Hill, 1996).

Michael Bernick, *Urban Illusions* (New York: Praeger Press, 1987).

Robert Cervero, "Transit Villages: From Idea to Implementation," *Access* No. 5, Fall 1994.

Robert Cervero, "Transit-Based Housing in California: Evidence on Ridership Impacts," *Transport Policy*, Vol. 1, 1994.

Witold Rybczynski, *City Life: Urban Expectations in a New World* (New York: Scribner, 1996).



Food Access For the Transit-Dependent

BY ROBERT GOTTLIEB AND ANDREW FISHER

A prevailing myth holds that America, land of plenty, provides everyone with vast opportunities for education, mobility, and food. Yet, not everyone shares this bounty. Significant sections of the population lack a neighborhood supermarket and thus end up paying high prices for inadequate or poor-quality food. Many of them do not have cars and thus depend on a transit system that fails to provide convenient access to groceries.

Adequate nutrition is commonly seen as a social welfare issue unrelated to transportation. So transportation planners have largely ignored the special needs of transit-dependent persons to access food, thus contributing to a critical problem.

An effective transportation system does more than simply provide safe roads for automobiles. It affects people's standards of living by facilitating access to jobs, stores, schools, parks, airports, and other desired destinations. Without the means to travel — whether by private vehicle or by transit — people cannot enjoy the most basic opportunities and resources, including the simple convenience of shopping at a supermarket or at a farmers' market.

LACK OF INNER-CITY SUPERMARKETS

Between the 1960s and 1980s, there was a mass exodus of supermarkets from the inner city to the suburbs. This trend fol-

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lowed the ubiquitous outmigration of the middle-class and changes in the retail food industry that triggered intense competition for new markets. In Los Angeles the number of chain markets in inner-city locations shrank from forty-four in 1975 to thirty-one in 1991.

The University of Connecticut's Food Policy Marketing Center conducted a major study of twenty-one metropolitan areas and found that nineteen of them had 30 percent fewer stores per capita in their lowest-income zip-code areas than regionwide averages. At the same time, the zip-coded areas with the fewest supermarkets per capita also had the lowest ratios of vehicle ownership.

Further, a USDA study found that only 22 percent of food-stamp recipients drove their own cars to purchase groceries, compared with 96 percent of non-food-stamp recipients — quite an extraordinary contrast, considering that non-food-stamp recipients enjoy much greater access to grocery outlets.

Recently some food chains have expressed modest interest in relocating to low-income urban communities, but transportation programs to improve access are still scarce among both food retailers and transit agencies. Some food suppliers, however, now recognize that providing transportation services for customers may further their own interests.

One compelling inducement for providing customer transportation is to reduce the rate of shopping-cart loss in areas with lower than average auto ownership. Grocers incur considerable hidden costs from cart theft or carts abandoned off site that require retrieval. The purchase of a new cart can cost as much as \$120, and cart-retrieval expenses may amount to thousands of dollars each year for some stores in transit-dependent areas. At some sites, retrieved or stolen carts may account for as much as 10 percent of the store's carts in a given year. The California Grocer's Association estimates that 750,000 carts are taken annually from stores in California alone, creating theft and retrieval losses estimated at \$17 million a year. To deter further cart loss, a few stores are beginning to explore transportation initiatives as an alternative to having customers walk home with their groceries in store-owned carts.

FOOD STORES AS TRANSPORTATION SUPPLIERS

Despite supermarkets' general lack of interest in providing customer transportation, a few food-store managers have initiated programs with an eye toward promoting goodwill and community service. Other programs have emerged through efforts of private retailers, public transit agencies, community groups, and nonprofit civic organizations. They include a variety of store-initiated van services, public transit programs, senior citizen transport programs, and food-delivery programs. Among these, three types of approaches appear feasible and promising.

First, supermarkets can establish private van services. In doing so they will likely realize profits not acknowledged by traditional accounting methods, such as through reduced shopping-cart loss, enhanced goodwill, increased customer loyalty, higher sales, less parking lot use, and possible regulatory relief from municipal ordinances such as shopping cart impoundment laws that charge fees for shopping carts left abandoned on city streets.

One example of this type of program is the Fine's Market van service in East LA, which transports customers to and from the store. As a sign of its popularity, loyal Fine's shoppers, appreciative of the store's community orientation, created a human >



barricade around the store to prevent it from going up in flames during the 1992 Los Angeles riots.

Second, joint ventures among private retailers, public entities, and community development organizations can establish transportation services to food outlets. The most prominent example of this strategy is the highly regarded Pathmark/New Communities Corporation (NCC) joint venture in Newark, New Jersey.

NCC is a community development corporation formed after the 1967 Newark riots. One of its earliest and most important objectives was to develop a supermarket-anchored shopping center in a low-income neighborhood that had been without a full-service market since the riots. After a lengthy process it forged an agreement with Pathmark's parent corporation and established a 44,000-square-foot supermarket run by Pathmark. NCC holds a two-thirds interest in the venture plus ownership of the shopping center property.

As part of the venture, NCC extended its existing senior citizen van service, which takes seniors from NCC-owned housing to stores in Newark, thus creating a supermarket van service. Both the van service (which subsidizes other NCC programs) and the supermarket (which has the highest sales per square foot of all the Pathmark stores) have become highly profitable.

Third, nonprofits can engender substantial community participation in food transportation programs — a prerequisite for most paratransit and public transit services for the transit-dependent. One of the more innovative nonprofit ventures comes from an initiative by the Southland Farmers' Market Association and the UCLA Community Food Security Project. Together, in October 1995, they created a "market basket" subscription program through the Gardena Farmers' Market — one of the oldest markets in Southwest Los Angeles, serving primarily low- and middle-income neighborhoods. Those participating in the program receive a basket of "fresh from the farm" produce that is assembled at the Gardena market and then brought to a series of drop-off sites where they can be picked up. To encourage low-income participation, baskets are available at a less-expensive rate that is highly competitive with supermarket prices.

Even with the drop-off point, project organizers have realized the critical lack of transportation services, both to deliver baskets to subscribers and to transport shoppers to the farmers' market. To accomplish those goals, nonprofit groups are seeking to develop a delivery service to bring the baskets to people's homes and a related service to transport shoppers to the farmers' market. By establishing the program as a nonprofit community effort to increase food self-reliance, project organizers have made connections with key community players who are essential for its success.

These approaches must be developed in conjunction with new policy and planning initiatives that increase awareness and participation among the relevant groups. At the municipal level, for example, newly established food-policy councils have the capacity to help stimulate each model described above. Legislation such as the Community Food Security Act and the Intermodal Surface Transportation Efficiency Act can stimulate transportation initiatives that promote food access through community grants.

CONCLUSION

The burden faced by people who rely on transit isn't simply inconvenience. Transit-dependence frequently means lack of access to the most basic opportunities and resources, including food. Without adequate food outlets in their neighborhoods — not even a simple supermarket — these people are denied a minimal, healthful standard of living. They end up shopping at small corner stores, paying higher prices for less selection and lower-quality items, which results in poor nutrition. Or, if they do venture outside their neighborhood, they're forced to take long trips on transit along routes that do not coincide with their usual travel patterns.

Transportation planners have an opportunity to help alleviate their problem by improving transit services in low-income urban areas. By adapting small-vehicle paratransit modes to link supermarkets with homes, improved public transit may improve the quality of life for people who don't own cars. ♦

FURTHER READING

L. Ashman, J. De la Vega, M. Dohan, A. Fisher, R. Hippler, and B. Romain, *Seeds of Change: Strategies for Food Security for the Inner City* (Los Angeles: UCLA, Department of Urban Planning, June 1993).

Robert Cervero, "Commercial Paratransit in the United States: Service Options, Markets and Performance," 1996. UCTC No. 299.

City of Cambridge, Community Development Department, *Supermarket Access in Cambridge, Report to the Cambridge City Council* (Cambridge: CDD, December 19, 1994).

City of Los Angeles, Community Development Department, *Hunger and Food Insecurity in Los Angeles: Findings of the Voluntary Advisory Council on Hunger: Final Report* (Los Angeles: VACH, April 1996).

R. Cotterill and A. Franklin, *The Urban Grocery Store Gap, Food Marketing Policy Center* (Storrs: University of Connecticut, April 1995).

Public Voice, *No Place to Shop: Challenges and Opportunities Facing the Development of Supermarkets in Urban America* (Washington DC: Public Voice for Food and Health Policy, 1996).

Youngbin Yim, "Shopping Trips and Spatial Distribution of Food Stores," 1993. UCTC No. 125.

The Full Cost of Intercity Travel:

A Comparison of Air, Highway, and High-Speed Rail

BY DAVID LEVINSON

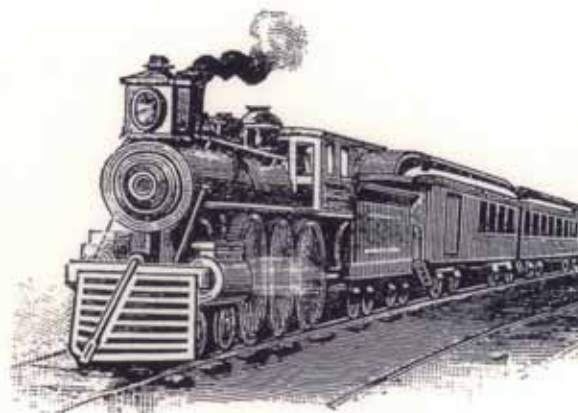
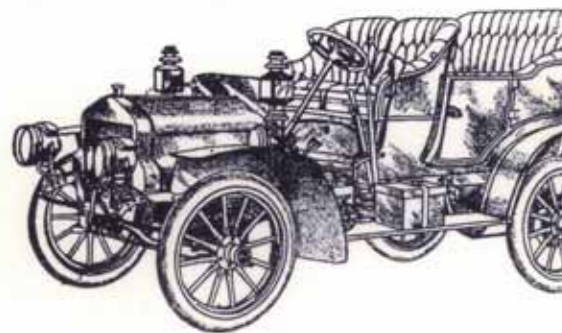
In 1993, the state of California formed the California Intercity High-Speed Rail Commission to develop a twenty-year plan for service along the California Corridor, from Los Angeles to San Francisco.

A high-speed rail system would cost \$10 billion to \$15 billion, but its advocates believe it would be the least costly mode of intercity travel in California. They emphasize that trains can travel between northern and southern California in under three hours, while consuming less energy and generating less pollution than automobiles or airplanes. Further, they contend that a cost analysis cannot be limited to out-of-pocket costs because air and highway transportation benefit from various hidden subsidies and generate external costs, such as pollution, that are borne by nonusers.

In an effort to appraise the comparative costs of competing rail, air, and highway systems, my colleagues and I conducted a detailed study that I summarize here. We have attempted to build upon several recent studies that estimate the full cost of transportation — not a simple accounting task because it's easy to fall into the trap of double counting or of missing a cost category.

Accounting difficulties arise because there are several shared costs. For example, travelers ride in vehicles (cars, planes, trains) that use infrastructure (roads, airports, tracks). One cannot simply add up the costs for each component. There are transfers between components, such as gas taxes used to fund infrastructure, and these transfers must be excluded from the final tally.

Other problems arise when establishing transportation system boundaries. Automobiles typically burn gasoline and create pollution, which usually get charged to the car's account. A high-speed train uses electricity, creating pollution at the power plant. Should this pollution be ascribed to rail travel? Or should we say that the electricity sector is responsible for mitigating its own pollution and that those mitigation costs >



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should be reflected in higher electricity costs borne by the railroad? Our research takes the latter approach of separating cost centers.

Travel costs depend on the number of people traveling. The more people sharing a fixed cost, the lower the per-passenger cost. On the other hand, the more people using a road, railroad, or airport, the greater the delay. Therefore properly measuring costs requires knowing how costs vary with use.

In this study, we divide costs into several main categories: infrastructure, carrier, user monetary, time, noise, accident, and air pollution and global climate change. Some of these costs are internal to the transportation system, that is, they are borne by the riders, carriers, and infrastructure owners. Others are external, that is, they are borne by persons other than riders, carriers, infrastructure owners. We use estimates based on travel along the California Corridor.

Infrastructure Costs

Infrastructure costs result from constructing and operating airports, highways, and tracks. They also include the costs of mitigating water pollution and other environmental damage when mitigation is integral in construction. The air-travel system generates *airway infrastructure*, such as air traffic control provided by the Federal Aviation Administration, and *airport infrastructure*, including both terminals and airside facilities, such as runways and taxiways. *Highway infrastructure* costs include not only pavement and land, but also the cost of maintenance, administration, law enforcement, and interest on debt. High-speed rail does not presently exist in California, so we rely on engineering estimates of land, construction, and maintenance costs.

Air-system infrastructure costs at the airport reflect economies associated with passenger loading — the more users, the lower the cost per passenger. However, highway infrastructure costs show slight diseconomies: the cost of building and operating the system rises with additional users. High-speed rail is expected to be like the air system, particularly since its capacity greatly exceeds its use.

Overall, in the California corridor, a high-speed rail system will have higher infrastructure costs per passenger-kilometer compared with air and highway. If the high-speed rail system were in a more heavily traveled corridor, there would be a trade-off between higher capital costs due to higher land and construction costs, and more passengers to share those costs. How that trade-off is resolved depends on site-specific conditions. The high cost of high-speed rail infrastructure comes as no surprise. The tracks serve only one corridor for one type of trip (intercity) and are usually underused, while airports serve many corridors for both short- and long-distance intercity trips. Roads similarly operate over many transportation markets and serve local travel as well. Rail infrastructure is the



least flexible among the three modes with its tracks standing idle most of the time.

Carrier and User Monetary Costs

Carrier costs are those that an airline incurs in owning and flying an airplane (or that a railroad incurs in owning and running a train) minus the taxes and fees they pay to use infrastructure. On highways, bus travel comprises carrier costs, but the vast majority of Californians travel by automobile. Thus we consider highway costs separately as user monetary costs, and bus costs are not calculated.

User monetary costs include all expenses users pay to ride the plane or train and all expenses they pay to own and operate their own vehicle, such as gas and vehicle ownership taxes.

All vehicles (planes, trains, and cars) show economies of capacity utilization. It is more cost-effective when there are greater numbers of passengers riding in the same number of vehicles. Similarly, it is more cost-effective to operate a vehicle more intensively over time than to purchase additional vehicles. This means that an auto owner who drives his car 30,000 kilometers a year has lower per trip costs than one who drives 15,000 kilometers per year. The depreciation in the car with the extra distance is negligible compared with the decline in a car's value over time, simply due to changing technological and stylistic preferences.

Comparing the three modes, the expected carrier costs for high-speed rail are slightly lower than the user monetary costs for cars, while the air system has the highest carrier costs. This is not surprising given the energy requirements to keep a plane airborne and the high cost of aircraft relative to trains and mass-produced autos. Take note of an interesting trade-off between infrastructure and carrier costs: High-speed rail has very high infrastructure costs, but relatively low carrier costs. In contrast, air travel has low infrastructure costs, but higher carrier costs. Investment decisions are thus very sensitive to the time-value of money. Long-term investments with low interest rates, such as sinking scarce capital into the land required to support high-speed rail, make more sense than those at high rates, when decisions need faster payback.

Time Costs

When choosing a travel mode, people consider how much time it takes to get to places via each mode. Unless they are charged for delays they impose on other travelers, they do not consider those time losses. Delays afflict both the air and highway modes. Congestion pricing, which charges users a fee based on the dollar-equivalent of the delay they impose on others, might

redistribute time costs equitably but it awaits a large-scale test.

Despite congestion, air is the fastest mode, followed by high-speed rail and automobiles. In this analysis, however, only point-to-point time matters. Other related costs such as access times, schedule delay, and the costs of renting a car at a final destination are excluded. Overall, we expect access times for the three intercity modes to be about even. However only air and rail, with their limited frequency of service, have schedule delays; automobile drivers can depart at any time. Again, this cost is likely to be small, with flights and trains departing every half-hour during peak periods. These excluded costs are clearly lowest for auto travelers, which somewhat mitigates their time disadvantage.

Noise

Cars, trains, and planes all generate noise, causing reduced property values near roads, tracks, and airports. Recent technological improvements have produced quieter vehicles, particularly planes, but the noise externality remains significant. One should note that noise levels flatten out as the number of sources increases; so two vehicles produce less than twice the noise effect of one vehicle. Further, as with other costs, the total cost of noise will rise with use, but the cost per unit will decline.

Overall, air and highway costs of noise are about the same and twice as expensive as high-speed rail. In the future, the air-noise costs can be expected to drop significantly with quieter engines mandated by the FAA.

Accident Costs

High-speed rail systems are designed to reduce the possibility of accidents. Routes are entirely grade-separated and have other built-in safety features. The safety costs are thus capitalized in higher construction costs, rather than being realized in accidents. There is a trade-off between safety and other costs. For example, even the highway system would be extremely safe if individuals were to travel at five miles per hour.

Insurance costs are simply transferring the risk of accidents from the purchaser to the insurance company. So one can count either insurance costs plus uninsured accident costs, or count all accident costs, but not both.

Highway safety depends on the volume of traffic flow. Accident costs on lonely rural roads are higher than on more heavily traveled roads. There are no well-understood relationships between air accidents and the utilization of the air transportation system. Overall the cost of highway accidents is fifty times larger than air accidents, and high-speed rail accidents are too infrequent to permit estimation of rates. >

TABLE 1

Components of Long-Run Average Costs

Cost Category	Air (%)	High-Speed Rail (%)	Highway (%)
Infrastructure	13.8	54.8	5.2
Carrier	71.9	25.5	0.0
User Monetary	0.0	0.0	37.3
User Time	8.7	18.7	43.4
Congestion	1.2	0.0	2.0
Accidents	0.3	0.0	8.6
Noise	3.3	0.9	2.0
Pollution	0.6	0.0	1.3
Total	100.0	100.0	100.0

Note: Highways assume 1.5 passengers per car. All transfers are subtracted out. Numbers may not add to 100% due to rounding.

Air Pollution and Global Climate Change Costs

Unlike cars and planes, high-speed rail avoids the pollution externality because the electricity that powers trains is considered outside the transportation sector. In an efficient economy, pollution costs would be internalized in the cost of electricity through government air-pollution regulation. Here, we assume that these costs are internalized, and we ascribe to high-speed rail electricity costs above current market conditions.

Cars and planes burn fuel, which generate pollution and contribute to global climate change. Automobiles generate at least three times as much pollution as do airplanes. Pollution generated by cars and planes has been reduced over time as vehicles become better regulated and more fuel efficient. Still, particulate matter, hydrocarbons, and oxides of sulfur, carbon, and nitrogen have measurable negative health effects. The severity of health effects depends on how many people are affected, as well as on local climate and geography. For instance, a gram of pollution in Los Angeles has greater health and economic effects than the same amount of pollution in San Francisco.

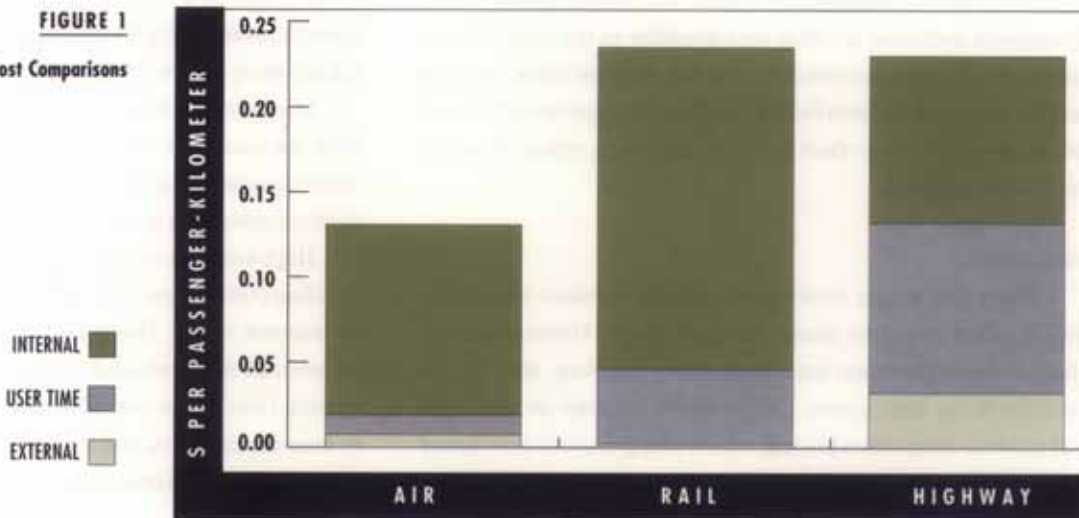
There is considerable controversy over the extent of economic damages that global climate change, the "greenhouse effect," may cause. The problem of changing temperature patterns took decades to emerge and will take decades to resolve. The solution most widely suggested is a tax on carbon emissions that is at least proportionate to the damage. There is over a forty-fold range among the serious proposals for carbon taxes; in this study, we use an amount lower than those advocated by some environmental organizations.

Pollution and global change costs from automobiles are about four times more than those from airplanes. This is mainly because cars typically have less efficient operations and more stops, starts, and changes in speed. Further, the fuels used for each mode have different combustion properties.

Costs Excluded From The Analysis

We have excluded several related costs because they are outside the strictly defined intercity transportation sector. In order to evaluate costs, borders must be drawn around

FIGURE 1
Full Cost Comparisons



the system being considered, otherwise an evaluation of the entire economy would be warranted.

For example, some researchers ascribe a fraction of US defense costs to the transportation sector, since much of our defense spending protects the Middle East, an oil-producing region that would not otherwise be defended. We find this link tenuous and consider defense costs outside the transportation market. It is unclear whether such expenditures actually lower energy costs and may be undertaken for other geopolitical reasons.

Others consider parking as a cost associated with transportation. Parking is not free — it is either charged directly to the motorist or subsidized by the provider (for example, a shopping center, an office building, or a developer that builds streets wider than necessary). We don't consider parking costs since this research is limited to assessing intercity transportation, and parking is a local cost that is unlikely to be avoided by switching intercity travel modes.

Urban sprawl and the increased cost of serving dispersed land uses are sometimes attributed to automobiles. Certainly automobile enables dispersed housing, but so do the telephone, fax, and other technologies. It is at least a second-order effect and outside the intercity transportation sector.

There are also costs that have long been recognized but are seemingly impossible to quantify accurately, such as "social severance" (the cost of dividing communities with infrastructure) or "ecosystem severance" (the environmental cost from placing a highway amidst native ecologies).

Conclusion

Figure 1 shows the internal, external, and user time costs for the three modes. For intercity travel with trip lengths and levels of demand similar to those in the Los Angeles–San Francisco market, air travel has the lowest full cost, while high-speed rail and highway are about the same. This suggests that high-speed rail is unlikely to become a substitute for air travel. Over shorter distances, high-speed rail has a chance to compete if other market conditions fall into place. However, like urban mass transit systems, the conditions are very specific. They require poor level-of-service on highways or high levels of point-to-point travel demand over distances shorter than those practically served by air.

Considering all relevant costs, high-speed rail would be California's most expensive mode of intercity transportation. ♦

FURTHER READING

IBI Group, "Full Cost Transportation Pricing Study: Final Report to Transportation and Climate Change Collaborative," 1995.

INFRAS/ IWW, "External Effects of Transport. International Union of Railways," Karlsruhe University, 1995.

T.E. Keeler, L.A. Merewitz, and P. Fisher, "Full Costs of Urban Transport" (Berkeley: Institute of Urban and Regional Development, University of California, 1975).

Daniel Leavitt, Peter Cheng, Erin Vaca, and Peter Hall, "Potential for Improved Intercity Passenger Rail Service in California: Study of Corridors," (Berkeley: Institute of Urban and Regional Development, Working Paper 612, 1994).

Daniel Leavitt, Peter Hall and Erin Vaca, "Revenue and Ridership Potential for a High-Speed Rail Service in the San Francisco/Sacramento-Los Angeles Corridor," (Berkeley: Institute of Urban and Regional Development, Working Paper 609, 1994).

Daniel Leavitt, Erin Vaca, and Peter Hall, "High-Speed Trains for California; Strategic Choice: Comparison of Technology and Choice of Route," (Berkeley: Institute of Urban and Regional Development, Working Paper 564, 1992).

Daniel Leavitt, Peter Hall, and Erin Vaca, "High-Speed Trains For California; Volume II: Detailed Segment Descriptions, Cost Estimates, and Travel Times Calculation," (Berkeley: Institute of Urban and Regional Development, Working Paper 565, 1992).

David Levinson, David Gillen, Adib Kanafani, and Jean-Michel Mathieu, "The Full Cost of Intercity Transportation: A Comparison of High Speed Rail, Air and Highway Transportation in California," ITS Research Report, UCB-ITS-RR-96-3 (1996).

James Mackenzie, Roger C. Dower, Donald D.T. Chen, *The Going Rate: What It Really Costs to Drive* (Washington, DC: World Resources Institute, 1992).

Peter Miller and John Moffet, "The Price of Mobility: Uncovering the Hidden Costs of Transportation," National Resources Defense Council, San Francisco, October 1993.

Emile Quinet, "The Social Cost of Land Transport," OECD Environment Monograph No. 32 (Paris: OECD, 1990).



The Freeway's Guardian Angels

BY ROBERT L. BERTINI

Everyone knows that major sources of freeway congestion are the "incidents," including accidents, that block free traffic flow. Other troubling incidents include stalled engines, cars that have just run out of gas, debris fallen from trucks, flat tires, strayed animals, and other random events. According to one estimate, half of all congestion is related to incidents. With vehicles stopped on the roadway, one incident can cause others, sometimes leading to chain reactions involving many cars. So motorists and traffic officials alike consider incident-mitigation a critical objective.

One obvious remedy is prevention, another is rapid clearance of blocked roadways. Clearance is the more feasible strategy and the means we focus on here. In California, Caltrans is working in partnership with the Highway Patrol, Metropolitan Planning Organizations (such as MTC in the San Francisco Bay Area and LAMTA in Los Angeles),

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and private towing companies, to clear traffic lanes quickly by deploying the Freeway Service Patrol (FSP). These are tow trucks that patrol the roadways for incidents and race to remove whatever is obstructing the freeway lanes. In California, some 270 trucks are patrolling 900 miles of freeway in fifteen counties, working 600 vehicle-hours per day. They provide road service free of charge to more than 1,000 motorists per day in Los Angeles alone.

Virtually everyone who's been helped by these freeway guardians is quick to praise the program's benefits, as are those who've speeded past incidents that might have induced congestion and delayed their trips. As one engineer put it, "FSP needs no more of a formal evaluation than does the snow plow after a blizzard." Nevertheless, my colleagues and I have sought to appraise its benefits and costs in order to determine how to best utilize resources in the Los Angeles and the San Francisco Bay Area programs.

We deployed probe vehicles to collect incident and traffic-speed data, both before and after FSP implementation. Loop detectors collected traffic volume data, and we then merged the two data sets to estimate average delay per incident type. We find that congestion following an incident is seriously exacerbated by passing motorists' curiosity and their seemingly universal habit of rubbernecking — slowing down to visually inspect the troubled vehicles.

Combined delay caused by a stalled car blocking one freeway lane for 60 minutes on a four-lane freeway, when combined with the effects of rubbernecking, turns out to be about 3,800 hours, affecting over 17,500 cars (Figure 1, 2, and 3). By reducing incident duration by 50 percent, total delay for an FSP-assisted incident would fall to 2,800 hours. >

FIGURE 1

Duration of Incident Effects

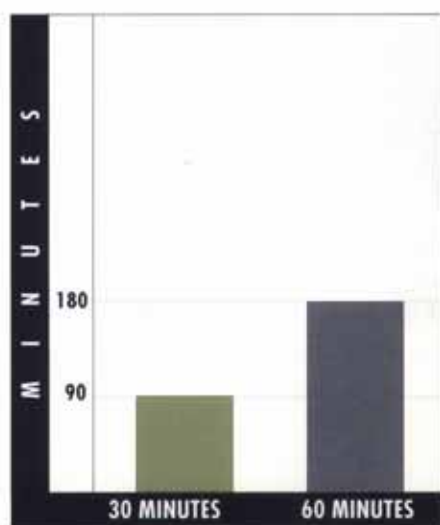


FIGURE 2

Number of Vehicles Affected

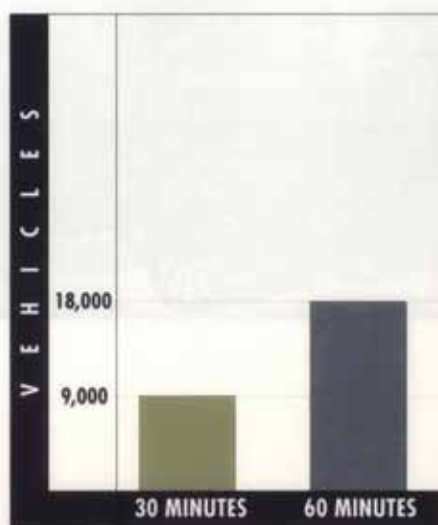
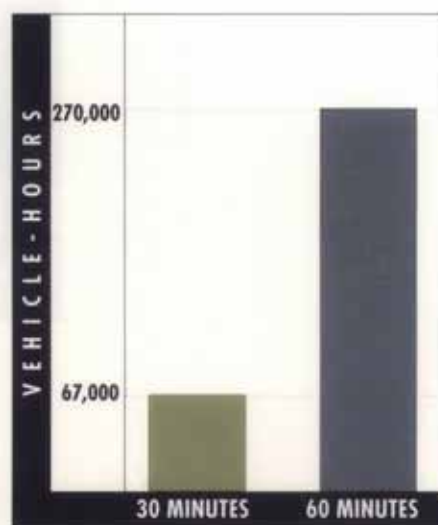


FIGURE 3

Total Vehicle-Hours of Delay



These figures compare the effects of a hypothetical incident that is cleared in either thirty or sixty minutes.

Our study concludes that FSP is clearly cost-effective. Our estimated overall benefit-cost ratio is 3.3 to 1 for one section of freeway in the Bay Area; the major costs being fiscal outlays for tow vehicles and attendants' wages, the major benefits the dollar-equivalent value of motorists' time savings.

In addition to these monetized benefits and costs, we must account for other contributions FSP makes to public welfare. Beneficiaries' stories abound: the tow truck that substituted for the car that lost a wheel when racing to the hospital with fragile cargo, a human transplant organ; numerous occasions when FSP drivers helped prevent suicides after spotting persons hovering at the edge of freeway overpasses; many more occasions when they helped newborns into the world; the mother duck who, crossing a freeway, would have lost a duckling had a tow truck driver not plucked it from harm's way; the FSP drivers who staged an impromptu rodeo when a cattle truck overturned and loosed its herd upon the freeway lanes.

Like Good Samaritans who seek to help others, the Freeway Service Patrol has proved to be a good neighbor and a real bargain. A transportation program that elicits such vast outpourings of positive response and emotion must surely be a winner worth expanding. Motorists who have encountered these Guardian Angels of the Freeways, as they've come to be called, say they

feel much more comfortable on the road, enjoy a heightened sense of security, and, according to many, will "never complain about paying gas taxes again." It is a rare transportation project that earns such declarations of public approval. ♦

FURTHER READING

Robert L. Bertini, et al., "The Los Angeles Freeway Service Patrol Evaluation," Transportation Research Board, forthcoming.

Metropolitan Transportation Commission, *On Patrol*, Freeway Service Patrol Newsletter, Oakland, California (see also <http://www.mtc.dst.ca.us/zoomind.htm>).

Michelle Morris and Wilson Lee, "Survey of Efforts to Evaluate Freeway Service Patrols," Transportation Research Record, No. 1446, 1994, pp. 77-85.

Michael A. Ogden, "Guidelines for Establishing Freeway Service Patrols," Institute of Transportation Engineers, Technical Committee 4M-36, 1996.

Alexander Skabardonis, et al., "Freeway Service Patrol Evaluation," California PATH Research Report, No. UCB-ITS-PRR-95-5, University of California, Berkeley, 1995.



TRAVEL BY CARLESS HOUSEHOLDS

Over the past thirty years the federal government has funded extensive programs to improve travel options for people who do not have their own vehicles. During this same period, independent of government actions, economic and demographic trends have diminished the target population and made vehicle access nearly universal, even among the poorest households. In 1969, 20.6 percent of households (HHs) had no vehicle. By 1983 this ratio had fallen to 13.5 percent. By 1990, it fell to 9.2 percent of HHs. Further, HHs without vehicles tend to be smaller than average, so in 1990 the zero-vehicle HHs comprised only 6.4 percent of the population.

WHO ARE THEY?

The typical zero-vehicle HH (0-VHH) has no one in the labor force (neither employed nor searching for work), has a lower than average income, and is located in the central part of a large urban area. In life cycle terms, most of these HHs are either retired older people or single adults without children. Most zero-VHHs are headed by women.¹

Although zero-VHHs have lower incomes than HHs in the general population, only 27 percent of them are below the poverty level. Poverty alone is not sufficient to explain why HHs have no vehicles. Of all adults living in HHs below the poverty level, 76.1 percent are in HHs that have at least one vehicle.

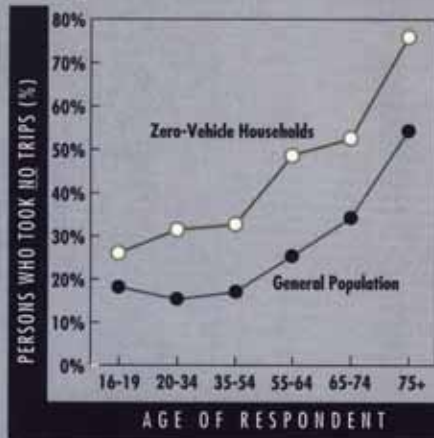
WHERE ARE THEY?

Most zero-VHHs are in central cities of Metropolitan Statistical Areas (MSAs). Of adults living in zero-VHHs, 52.9 percent are in central cities, with the remainder about evenly split between suburbs and nonMSA locations. Zero-VHHs outside the central >

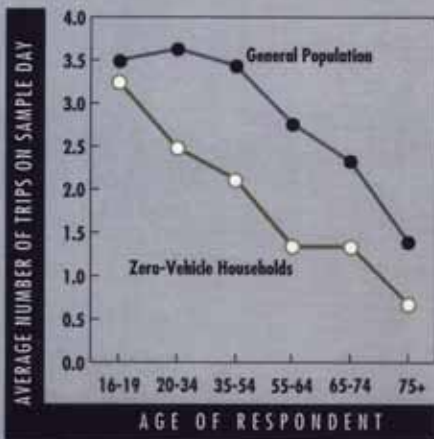
¹ The data are from the 1990 Nationwide Personal Transportation Survey. "Adult" means all persons age sixteen or older; "vehicle" includes all household-based cars, vans, and light trucks. None of the data reported here include the New York MSA: Why exclude these data? New York is unique: No other city comes close to it in population density, difficulty and expense of operating a vehicle, or universality of transit access. Furthermore New York's zero-VHHs are atypical: They have unusually high incomes, high labor force participation, and education. These are all differences that bias tripmaking rates upwards. Since New York has an unusually large fraction of zero-VHHs, the resultant statistics would tend to understate the mobility problems of zero-VHHs.

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Charles Lave is professor of economics at the University of California, Irvine, CA 92717 (clave@umsa.uac.uci.edu).*

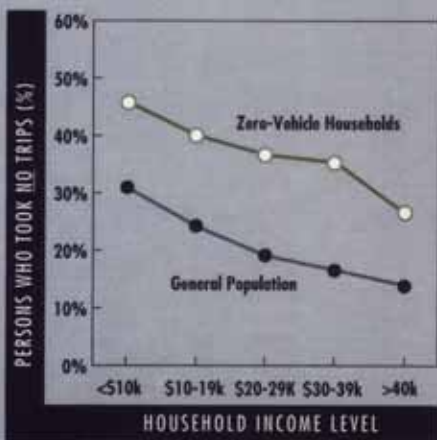
Age and Mobility (%)



Age and Trips/Day



Income and Mobility (%)



city are less mobile: 52 percent of adults living outside the central city took no trips at all on the sample day; inside the central city only 37 percent stayed home all day.

To the extent that federal policy seeks to assure mobility for all, it needs to concentrate more attention outside the central cities.

HOW DO THEY TRAVEL?

Commuting is not an overwhelming concern since only 31.3 percent of zero-VHHs have a family member in the labor force. Adults living in zero-VHHs make 43 percent of their daily trips by walking. Because most zero-VHHs are in central urban locations, their transit access is good: 53 percent report they have transit access within three blocks; 65 percent have transit access within twelve blocks. Yet adults living in zero-VHHs use transit for only 16 percent of their trips.

Surprisingly, adults living in HHs without vehicles make twice as many trips by private vehicle as they do on transit (36 percent versus 16 percent). The share of travel on public transportation is essentially constant across education levels, but the private-vehicle share declines as education increases, and the walk-mode share increases with education. Regarding trip purpose, the reason for travel tends to be about equally divided between errands, social activities, and shopping.

MOBILITY: HOW MUCH DO THEY TRAVEL

From a social viewpoint, we are interested in seeing how well the people in zero-VHHs get around — whether they have enough mobility options to lead reasonable lives. One possible measure of mobility is the average number of trips per day made by persons in zero-VHHs. (A trip is a one-way journey; the roundtrip commute to work would be two trips.) The average adult living in a zero-VHH made 1.8 trips per day. The corresponding figure for the general population is 3.2 trips per day. This is a substantial difference, but it primarily reflects the different proportions of workers and the elderly in each group.

Another possible measure of mobility is the total absence of trip-taking on the sample day — the proportion of people who took no trips at all. Of all adults living in zero-VHHs, 46 percent made no trips during the sample day. The corresponding figure for the general population is 21 percent. Again, a substantial difference in mobility, and again, much of it reflects the different proportions of workers and the elderly in the two groups.

We can measure both “trips per day” and “percent who took no trips.” Which is the better gauge? The zero-trip measure is a more sensitive measure of immobility. Trips per day, being an average, is more influenced by outliers — a few respondents with a large number of trips can affect the average, though the proportion of immobile people might still be the same. One might think of average trips per day as a measure of mobility, and the zero-trip proportion as a measure of immobility.

DEMOGRAPHIC EFFECTS ON TRAVEL

Demographic differences within the zero-VHH population produce strong effects on mobility patterns:

- (1) Workers travel much more than nonworkers: 2.85 trips/day versus 1.35 trips/day;
- (2) The young (20-34) travel much more than the old (65-74): 2.48 trips/day versus 1.34 trips/day;

- (3) Higher incomes produce more travel: 2.62 trips/day at \$40,000 plus income versus 1.91 trips/day for the under \$10,000 income group;
- (4) Men travel more than women: 2.1 trips/day for men versus 1.69 trips/day for women;
- (5) Education produces remarkably strong effects: 2.67 trips/day for college graduates versus 1.28 trips/day for those without high school degrees and only some of this change can be accounted for by income differences.

TRAVEL BEHAVIOR OF OLDER PERSONS

Persons sixty-five and older account for almost half of all zero-VHHs. Our major finding is that their travel is not affected by changes in most of the explanatory variables. For example, there is little difference in trips per day by gender, ethnicity, or across the observed ranges of income and education.

The geographic consistency is also quite striking. There is almost no difference in either trips per day or proportion of persons with zero-trips across the three MSA categories, the size of the urban area, or the population density.

Consider the implications of these findings. Transit access is certainly much better in the central city of an MSA than it is in a nonMSA, yet there was no difference in mobility patterns. Transit access is certainly much better in large urban areas than in small ones, but again there was no difference in mobility patterns. Transit access is certainly much better in high-density areas than in low-density ones, but we find only small increases in mobility in the densest areas. Taken together, these three findings seem to indicate that the presence or absence of transit makes little difference in the mobility patterns of older people.

IMMIGRATION AND VEHICLE OWNERSHIP

New immigrants have much lower vehicle ownership rates than the native-born population, but vehicle ownership increases strongly with length of stay in the US. The fastest rate of change is for Asian immigrants, the slowest is for black immigrants. The change is inherently interesting because these immigrants come from cultures less auto-obsessed than our own. What explains the change in their vehicle ownership patterns over time? The data indicate that increased income, rather than any change in values toward the automobile, is the overwhelming factor behind the decline in zero-VHHs among immigrant groups. ♦

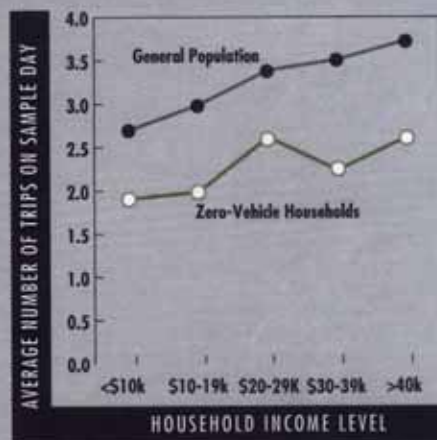
ACKNOWLEDGEMENTS

This research was funded by a contract from the Federal Highway Administration of the US Department of Transportation. We owe special thanks to Susan Liss and Elaine Murakami for their support and advice.

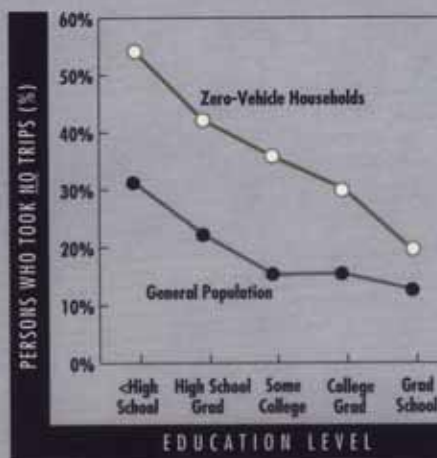
FURTHER READING

US Department of Transportation, "Travel by Households Without Vehicles," Travel Mode Special Reports: 1990 NPTS Report Series, Chapter 1 (Washington, DC: December 1994).

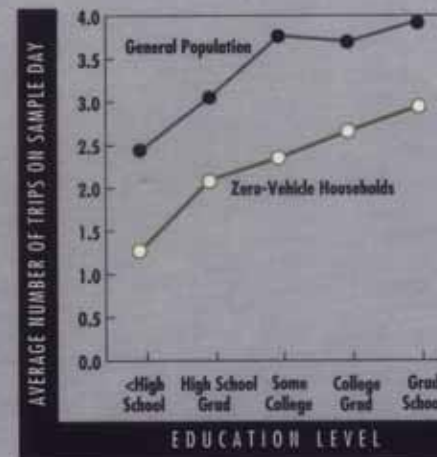
Income and Trips/Day



Education and Mobility (%)



Education and Trips/Day



Adler, Jeffrey L. and Michael G. McNally
 "In-Laboratory Experiments to Investigate Driver Behavior Under Advanced Traveler Information Systems (ATIS)"
 1993 UCTC 184

Adler, Jeffrey L., Michael G. McNally and Wilfred W. Recker
 "Interactive Simulation for Modeling Dynamic Driver Behavior in Response to ATIS"
 1993 UCTC 171

Adler, Jeffrey L., Thomas F. Golob and Michael G. McNally
 "A Structural Model with Discrete-Choice Variables for Predicting Enroute Behavior Under ATIS"
 1993 UCTC 174

Adler, Jeffrey L., Wilfred W. Recker and Michael G. McNally
 "In-Laboratory Experiments to Analyze Enroute Driver Behavior Under ATIS"
 1993 UCTC 148

Barnett, Roger
 "British Rail's InterCity 125 and 225," CalSpeed Series
 1992 UCTC 114

Barth, Matthew J. and Ramakrishna R. Tadi
 "An Automobile/Transit Emissions Evaluation of Southern California's Metrolink"
 1995 UCTC 279

Boarnet, Marlon G.
 "Geography and Public Infrastructure"
 1996 UCTC 305

Boarnet, Marlon G.
 "Highways and Economic Productivity: Interpreting Recent Evidence"
 1995 UCTC 291

Boarnet, Marlon G.
 "Highways and Intrametropolitan Employment Growth"
 1995 UCTC 85

Boarnet, Marlon G.
 "The Economic Effects of Highway Congestion"
 1995 UCTC 292

Boarnet, Marlon G.
 "Transportation Infrastructure, Economic Productivity, and Geographic Scale: Aggregate Growth versus Spatial Redistribution"
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Boarnet, Marlon G. and Randall Crane
 "LA. Story: A Reality Check for Transit-Based Housing"
 1995 UCTC 250

Boarnet, Marlon G. and Randall Crane
 "Public Finance and Transit-Oriented Planning: New Evidence from Southern California"
 1995 UCTC 304

Brownstone, David, David S. Bunch and Thomas F. Golob
 "A Demand Forecasting System for Clean-Fuel Vehicles"
 1994 UCTC 221

Burns, Elizabeth K.
 "Employee and Student Trip Reduction: First Year Results from Metropolitan Phoenix"
 1994 UCTC 226

• **Burns, Elizabeth K.**
 "Involuntary Mobility, Gender, and Travel Demand Management in Metropolitan Phoenix"
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Burns, Elizabeth K.
 "Linking Geographic Information Systems and Trip Reduction: Limitations in a Pilot Application"
 1994 UCTC 241

Burns, Elizabeth K.
 "Linking Geographic Information Systems and Trip Reduction: Success and Failure in a Pilot Application"
 1993 UCTC 143

Cervero, Robert
 "Commercial Paratransit in the United States: Service Options, Markets and Performance"
 1996 UCTC 299

Cervero, Robert
 "Congestion, Growth and Public Choices"
 1991 UCTC 51

Cervero, Robert
 "Ridership Impacts of Transit-Focused Development in California"
 1993 UCTC 176

• **Cervero, Robert**
 "Subcentering and Commuting: Evidence from the San Francisco Bay Area, 1980-1990"
 1996 UCTC 331

Cervero, Robert
 "Surviving in the Suburbs: Transit's Ultimate Challenge"
 1993 UCTC 169

Cervero, Robert, Alfred Round, Carma Reed, and Brian Clark
 "The All-Electric Commute: An Assessment of the Market Potential for Station Cars in the San Francisco Bay Area"
 1994 UCTC 249

Cervero, Robert, Alfred Round, Todd Goldman, and Kang-Li Wu
 "BART @ 20: Rail Access Modes and Catchment Areas for the BART System"
 1995 UCTC 307

Cervero, Robert and Alfred Round
 "Future Ride: Adapting New Technologies to Paratransit in the United States"
 1996 UCTC 306

Cervero, Robert and Carolyn Radisch
 "Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods"
 1995 UCTC 281

Cervero, Robert and Mark Dunzo
 "An Assessment of Suburban-Targeted Transit Service Strategies in the United States"
 1993 UCTC 178

Cervero, Robert and Peter Bosselmann
 "An Evaluation of the Market Potential for Transit-Oriented Development Using Visual Simulation Techniques"
 1994 UCTC 247

Cervero, Robert and Val Menotti
 "Market Profiles of Rail-Based Housing Projects in California"
 1994 UCTC 242

Cervero, Robert, Carlos Castellanos, Wicaksono Sarosa, and Kenneth Rich
 "BART @ 20: Land Use and Development Impacts"
 1995 UCTC 308

Cervero, Robert, Michael Bernick and Jill Gilbert
 "Market Opportunities and Barriers to Transit-Based Development in California"
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Cervero, Robert, Thomas Kirk, Douglas Mount, and Carma Reed
 "Paratransit in the San Francisco Bay Area: Providing Feeder Connections to Rail"
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Chatti, Karim, John Lysmer and Carl L. Monismith
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 "On Real-Time Distributed Geographical Database Systems"
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Chu, Xuehao
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 1993 UCTC 199

Chu, Xuehao and Gordon J. Fielding
 "Electronic Road Pricing in Southern California: Policy Obstacles to Congestion Pricing"
 1994 UCTC 189

Cohn, Theodore E.
 "Integration by the Human Eye: Implications for Warning Signal Design"
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Crane, Randall
 "Cars and Drivers in the New Suburbs: Linking Access to Travel in Neotraditional Planning"
 1994 UCTC 239

Crane, Randall
 "On Form Versus Function: Will the 'New Urbanism' Reduce Traffic, or Increase It?"
 1995 UCTC 266

Crane, Randall
 "The Influence of Expected Suburbanization on Urban Form and the Journey to Work"
 1994 UCTC 240

De Vany, Arthur and W. David Walls
 "Network Connectivity and Price Convergence: Gas Pipeline Deregulation"
 1993 UCTC 202

De Vany, Arthur and W. David Walls
 "Pipeline Access and Market Integration in the Natural Gas Industry: Evidence from Cointegration Tests"
 1993 UCTC 200

Deakin, Elizabeth
 "Effects of the Loma Prieta Earthquake on Transbay Travel Patterns"
 1991 UCTC 294

Deakin, Elizabeth
 "The United States"
 1990 UCTC 66

Delucchi, Mark A.
 "Monetary Externalities of Motor-Vehicle Use"
 1996 UCTC 318

Delucchi, Mark A.
 "Motor-Vehicle Goods and Services Priced in the Private Sector"
 1996 UCTC 315

Delucchi, Mark A.
 "Payments by Motor-Vehicle Users for the Use of Highways, Fuels, and Vehicles"
 1996 UCTC 327

Delucchi, Mark A.
 "Personal Nonmonetary Costs of Motor-Vehicle Use"
 1996 UCTC 314

Delucchi, Mark A.
 "Some Comments on the Benefits of Motor-Vehicle Use"
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 "Some Conceptual and Methodological Issues in the Analysis of the Social Cost of Motor-Vehicle Use"
 1996 UCTC 312

Delucchi, Mark A.
 "Summary of the Nonmonetary Externalities of Motor-Vehicle Use"
 1996 UCTC 319

Delucchi, Mark A.
 "The Allocation of the Social Costs of Motor-Vehicle Use to Six Classes of Motor Vehicles"
 1996 UCTC 320

Delucchi, Mark A.
 "The Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991: Summary of Theory, Methods, Data, and Results"
 1996 UCTC 311

Delucchi, Mark A. and Don McCubbin
 "The Contribution of Motor Vehicles to Ambient Air Pollution"
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Delucchi, Mark A. and J.M. Ogden
 "Solar-Hydrogen Fuel-Cell Vehicles"
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Delucchi, Mark A. and James Murphy
 "General Taxes Paid by Producers and Consumers of Motor Vehicles, Motor Fuels, and Other Motor-Vehicle Goods and Services"
 1996 UCTC 328

Delucchi, Mark A. and James Murphy
 "Motor-Vehicle Goods and Services Bundled in the Private Sector"
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Delucchi, Mark A. and James Murphy
 "Motor-Vehicle Infrastructure and Services Provided by the Public Sector"
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Delucchi, Mark A. and James Murphy
 "U.S. Military Expenditures to Protect the Use of Persian-Gulf Oil for Motor Vehicles"
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Delucchi, Mark A. and Shi-Ling Hsu
 "The External Cost of Noise from Motor Vehicles"
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Delucchi, Mark A., James Murphy, Jin Kim, and Don McCubbin
 "The Cost of Reduced Visibility Due to Air Pollution from Motor Vehicles"
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Fielding, Gordon J.
 "Congestion Pricing and the Future of Transit"
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Fielding, Gordon J. and Daniel B. Klein
 "High Occupancy / Toll Lanes: Phasing in Congestion Pricing a Lane at a Time"
 1993 UCTC 179

Fielding Gordon J. and Daniel B. Klein
 "How to Franchise Highways"
 1992 UCTC 134

Gärling, Tommy, Mei-Po Kwan and Reginald G. Golledge
 "Computational-Process Modelling of Household Activity Scheduling"
 1993 UCTC 217

Gärling, Tommy, Mei-Po Kwan and Reginald G. Golledge
 "Computational-Process Modelling of Travel Decisions: Review and Conceptual Analysis"
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Garrison, William L. and Reginald R. Souleyrette II
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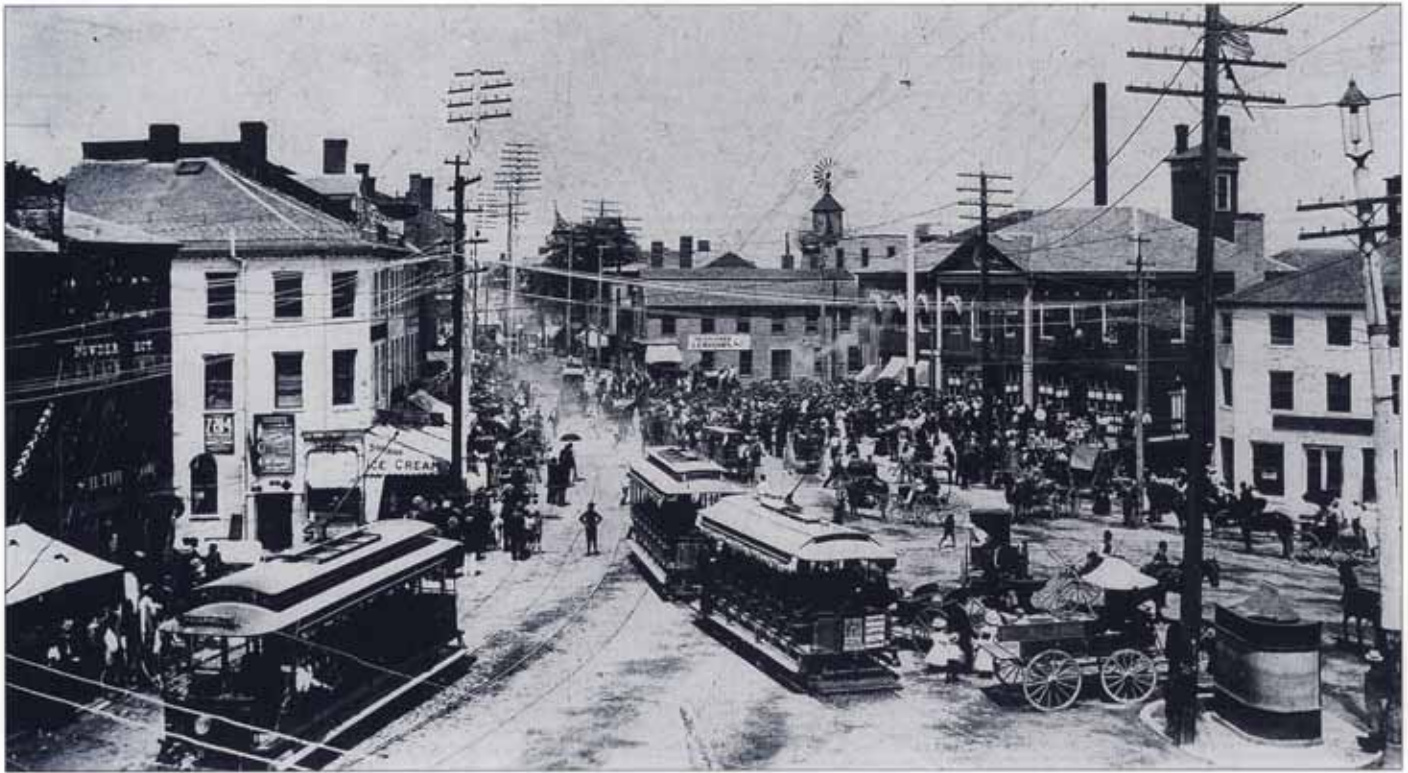
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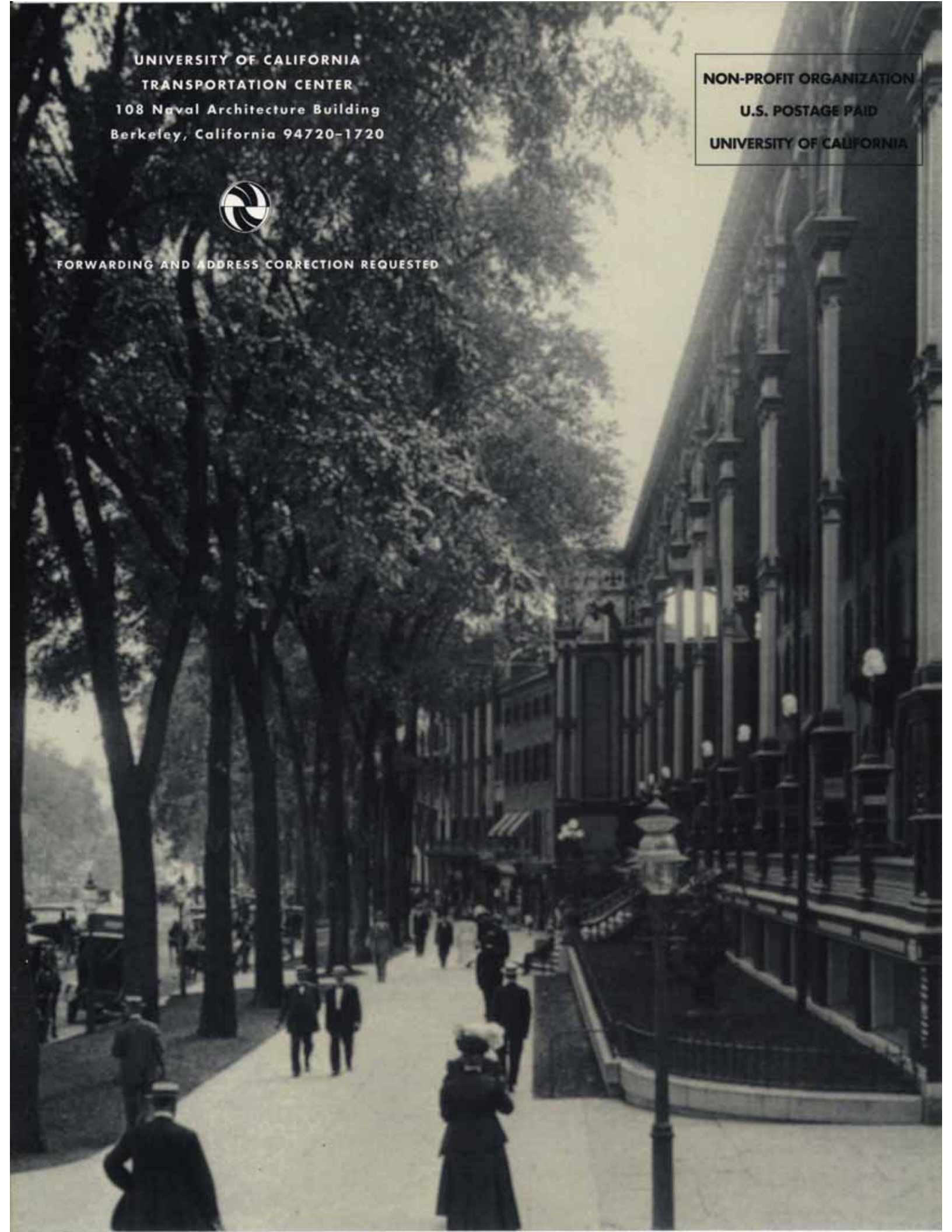
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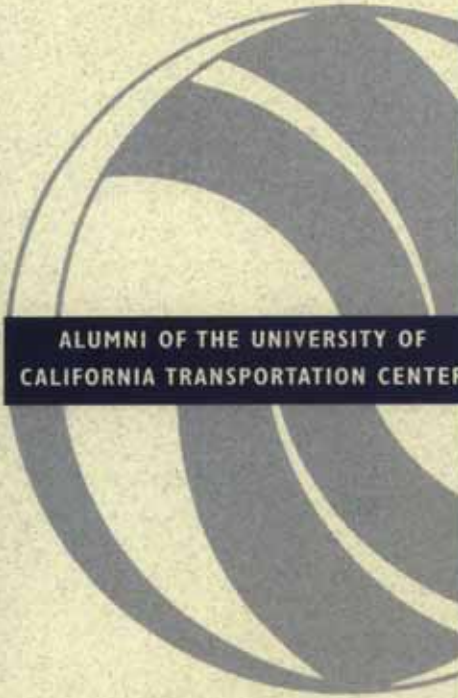
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What can you do with a graduate degree in transportation engineering? Build highways? Predict traffic patterns? Calculate transit costs? Sure. Or, like Jaclyn Landsman, you can venture into policy and politics.

Landsman, a University of California Transportation Center (UCTC) alumna, recently left her management post at the Federal Highway Administration (FHWA) to become State Senator Quentin Kopp's Field Coordinator in San Francisco. Kopp, who chairs the Senate Transportation Committee, invited Landsman to become his District Office Chief of Staff immediately after she completed a four-month internship with his committee.

As a committee consultant, she reviewed proposed legislation to determine its viability. She analyzed a wide range of issues — for instance, allowing electric vehicles in HOV lanes and requiring that DMV information be written in English. “While the nine-member committee can pick up the crux of complex issues,” Landsman says, “we had to determine whether an idea has hidden flaws that make it infeasible in the real world.”

Since 1991 Landsman had coordinated FHWA intelligent transportation systems and congestion management programs in Region 9 (California, Nevada, Arizona, and Hawaii). She received numerous FHWA awards, including the “Special Act

Award” for effective program management and the “On the Spot Award” for developing a training course. In 1995, she was one of two FHWA members selected for the Federal Women’s Executive Leadership Program.

Landsman’s impressive record belies her age — she’s thirty-one. Growing up in Huntington Beach, California, she demonstrated a propensity for mathematics in grade school and always planned to be an engineer, just like her father.

She chose transportation engineering over the other engineering disciplines partly, she says, “because it’s people-oriented.” Recalling her childhood days, when she’d sit at a red light and wonder why the signals weren’t coordinated, she says, “Traffic affects everyone. It’s a multidisciplinary field that engages not only city planners and engineers, but the general public too.”

Landsman’s career interests have focused on the social consequences of transportation — on how to use transportation to improve the average person’s life. “Decision-makers don’t always seem to understand what most people really care about,” she says. “They’re often too removed from the day-to-day realities of commuting and from some of the failures of mass transit.” With her current position in state government, Landsman now has an opportunity to facilitate the kind of policy changes that got her to enter the field at the outset.

Landsman earned a bachelor’s degree in civil engineering in 1988, followed by a master’s degree in transportation engineering in 1991, both from the

University of California, Irvine. During her master's program, Landsman received a UCTC grant to fund her thesis research, "Dynamic Travel Environment Change as an Outcome of Travel-Related Stresses." Her study analyzed how people make travel choices based on their demographics and desired destinations. She demonstrated that travel behavior remains unpredictable because people often don't always act consistently, thus posing a large dilemma for travel forecasters.

"My results may have been somewhat inconclusive, but the project allowed me to enter an ambiguous area and create my own hypotheses. Doing independent research forced me to deal with the unexpected inconsistencies that occur when using real data rather than just textbooks." She cites Professor Wilfred Recker as a mentor who gave her the confidence to think for herself. "He taught me that in most cases there are no right or wrong answers. Instead, the focus should be on the processes of finding relevant directions — of searching for better ways."

In five years, Landsman has drawn on her work in transportation engineering of federal highways to build a career in the politically turbulent world of state government. She exemplifies a new breed of transportation engineers who are expanding the concept of engineering to encompass public finance and social policy.