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A New Planning Template for Transit-Oriented Development

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Appendix A Only:
REVIEW OF SELECTED TOD LITERATURE

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16. Abstract: The Norman Y. Mineta International Institute for Surface Transportation Policy Studies (IISTPS) at San José State University assigned a project team to design a planning template for transit-oriented development (TOD) that incorporates an understanding of nonwork travel, that is, trips for shopping, eating out, and engaging in recreational and cultural activities. Nonwork trips are growing in significance and now account for four of every five person trips. At the same time, TOD has become a popular planning response to the impacts of metropolitan growth. Some planners believe that TOD will induce more pedestrian and transit trips, and will reduce the average length and frequency of household auto travel. This effect is assumed to result from improved accessibility to employment and nonwork venues located in compact, mixed-use centers. Planning professionals in many MPOs also suggest that if multiple centers are linked by high quality transit, such as light or heavy rail, access is enabled to the broad range of nonwork activities.

The project arrived at these essential findings: (1) Venues for nonwork activities are very numerous and geographically dispersed. (2) The spatial environment for nonwork activities is the result of growing prosperity, technical innovation, and a dynamic, competitive marketplace. (3) The consumer marketplace will provide many more places to go than mass transit can cost-effectively serve. (4) Current metropolitan planning methods and modeling tools focus on the work trip and do not adequately account for the complexity of nonwork trips and their linkage to work trips.

These findings support the need for a new regional planning process to complement current methods. One recommended approach is that metropolitan communities establish a Nonwork Travel Improvement Planning Process using a multidisciplinary expert advisory group interacting with a core, Internet-enabled professional transportation planning staff. An iterative interaction across varied but relevant skill sets could be achieved through a Backcasting Delphi process. The focus of the interaction would be on understanding the ramifications of consumer and retail industry behavior for TOD and other new transportation strategies, and then assessing the available strategies for cost-effectiveness in reducing the impacts of growth and automobility in a complex and uncertain metropolitan market environment.

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APPENDIX A:

REVIEW OF SELECTED TOD LITERATURE

A number of researchers have been actively testing various features of the TOD paradigm and the premise that government actions can significantly reshape urban form and travel patterns so that a greater share of urban travel is by mass transit. We very briefly review and cite selected examples of their work. These papers touch on, to various degrees, important TOD issues, including nonwork activity patterns and the land use-transportation linkage. We provide direct quotes (in italics) that appear to summarize key findings and conclusions. While this review does not by any means include all of the research literature on these topics, we believe these authors and papers to represent a consistent and comprehensive perspective of the current state-of-understanding.

Marlon Boarnet

Marlon Boarnet is associate professor, Urban Planning and Economics Departments, University of California at Irvine, and research associate of UC-Irvine's Institute of Transportation Studies. His interest is how local governments actually implement TOD. In a series of papers and a forthcoming book with Randall Crane, Boarnet addresses the financial and other objectives of local governments that can differ from regional planning goals.

Boarnet investigated the development of housing at 232 station-areas across Southern California, and compared the intensity of housing with that allowed under local zoning (Boarnet & Crane 1997). He found that municipalities behave as if they prefer to use rail transit stations for economic rather than residential development. There is a stronger trend toward commercial rather than residential zoning that is consistent across existing and proposed rail lines, whether in central or suburban communities.

Residential development appears to be a secondary goal, at best. Left to their own devices, almost every city wants the train to bring people into town in the morning rather than send them elsewhere (in order to maximize the fiscal and economic benefits).

Boarnet suggests that this creates an imbalance in the form of an excessive number of employment and shopping 'destination' stations relative to the

number of residential 'origin' stations. And he doesn't believe that California is unique.

The cross-jurisdictional economic competition that makes transit-based commercial development attractive in Southern California is also characteristic of many other urban areas. The tensions that prompt municipalities to think first of their own economic development have, if anything, grown stronger over time.

In a follow-up paper, Boarnet suggests that local fiscal concerns are evident in a broad range of planning activities beyond transit-oriented development (Boarnet & Crane 1998).

Anecdotal evidence suggests that local competition for regional shopping malls and big-box retailers is becoming increasingly intense. In the past, researchers have studied incentives for fiscal zoning focusing on attempts to increase the local property tax base. In California, and likely in other states also, fiscal pressures are increasingly focusing on land uses that generate sales tax revenue. Fiscal competition now is over commercial uses, and the ramifications of these new fiscal pressures are not fully understood.

Boarnet undertook a more detailed study of TOD implementation in San Diego that has the oldest of the current generation of light rail lines (Boarnet & Compin 1999). He found, through detailed interviews with planning directors, that cities along rail routes, though sympathetic to regional rail planning objectives, have approached TOD from a perspective of local goals, opportunities, and constraints.

The lesson from San Diego County is that progress towards TOD goals is often incremental. TOD projects are the results of a number of local governments acting in their own interests, pursuing opportunities as they present themselves, and working within local constraints. The legacy of preexisting land uses (and rights-of-ways) is an important determinant of TOD implementation. Placing rail lines along high-growth corridors can be expensive, especially when those corridors do not have suitable existing rail rights-of-way. Whether TOD benefits, such as an increase in transit ridership, outweigh the cost of placing a line along a high growth corridor is open to question.

Boarnet and a coworker also modeled the effect of general neighborhood land use variables (extent of grid street pattern, population density and retail and service job concentrations) on nonwork automobile trips, using southern California travel diary data (Boarnet & Sarmiento 1998). None of the land-use

variables was found to be significant either individually or jointly, which is consistent with the findings of Crane. Based on the results, they conclude:

We are not yet ready to make transport policy based on the link between nonwork travel and land-use patterns. The primary lesson to emerge from this study is that any link between land use and nonwork trip generation is a complicated one.

The authors suggest that several issues need to be addressed in further research: New Urbanists designs are at a neighborhood scale, whereas nonwork trips cover much larger areas; the possibility that persons choose their residential location based in part on how they wish to travel; and the complexity of non work trips, i.e., trip chaining.

Robert Cervero

Robert Cervero is professor, Department of City and Regional Planning, University of California at Berkeley. He and his coworkers have conducted many studies of the relationship between travel patterns and urban design features, both in the United States and abroad. Cervero has published extensively in transportation and planning journals, and has written several books on the topic of the land use and transportation problem.

Cervero's perspective is clearly one of support for a menu of government policies that can have some impact on urban form in ways that will reduce the effects of automobility. Yet, he tempers his enthusiasm for these efforts with a pragmatic assessment of what has been experienced and can be expected in terms of actual outcomes.

Cervero comments on the concern expressed about light rail systems (1998a):

Proposals to build and extend fixed-guideway systems, especially light rail, in the United States have triggered a wrath of criticism. Even cities that show great promise, such as Portland, have come under attack, and with some justification. The track record with new rail systems in the United States leaves a lot to be desired. Studies show that new-generation rail systems have failed to produce the ridership that was promised and ended up costing more than was forecast.

Although the reasons for transit's poor showing over the years are many, the gross under pricing of automobile travel—especially along heavily trafficked corridors where transit is most needed—heads the list. An absence of coordinated and comprehensive planning, carried out on a regional scale, is also to blame. Putting a point-to-point rail system in a sea of spread-out, auto-oriented development is hardly a recipe for successful and sustainable

transit. Quite simple, too often across America, transit and cityscapes have been way out of synch.

Of course, transit investments that are out of kilter with how our cities and regions grow do nobody any good. Running trains and buses that fail to draw people out of drive-alone cars does little to relieve traffic congestion, conserve fuel, or reduce pollution. The best prescription for filling trains and buses, and winning over motorists to transit, is to find a harmonious fit between transit systems and the cities and suburbs they serve.

Cervero also comments on bus rapid transit, debunking what he terms the myth that bus transit is incapable of shaping urban form and attracting high-rise development around stops:

Besides buses being stigmatized as a second-class form of conveyance, the conventional wisdom holds that buses repel development because of their negative-byproducts: diesel toxins that spew from tail pipes. Experiences around busway stops in Ottawa and Curitiba should put this myth to rest. In both cities, some of the priciest condominiums anchor sites adjacent to busway stops. Retail and office developers also flocked to busway corridors in both cities. Good quality service—whether vehicles are propelled by electricity or fossil fuels, or whether they roll on steel wheels or pneumatic tires—will spawn compact development. It is the accessibility premium that attracts real estate development, not the type of transit equipment. In fact, compared to freeways and even rail corridors, busways produce relatively low ambient noise levels. Its inherent flexibility advantages and superior adaptability to spread-out patterns of development make bus transit—especially when combined with dedicated busways—a potentially stronger shaper of growth patterns than rail transit in some settings.

Cervero has also reviewed TOD in California which he has actively sought to promote through government polices (1998b):

Despite successes, the track record with TOD in California has not always been positive. Far more growth in the Bay Area has been auto-oriented than transit-oriented, despite BART's 25-year presence. A number of stations along Sacramento's light rail line have attracted big-box retail projects; despite repeated efforts by the Sacramento Regional Transit Authority to promote TOD, in the final analysis, the prospect of localities receiving large sums of sales tax revenues won out over regional concerns, like TOD.

In a separate study, Cervero and a co-author estimate that only about 9 percent of the residents from the three BART-served counties lived within a half mile of a BART station in 1990 (Bernick & Cervero 1996). And 1990 Census

journey-to-work data indicate that only 18 percent of these station-area residents commuted by rail transit. Multiplying these two percentages led them to conclude that fewer than 2 percent of 1990 commute trips within the three counties were by station-area rail users.

Doubling the number of station-area rail users would have a pretty small impact on current commuting and environmental conditions in the Bay Area.

The two authors suggest that more than singular measures, such as transit-based housing are needed if outcomes are to be more than minimal.

Transit-oriented development matters when bundled together with other supportive policies.

They call for fundamentally different settlement patterns and pricing arrangements for driving:

Putting more suburban jobs in office towers near rail instead of sprawling business parks would no doubt make these numbers more impressive. So would dramatically raising the price of fuel and parking (so that motorists pay for externalities they create, including time losses and air pollution).

Urban villages, they suggest

...would tap the synergy of orienting the future growth of both ends of the commute trip—homes and workplaces—to rail, in addition to retail shops, restaurants, entertainment centers, and other urban uses. Land-use initiatives, like transit-supportive development, by themselves are clearly no panacea to today's congestion, air quality, and social equity problems.

Randall Crane

Randall Crane is associate professor of urban planning, environmental analysis, and economics at the University of California, Irvine. He has done extensive modeling and empirical analysis of the possible influence of urban design factors on travel behavior, and has authored several papers and is co-authoring a book with Marlon Boarnet on the subject which is due to be published in September 2000.

We refer here to only two papers, in which he summarized the results of his work (Crane 1998, 1999). Crane's concern is that much of the analysis that purports to support the belief that changes in urban form can shape travel behavior is problematic. It does not, in his opinion, have a strong behavioral foundation. Crane has attempted to improve the research on TOD by isolating the separable influences of urban design on travel.

Individuals make choices based on their preferences for benefits obtained by travel and on the relative costs of making different trips and of taking different

modes. Past empirical research about the influence of neighborhood design on travel has neglected the role of costs in choosing among trips and modes.

Crane believes that individual design elements, such as grid street patterns, traffic calming features, and a concentration and greater mix of uses, may both increase and decrease car trips and VMT. Walking trips may be similarly affected. Crane cites the example of shopping:

People may shop more often if stores are nearby, and they may make so many shopping trips that they drive more miles.

Crane believes the net effect of urban design features on travel is uncertain at best, and that actual outcomes depend on specific details of implementation at each location, not on their intrinsic traffic-affecting properties.

There is no evidence that New Urbanist's designs influence travel behavior at the margin. They remain a wobbly foundation indeed for current transportation policy.

Crane comments on previous research involving the effect of urban design on travel:

Any empirical work of this nature is problematic given the enormous complexity of the behavior to be explained and the great difficulties of conceptualizing the interaction of travel and the physical character of the city.

Anthony Downs

Downs is a senior fellow in the Economic Studies Program at the Brookings Institution (Washington, DC). He has analyzed and commented on the patterns and problems of American urban areas for more than three decades. His recent books include strategies to address traffic congestion and the renewal of large older central cities. He has also written on the problem of urban sprawl. Downs' perspective is often conditioned by what he feels is politically possible and feasible in the American system.

Downs often uses simple spatial models to elucidate his points. He did so to estimate the effect on transit commute mode share of a major radial mass transit system serving the central city's employment center (Downs 1992). He concluded that

...even an extensive rapid transit system serving many high-density housing clusters near their stops would carry only relatively few suburban commuters. The results would be minor in comparison to the economic and political efforts required to build and maintain the transit systems and create high-density clusters.

Downs subsequently extended this analysis by estimating the size of the TOD areas and rail transit system required to accommodate the population growth experienced by the average Metropolitan Statistical Area over one million in population in the decade of the 1980s (Downs 1994). He found that the system would have to be much larger than the actual systems in either the Washington, DC, or the San Francisco Bay metro areas, yet those areas have much larger total populations than the population used to calculate the model.

Realistically, it may not be feasible to accommodate all or even most urban growth in transit-oriented developments. The feasibility of applying them on a large scale is weakened by the high cost of building the rapid-transit links among them. However, Calthorpe's TODs should be viewed as building blocks that could be used to handle some significant part of growth in the range of visions except the unlimited low-density vision.

In a contribution to a multifaceted discussion of sprawl, Downs sounds a rather pessimistic note about government's ability to adopt tactics that effectively address the growth problems plaguing many metro areas (Downs 1998).

Effectively adopting any of these tactics, or certainly most of them, would require a strong region wide implementing body. Yet hardly any US metro areas have been willing to consider doing this. Nor is it certain that these tactics would overcome a region's growth related problems. For example, I am positive that traffic congestion will get worse almost everywhere, no matter what tactics anyone adopts. Until advocates of limited future sprawl can overcome the metropolitan majority's belief that the benefits of sprawl outweigh its social costs, they are not likely to notably reduce sprawl's dominance.

Kenneth Dueker

Ken Dueker is professor of Urban Studies and Planning and director of the Transportation Studies Center, Portland State University. He directed the Center for Urban Studies at PSU from 1979 to 1998. His areas of research interest include transportation and land use interactions.

Dueker and his PSU colleagues have been closely monitoring the impacts of Portland's light rail transit system and its TOD strategy. Just as the State of Oregon has been a testing ground for strong growth controls, Portland is a laboratory for TOD. Its Eastside light rail line, the first in a planned metro-wide radial network focusing on downtown Portland, opened in 1986. Portland has gone to considerable lengths to encourage development that supports light rail.

Dueker has used data for the first 10 years of operation to research the impacts of the rail line on development patterns, choice of residential location, freeway traffic, and transit ridership (1999a). In a presentation at a 1999 conference (1999b), Dueker reported that:

What we have found is that light rail alone has not been sufficient to change development patterns appreciably.

He sees an apparent self-selection in housing location choice. People who are already prone to use transit are willing to relocate to areas accessible to light rail, but rail has not had an impact on traffic congestion.

What we're observing is that the peak period for highway traffic is widening, and that non-peak and weekend travel on light rail is where the growth in transit riders is occurring.

And Dueker has concerns about the transit component of Portland's TOD.

A lot of bus lines, including express bus lines, have been discontinued, and a lot of people have been forced onto light rail and to make transfers. Light rail in suburban service has problems. When you get 15 miles out, you're almost an hour by light rail to downtown, because it has to stop at every stop. I think that express bus service could do a better job for the suburban commute.

Dueker confirms that Portland's success at controlling growth is somewhat clouded by its proximity to Clark County in Washington State, which is a bedroom suburb just across the Columbia River (1999c). Clark County is the most rapidly growing county in Washington State, with an annual population growth rate that surpassed even the high range of forecast population. Its 1999 population accounted for approximately 25 percent of the Portland-Vancouver urbanized area.

Reid Ewing

Reid Ewing is with the Surface Transportation Policy Project in Washington, DC. He formerly was associate professor, College of Engineering and Design at Florida International University. He has authored books on development practices and transportation and land use innovations, as well as research dealing with travel patterns in Florida communities and their land use relationships (Ewing, et al, 1994). Ewing wrote a lengthy paper from the "anti" sprawl perspective as counterpoint to a "pro" sprawl paper by Peter Gordon (Ewing 1997). We quote from that paper.

We include Ewing because he is a thoughtful proponent of strategies to minimize auto externalities. Ewing believes that sprawl, that he defines as suburban development lacking accessibility and open space, is not a natural

response to market forces, but a product of subsidies and market imperfections. His solution is active planning as it is practiced "almost everywhere but the United States."

Ewing's analysis of Florida suburban communities found that regional accessibility, not land use density, is the most significant land use variable. In other words, land use patterns that recognize that density is not feasible but provide more services in closer proximity can reduce some auto trips. Ewing also recognizes that

As suburban areas grow, the central city becomes less and less accessible. At some point, emergence of other centers is beneficial.

He favors "good" development over "bad." He cites Florida's best practices as an example of an initiative to upgrade the quality of development, "wherever" and "whenever" it should occur. Cluster development, which concentrates housing and commercial in walkable areas while preserving a large part of the land area as park or natural open space, is one approach.

Peter Gordon

Peter Gordon is professor of planning and economics in the School of Urban Planning and Development and the Department of Economics, University of Southern California. Gordon, often together with his colleague Harry Richardson, has authored numerous research papers addressing the forces shaping the growth of major metro areas and associate travel patterns.

Gordon (& Richardson's) general premise is stated in the first sentence of his "pro" sprawl article:

The revolution in information processing and telecommunications is accelerating the growth and dispersion of both economic activities and population, possibly moving towards the point where 'geography is irrelevant' (Gordon & Richardson 1997).

Gordon has a blunt opinion of high-capacity transit and TOD.

Low densities make high-capacity transit systems unattractive and therefor wasteful of all resources utilized, including energy. Because the spreading out of cities reduces markets for conventional public transit (especially fixed rail, which is spatially inflexible and usually oriented downtown, it should be no surprise that the US transit industry has been in decline for most of the 20th century. Massive subsidies have not helped. New federally assisted systems have not added to mass transit; instead, they have replaced flexible bus routes with costly fixed-routes to a few downtown areas, while the growth of jobs and population has been in the suburbs and in the smaller cities. At the same time

transit fleets in general are under used, and the new systems have added to costs without attracting riders from cars.

Citing Cervero and Downs, he says:

It appears that 'Neo-traditional' neighborhoods do not make much of a difference.

Genevieve Giuliano

Giuliano is professor and vice dean, School of Policy, Planning and Development, University of Southern California. She has investigated the land use and travel impacts produced by the high accessibility that modern roadway systems create, and the effectiveness of land use policy on reducing congestion and the environmental costs of automobility. Giuliano has also contrasted the land use-transportation relationship in Europe and the United States.

Because of the federal highway program of the 1950's through the 1970's, she observes that Metro areas are marked by well-developed transportation systems (Giuliano 1995):

Even a large investment (such as a new freeway segment) will have only an incremental effect on accessibility. Moreover, the decentralized land use pattern of today's metro areas has reduced differences in accessibility among locations.

Giuliano also observes that rail transit continues to have strong public support, in spite of "rather overwhelming evidence" that transit investment is not an efficient means for affecting land use patterns (1). She cites Los Angeles as the most extreme example of this view.

Planners expect this massive program (originally a $78 billion rail-transit investment) to increase the proportion of commuters who use transit from 4.5 percent to 19 percent by the year 2010, through the generation of high-density and mixed-use development along transit lines. To test whether their expectations were reasonable, the regional planning agency sponsored a study using a transportation forecasting model to determine the effect of various land use scenarios on transit use. Results show that by relocating 75 percent of all forecast employment growth and 65 percent of all population growth in the 5-county region to transit-station areas, 7 to 10 percent of commuters would use transit. Study authors conclude that even if anticipated land use changes were to occur, travel patterns would not change very much, because the overall regional pattern of land use would not change very much.

Giuliano does not view land use policy as an effective means for reducing the environmental impacts associated with private vehicle use (Giuliano 1999):

Significantly less private vehicle use would require substantial increases in densities from existing levels and a reversal of development trends that have been in progress for many decades. I do not think such increases in density can be achieved, and increases in density that might be achieved would have at best very little effect on private vehicle travel. The trends in car use and decentralization are powerful (even in Europe where government land use controls are stronger and where tax and pricing policies favorable to car ownership and use are not present). They are supported by changing economic structure and rising affluence, and there is no reason to believe that fundamental shifts away from these trends will occur in the future. The greatest success in addressing automobile externalities has been realized by regulating the car, rather than the driver.

Susan Handy

Handy is Assistant Professor of Community and Regional Planning, School of Architecture, University of Texas at Austin. Part of her research was done at the Institute of Transportation Studies, University of California at Berkeley.

Handy was the first researcher to question the suggestion by supporters of New Urbanism that traditional urban form (rectilinear street patterns, sidewalks, accessibility to transit service, and proximity to a mix of commercial establishments, including jobs) discourages automobile dependence (Handy 1991). She points out that there is a tension between providing local services and regional transit links:

- *The ability of residents to live and work in the same place is limited by numerous constraints, including the match between employee qualifications and employer needs, dual wage earner households, job security, etc.;*
- *The growing variety and complexity of lifestyles requires a number of services that can't be supported by a small neighborhood population;*
- *Residents may choose not to use local services if they have easy access to other areas, and if other factors that affect destination choice play a role. These include price, quality of service, habit, etc.; and*
- *Services evolve over time as the size and character of the population changes; what is sufficient to encourage use of local facilities now may be insufficient in the future.*

In a series of papers (Handy 1992, 1996a, 1996b, 1996c), she addresses the effect of TOD design elements on mode choice, particularly pedestrian travel to nonwork destinations, in San Francisco Bay area and Austin neighborhoods. In the most traditional Austin neighborhood, 95% of residents live within

walking distance of the neighborhood commercial center. She both surveyed and modeled the travel behavior of residents.

Handy finds that certain design aspects can encourage walking trips but the savings in travel from substitution for driving are likely to be small. For San Francisco:

The evidence does not support the popular belief that neo-traditional style development will help reduce levels of nonwork travel (Handy 1992).

For Austin:

The total savings in automobile travel appears to be on the order of 8 km per adult resident per month—a drop in the bucket when average driving per month is approximately 2000 km per household (Handy 1996a).

Handy, based on further detailed analyses of the San Francisco neighborhoods, suggests that some land use policies may help provide alternatives to driving, but their effectiveness in reducing total travel will be at least partially offset by the range of choices available to residents of a metropolitan region (Handy 1996b).

A greater range of choice seems to be associated with greater trip frequency; a greater range of choice may induce some trips that would not have been made given more limited choices. And the greater the range of destinations visited, the longer the average trip, such each additional destination is farther away.

Handy suggests that the overall policy goal—namely that of reducing auto travel—toward which much of research on the link between urban form and travel behavior is directed, should be reconsidered (Handy 1996c).

Land-use policies are likely to have only a marginal impact on travel given the extent of existing development and the relatively small increment that new growth represents. Certainly it is important that any development that occurs be designed appropriately so as to minimize the need for automobile travel, but other strategies to manage travel demand, such as pricing strategies, are also needed.

Richard W. Longstreth

Longstreth is an architectural and urban historian whose interest is in understanding the role of the retail marketplace in shaping the modern metropolis. In a comprehensive study (Longstreth 1997), he has traced the evolution of the regional mall in Los Angeles in the mid 20th-century, and how these shopping centers, together with the rapid growth of private vehicles, shaped the land use and travel environment of the city and region.

His book is an observational and deductive work, relying on photographs, maps, and historical records found in newspapers and other documents. From this evidence, Longstreth sees relationships and patterns that lead him to draw several conclusions about the importance of retail in the building of Los Angeles and post-auto cities generally:

...(M)ost historical studies of how the automobile has affected the landscape imply, at least, that the process was un- or even anti-urban, ultimately leading to decline and decay in the city. Such characterizations, however, ignore the inherently urban circumstances affecting change in the commercial sphere. Los Angeles reveals that the automobile was not an isolated cause but one of several factors that contributed to a recasting of metropolitan form rather than its destruction.

Just as Los Angeles is one of the major population, business, and cultural centers of the nation, so retail development is a key indicator of urban form and identity. No other single component of the city attracts so many people so frequently and for so many reasons. No other more frankly reveals current attitudes toward public assembly and decorum. No other so clearly reflects change both in market conditions and consumer taste. No other embodies more fully the unyielding impact of motor vehicles on the landscape.

At a time when "sprawl" is becoming a code word for urban ills, much as "congestion" and "overcrowding" were two generations ago, we need to be careful not to condemn in wholesale fashion the environment created in recent decades. My argument is not to defend all that has been developed in the recent past, nor is it against the strategies for change, but only that we should not repeat the mistake of previous generations who dismissed cities of the nineteenth and early twentieth centuries as wastelands. Only through understanding the modern metropolis can our choices for the future be informed, rational, and productive.

Daniel Luscher

Luscher is manager, economics and policy analysis, Acurex Environmental Corporation, Mountain View, CA. The paper summarized here is based on work done at the J. F. Kennedy School of Government, Cambridge, MA.

Luscher's work is unique because it directly addresses a central public concern: congestion. He estimated the congestion reduction benefits of TOD in the San Francisco Bay area using a simple spatial model (Luscher 1995). His analysis focused on residential development and did not directly address the role of TODs in altering commercial development patterns. Luscher found that, employing optimistic travel behavior modification assumptions, that redeveloping the area around most of the existing rail transit stations,

coordinating similar development around feeder bus routes, and clustering one-fifth of the region's population in these areas would reduce vehicle miles traveled by 5 percent. The strategy would offset about three years of VMT growth.

Luscher concludes that TOD would not have a significant impact on the Bay Area's congestion problems but may have collateral benefits.

It is clear that TOD is inappropriate as the foundation of a congestion reduction strategy for the Bay Area. To the extent that TODs are a part of a larger scale rethinking of urban design, they are likely to have worthwhile non-transportation benefits, such as an enhanced sense of community and the preservation of open space on the suburban fringe.

Douglas Porter

Porter is president of The Growth Management Institute, Chevy Chase, MD, and a planning and development consultant. He has written and edited books on growth management, and was the author of the Transit Cooperative Research program study of transit-focused development in 23 US cities and metro regions (Porter 1997, 1998). We excerpt and summarize here some of the conclusions he reached in the latter research.

Porter was interested in the effect of TOD-supportive policies on development around light and heavy rail station areas. He did not probe for actual transportation benefits. What he observed were actual patterns of development that, in some cases, were the result of governmental efforts over several decades. His analysis suggests that transportation and land use planners, who have expectations that TOD can reduce auto dependency, must recognize the realities of the real estate markets, public attitudes, and the nature of rail lines themselves.

Especially along light rail lines, development opportunities will be influenced by changes in the development industry and its primary markets, increasing deference to neighborhood groups regarding development impacts, and the generally lower intensity of use of suburban rail stations compared to stations along heavy rail lines. Unlike experience with heavy rail systems, non central business-district stations on light rail lines are more likely to attract relatively small, uncomplicated projects (Porter 1998).

Porter found that the intensive development that has taken place has occurred mostly in central business districts and some midtown and inner suburban locations.

Except in older cities and downtown area, development falls short of the density and design thresholds needed for generating significant transit

ridership; transit-focused development still remains more a concept than a reality in most regions. The primacy of the automobile and the desire of most North Americans to live and work in low-density surroundings strongly dissuade market forces and governmental policies from producing densities and forms of development most supportive of transit.

Jonathan E. D. Richmond

Jonathan Richmond is a fellow at the Taubman Center for State and Local Government, Kennedy School of Government, Harvard University. Richmond has extensively studied light rail systems built in the US since 1970. He recently published a review of the capital and operating costs, and the ridership levels, of these systems (Richmond 1998a). His findings correspond with earlier work by Pickrell who found that costs typically were underestimated and ridership was overestimated.

Richmond has also investigated the reasons rail systems are highly popular in spite of considerable evidence that they do not perform well (Richmond 1998b). This may be his most interesting and useful work for TOD planning. It is only possible to distill the essence of this work into a few selected quotes, since space limits a thorough review.

Transportation as a problem is most basically understood as a static concept—a derived demand. But transportation is part of a complex and dynamic system of elements that overlap and interact in a plethora of ways at a given point in time and whose interaction patterns shift over time in response to those interactions.

The public-sector response to transportation problems has focused on transportation facilities and not the underlying problems.

There are frequent references to the need for a 'balanced' transportation system. The idea of 'balance' is attractive because it simplifies complex ideas into a physically based metaphor.

The train is seen as necessary part of a balanced system, excluding the possibility that rail service may not be appropriate for all cities. The vast per capita expenditures on the rail system take away opportunities for the more productive use of scarce resources.

The artificially created 'urban village' does not reflect the richness of today's multifaceted and overlapping urban possibilities. Residents will remain attracted to exploiting the overlapping richness of the city with automobiles in ways that remain beyond the ready capabilities of public transport.

The assumption that people will use local facilities in a village-like community setting and that they will cycle to the train station along dedicated landscaped cycle routes is easy to make if you do not appreciate the web of complex interactions for work, shopping, and leisure that automobility has created throughout the metropolis.

Recognizing that transportation is inevitably tied in an intricate web of overlaps with all other urban functions and with the rich morass of human life complicates the planning task but makes it more likely to succeed.

The successful transportation planner of the future must move from attempting to shape lifestyles in ways that cannot succeed in a democratic society to instead appreciate the many dimensions of how people have chosen to live and interact across space and how this relates to their aspirations for life in the future. And then accommodate their wishes in environmentally responsible ways.

BIBLIOGRAPHY FOR APPENDIX A

Bernick, Michael, and Robert Cervero. Transit Villages in the 21st Century, New York: McGraw-Hill, 1996.

Boarnet, Marlon G., and Nicholas S. Compin. "Transit-Oriented Development in San Diego County: The Incremental Implementation of a Planning Idea," Journal of the American Planning Association 65.1 (Winter 1999): 80-95.

Boarnet, Marlon G., and Randall Crane. "Public Finance and Transit-Oriented Planning: New Evidence from Southern California." Journal of Planning Education and Research 17 (1998): 206-219.

Boarnet, Marlon, and Randall Crane. "L.A. Story: A Reality Check for Transit-Based Housing," Journal of the American Planning Association 63.2 (Spring 1997): 189-204.

Boarnet, Marlon G., and Sharon Sarmiento. "Can Land Use Policy Really Affect Travel Behavior? A Study of the Link Between Non-Work Travel and Land-Use Characteristics." Urban Studies 35. 7 (1998): 1155-1169.

Boarnet, Marlon G., and Randall Crane. Travel By Design? The Influence of Urban Form on Travel, New York: Oxford University Press (forthcoming).

Cervero, Robert. The Transit Metropolis: A Global Inquiry, Washington, DC: Island Press, 1998a.

Cervero, Robert. "Transit Villages in California: Progress, Prospects, and Policy Reforms." Working Paper 98-08, Institute of Urban and Regional Development, University of California at Berkeley, 1998b.

Crane, Randall. “Travel by Design?” Access 12 (Spring 1998): 2-7.

Crane, Randall. "The Impacts of Urban Form on Travel: A Critical Review," Lincoln Institute of Land Policy Working Paper, Cambridge, MA, 1999.

Crane, Randall, and Richard Crepeau. “Does Neighborhood Design Influence Travel?: A Behavioral Analysis of Travel Diary and GIS Data.” Transportation Research D 3.4 (1998): 225-238.

Downs, Anthony. Stuck in Traffic: Coping With Peak-Hour Traffic Congestion, The Brookings Institution, Washington DC, and The Lincoln Institute of Land Policy, Cambridge, MA, 1992.

Downs, Anthony. New Visions for Metropolitan America. The Brookings Institution, Washington DC, and The Lincoln Institute of Land Policy, Cambridge, MA, 1994.

Downs, Anthony. "How America's Cities are Growing." Brookings Review, 16.4 (Fall 1998) 8-11.

Dueker, Kenneth J., and Martha J. Bianco. "Light Rail Transit Impacts in Portland: The First Ten Years." In Transportation Research Record 1685, 1999a

Dueker, Kenneth J. Presentation to the Center for the New West Forum, "Sprawl and Congestion: Are Light Rail, High Density Living and Transit-Oriented Development the Answer?," Colorado Springs, CO, June 16-17, 1999b.

Dueker, Kenneth J. Private communication with authors, 1999c.

Ewing, Reid. "Is Los Angeles-Style Sprawl Desirable? Journal of the American Planning Association 63.1 (Winter 1997) 107-126.

Ewing, Reid, Padma Haliyur, and G. William Page. “Getting Around a Traditional City, a Suburban Planned Unit Development, and Everything in Between.” In Transportation Research Record 1466, Washington, D.C., Transportation Research Board, National Research Council, 1994: 53-62.

Giuliano, Genevieve. "The Weakening Transportation-Land Use Connection." Access, 6 (Spring 1995) 3-11.

Giuliano, Genevieve. "Land Use Policy and Transportation: Why We Won't Get There From Here." In Transportation, Energy, and Environment (Proceedings of the Conference on Policies to Promote Sustainable Transportation Policies, Asilomar, CA, August 17-20, 1997). Transportation Research Circular 492, August 1999, 179-198.

Gordon, Peter, and Harry W. Richardson. "Are Compact Cities a Desirable Goal? Journal of the American Planning Association 63.1 (Winter 1997) 95-118.

Handy, Susan L. "Neo-Traditional Development: The Debate." Berkeley Planning Journal 6 (1991) 135-144.

Handy, Susan L. "Regional Versus Local Accessibility: Neo-Traditional Development and its Implications for Nonwork Travel." Built Environment 18.4, 1992, pp. 253-267.

Handy, Susan L. "Urban Form and Pedestrian Choices: Study of Austin Neighborhoods." In Transportation Research Record 1552, Transportation Research Board, 1996a: 135-144.

Handy, Susan L. "Understanding the Link Between Urban Form and Nonwork Travel Behavior." Journal of Planning Education and Research 15 (1996b) 183-198.

Handy, Susan L. "Methodologies for Exploring the Link Between Urban Form and Travel Behavior." Transportation Research D 1.2 (1996c): 151-165.

Longstreth, Richard W. City Center to Regional Mall: Architecture, the Automobile, and Retailing in Los Angeles, 1920-1950, The MIT Press, Cambridge, MA, 1997.

Luscher, Daniel R. "Transit-Oriented Development as a Congestion-Reduction Strategy in the San Francisco Bay Area." Berkeley Planning Journal 10 (1995): 55-74.

Porter, Douglas R. “Transit-Focused Development: A Synthesis of Research and Experience.” Transit Cooperative Research Program Report No. 20, Washington, D.C.: National Academy Press, 1997.

Porter, Douglas R. "Transit-Focused Development and Light Rail Systems: The Lite Connection." In Transportation Research Record 1623 (1998): 165-69.

Richmond, Jonathan E. D. New Rail Investments -- A Review. Taubman Center for State and Local Government, John F. Kennedy School of Government, Harvard University, Cambridge, MA, June 29, 1998a.

Richmond, Jonathan E. D. "Simplicity and Complexity in Design for Transportation Systems and Urban Forms," Journal of Planning Education and Research 17 (1998) 220-230.