Public Transit

Introduction

Revised 3-18-09

While public transit has not been the dominate transportation mode in this country for the last 70 years, the United States once led the world in public transit use.[1] In the early part of the 20th century, the rapid population growth of American cities provided ideal settings for introducing new transit technologies.

However, following World War I, Americans increasingly bought cars, such that by 1930 one in every four households owned a car. Following World War II, the automobile became synonymous with the American way of life and essential for accessing the single family detached homes, malls and office parks of an increasingly segregated land use pattern. Levittown was a harbinger of the suburban development pattern fostered by Euclidian zoning with its strict separation of uses, curvilinear streets and minimum lot sizes. A variety of governmental programs further encouraged and directly subsidized this type of greenfield development on the urban edge. These public policies ensured that most new development would occur away from transit lines and be almost entirely shaped by the automobile.

The near exclusive reliance on auto travel in most metro areas has produced a 75.7 percent single occupant vehicle (SOV) commute mode share, peak hour vehicle occupancy of 1.08, increased travel times[2] and increasing congestion. The Texas Transportation Institute's periodic report on congestion shows that the average American annually spends more than 47 hours in congestion with a resulting national cost of 3.7 billion hours of travel delay and 2.3 billion gallons of wasted fuel with a total cost of more than $63 billion.[3] At the same time, road infrastructure funding is severely lacking for both maintenance and system expansion.

[1] Committee for an International Comparison of National Policies and Expectations Affecting Public Transit, *Making transit work : insight from Western Europe, Canada, and the United States*, Transportation Research Board, National Research Council. Transportation Research Board Special Report 257, 2001

[2] Reschovsky, Clara, Journey to Work: 2000 Census 2000 Brief, March 2004

[3] Schrank, David, and Lomax, Tim, *The 2005 Urban Mobility Report, Texas Transportation Institute*, The Texas A&M University System, May 2005

Despite the long history of auto-centric planning and financial subsidies, recent trends show that transit may be reestablishing a significant role in American metropolitan areas. National increases in vehicle miles of travel (VMT) flattened in 2003 and actually declined in 2006.[4] In 2005, for the first time in nearly a century, national transit ridership increased faster than VMT. Since 1995, transit ridership is up 25.1 percent compared to a 22.5 percent increase in VMT.[5]

A number of factors suggest that increased transit use is a more sustainable transportation option. The first of these is the direct relationship between SOV use and energy consumption. For the past 20 years, the US has consumed about a quarter of the world's petroleum production with the transportation sector accounting for 68 percent of U.S. consumption.[6] Travel behavior experience shows that a once a person leaves home as a SOV driver, they tend to make virtually all trips during that day in the car. In contrast, a transit rider tends to be a pedestrian at one or both ends of the transit trip, and will make a majority of trips during the day as a pedestrian with the associated energy savings.[7] On average, the typical public transit rider consumes half the oil consumed by an automobile user, responds to limited oil supplies and is a clear step toward sustainability.

As most transit riders are also pedestrians, closely related factors in sustainability are the potential air quality and health benefits of increased transit use. Increased transit use is a traditional strategy to improve air quality. Alternatively fueled vehicles, compared with private vehicles, produce 95 percent less carbon monoxide, 92 percent fewer volatile organic compounds, 45 percent less carbon dioxide and 48 percent less nitrogen oxide on average per passenger mile.[8] Potential health benefits result from improved air quality, increased activity levels and reduced stress. Transit users tend to walk more as the traditional urban settings that support pedestrians and transit generate about half the automobile trips of similarly sized modern-day suburbs.[9] Finally, in terms of fatalities per million miles of travel, all modes of transit are far safer than personal vehicles. Depending on vehicle type, transit is 26 to 79 times safer than auto travel,[10] resulting in an estimated 190,000 fewer deaths, injuries and accidents annually as well as $2 billion to $5 billion in safety benefits, based on 1994 data.[11]

While often overlooked, increased transit use also contributes to sustainability by improving both personal and regional economics. A two adult "public transportation household", defined as a household located within ¾ mile of public transportation, with two adults and one car saves an average $6,251 every year, compared to an equivalent household with two cars and no access to public transportation service. Household savings on transportation also translate into significant regional effects. In the case of Portland, residents of the metro area drive an average of 4 miles per day less than the average metro area, resulting in an estimated 2.9 billion miles of reduced vehicle travel, a direct cost savings to the

[4] U.S. Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, *Traffic Volume Trends*, available at http://www.fhwa.dot.gov/, as of August 2007.

[5] American Public Transportation Association, *Public Transportation Ridership Up In 2005, Media Advisory*, April 4, 2006

[6] Davis, Stacy, and Diegel, Susan, Transportation Energy Data Book, U.S. Department of Energy, Oak Ridge National Laboratory, 2007

[7] National Research Center, Mode Shift Report, 2003 for the City of Boulder, 2003.

[8] *Shapiro, Robert J. et al, Conserving Energy and Preserving the Environment: The Role of Public Transportation*, *July 2002*

[9] American Public Transit Association, *The Benefits of Public Transportation, The Route to Personal Health*, 2003

[10] Litman, Todd, *Evaluating Public Transit Benefits and Costs,* Victoria Transport Policy Institute, 2006

[11] Campaign for Efficient Passenger Transportation, Dollars and Sense: The Economic Case for Public Transportation in America, June 1997

region of $1.1 billion and time cost savings of $1.5 billion.[12] These travel cost savings results in an estimated $800 million dollars staying within the local economy.

While the relationship between fixed guideway transit, such as light rail and passenger rail, and land use change is well documented in the material related to transit oriented development (TOD), for most communities a majority of their transit service will be bus-based. Bus-based transit has only been marginally integrated into land use planning and the development process as it is often seen as temporary. A recent survey of bus-based planning efforts notes,

Prominent and permanent strategies for moving toward a bus-based, transit supportive community include enhancing the pedestrian environment, changing land use, operational improvements to maintain or increase transit speeds, improving passenger amenities and information, and transportation demand management measures including managed parking.

In addition to good pedestrian design, density and a mix of land uses support pedestrians and transit use. The standard guidelines are shown in the table below:

Communities can also invest in passenger amenities, including features that increase the security, comfort and certainty of the transit patron. These commonly include fully accessible bus stops, lighting, shelters, seating, and route information but can now include real time information on bus arrival times and bus location. Such improvements have a documented positive effect on passenger satisfaction and attraction,[13] and are things that can be required of developers through the local development review process.

Finally, communities can include ongoing requirements and programs for transportation demand management. Transportation demand management (TDM) is a program of specific strategies that promote more efficient use of the existing transportation system by influencing travel behavior in terms of the time, route or mode selected for a given trip. TDM strategies manage the demand placed on the transportation system by increasing travel choices; encouraging the use of alternate modes – carpooling, vanpooling, public transit, bicycling, walking, and teleworking; and, reducing the incentives to use the single-occupant vehicle.

Transit Service Level
Minimum Residential Density

	Dwelling Units/Acre
Minimum Bus Service (once an hour or longer)	4
Intermediate Bus Service (two to three times an hour)	7
Frequent Bus Service (more than three times an hour)	15
Light Rail	9
Rapid Rail	12
Commuter Rail	2

While a variety of TDM strategies can be applied and included in the development review process, managed and paid parking has been shown to have the greatest effect on land development and transit use. Donald Shoup provides the definitive analysis of the effects of free parking[14] and has documented repeatedly that excessive parking requirements are almost universally required by local governments. The minimum parking requirements contained in most zoning codes are based on a shaky foundation of limited data and a misunderstanding of its meaning,[15] and are the single biggest obstacle to creating a pedestrian and transit supportive environment. Even in transit poor environments, the simple strategy of parking cash out that allows the employee to choose to buy parking or keep the cash, results in at least an 11 percent mode shift away from the SOV.[16] While politically difficult, the careful modification of parking requirements and pricing as part of a comprehensive TDM program in bus served corridors is the surest and most significant change that a local community can undertake to support transit.

Goals

1. Increased transit usage by increasing population within the trip shed of transit service and increasing density and mix of uses
2. Eliminate barriers to transit use such as excessive parking requirements and poor pedestrian and bicycle access to transit facilities
3. Promote incentives to increase transit use such as transit fare free zones, reduced impact fees, reduced parking requirements
4. Enact standards that will result in Increase in pedestrian, bike and transit mode share

Implications of Not Addressing the Issue

1. Without an increased modal share of public transit to reduce vehicle miles traveled (VMT), we will be unable to successfully reduce GHG
2. We will be unable to successfully address the social injustice concerns for the 30% of Americans who do not drive an automobile
3. American cities will continue to sprawl in an unsustainable fashion as rail expansion and transit oriented development will only be able to accommodate a relatively small proportion of future population growth
4. Continued dependence on fossil fuels will further hasten the transition to a renewable energy economy

Potential Sustainability Measures:

1. Percent of population within the trip shed of transit service, defined by transit type and service levels. For example, 80% of employees and dwelling units will be located within a half mile of a transit stop
2. Increase in pedestrian, bike and transit mode share within the transit service area, for both work and non-work trips
3. Increase in density and mix of uses within TODs and transit service corridors
4. Percentage of those living in TODs and transit corridors that use transit
5. Percent of managed parking within major destinations, and ultimately within the transit service area
6. Improvement in pedestrian facilities LOS. For example, all parcels within a quarter mile of a transit stop should be served by pedestrian facilities operating at Level of Service C or better.

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[12] Cortright, Joe, *Portland's Green Dividend,* A White Paper from CEOs for Cities, July, 2007
[13] Kittelson & Associates, Inc., KFH Group, Inc., Parsons Brinckerhoff Quade and Douglass, Inc., and K. Hunter-Zaworski. 2003. *TCRP Report 100: Transit Capacity and Quality of Service Manual*, 2nd Edition. Washington, D.C.: Transportation Research Board.
[14] Shoup, Donald, *The High Cost of Free Parking*, Planners Press, 2005
[15] Shoup, Donald, *The Trouble with Minimum Parking Requirements,* Transportation Research Park A 33, p. 549-574, Pergamon, 1999
[16] Shoup, Donald , *Evaluating the Effects of Parking Cash Out: Eight Case Studies*, prepared for the California Air Resources Board, 1997

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KEY STATISTICS:

- For the past 20 years, the US has consumed about a quarter of the world's petroleum production with the transportation sector consuming 68 percent of that.[17]
- National increases in vehicle miles of travel (VMT) flattened in 2003, began declining in 2006 and dropped 3.6 % for the year ending in July 2008.[18] Since 2005, for the first time in nearly a century, national transit ridership has increased faster than the increase in VMT. Since 1995, transit ridership is up 25.1 percent compared to a 22.5 percent increase in VMT.[19] The current use of public transportation reduces U.S. gasoline consumption by 1.4 billion gallons each year or almost 4 million gallons a day[20] compared to a total U.S. daily consumption of about 59 million gallons and reduces carbon emissions by 37 million metric tons annually.[21] Record transit ridership was recorded in the second quarter of 2008 with an increase of 5.2 %.[22]
- In the case of Portland, residents of the metro area drive an average of 4 miles per day less than the average metro area. This is estimated to result in 2.9 billion miles of reduced vehicle travel with a direct cost savings to the region of $1.1 billion and time cost savings of $1.5 billion.[23] These travel cost savings results in an estimated $800 million dollars staying within the local economy
- Travel behavior experience shows that a once a person leaves home as a single occupancy vehicle (SOV) driver, they tend to make virtually all trips during that day in the car. In contrast, a transit rider tends to be a pedestrian at one or both ends of the transit trip, and will make a majority of trips during the day as a pedestrian.
- All modes of transit are far safer than personal vehicles in terms of fatalities per million miles of travel. Depending on vehicle type, transit is 26 to 79 times safer than auto travel[24], resulting in an estimated 190,000 fewer deaths, injuries and accidents annually with $2 billion to $5 billion in safety benefits, based on 1994 data.[25]
- A two adult "public transportation household", defined as a household located within ¾ mile of public transportation, with two adults and one car saves an average $6,251 every year, compared to an equivalent household with two cars and no access to public transportation service. These household savings are significant when put in perspective of other household expenditures, which included an average of $5,781 spent on food, $6,848 spent on mortgage interest and fees, and $3,925 in mortgage principal in 2004. These savings are due to driving less, walking more, and owning fewer cars.[26]
- Transit will only attract discretionary travelers if travel time, cost, comfort and safety are comparable or better than automobile travel. Waiting times and transfers have particularly high costs but these can be reduced by high frequency service and improved traveler information.[27] Experience in Boulder, Colorado shows that transit frequencies of 10 minutes or less are perceived as "schedule free" and that a frequent schedule is a primary desire of choice riders.
- Depending on their level of implementation, operational improvements and BRT service have resulted in a 30 to 200 percent increase in transit ridership[28], and there is growing evidence that the permanent investment in these bus based transit facilities can produce the kind of real estate investment that results from rail transit.
- Transit use is strongly supported by Transportation Demand Management efforts, particularly managed parking. Even in transit poor environments, the simple strategy of parking cash out, allowing the employee to choose to buy parking or keep the cash, results in at least a 11 percent mode shift away from the SOV.[29] In Boulder, Colorado, paid parking in the downtown and University activity centers is a major contributor to increasing alternative mode share by a factor of two to six times over Boulder employees as a whole.[30] Free parking is hug subsidy to SOV use and the requirements for excessive parking are generally the largest impact fee imposed on new development.[31]
- Transit operations are poorly integrated into land use planning or ignored. Bus transit elements are not often considered when planning land developments. One survey revealed that many transit agencies are frustrated by the lack of impact that they have on land development plans.32

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[17] Davis, Stacy, and Diegel, Susan, Transportation Energy Data Book, U.S. Department of Energy, Oak Ridge National Laboratory, 2007

[18] U.S. Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, *Traffic Volume Trends*, available at http://www.fhwa.dot.gov/, as of August 2008.

[19] American Public Transportation Association, *Public Transportation Ridership Up In 2005, Media Advisory*, April 4, 2006

[20] Bailey, Linda, *Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil,* ICF International, January 2007

[21] U.S. Energy Information Administration (2006). Petroleum Navigator, Accessed at http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_nus_a.htm

[22] American Public Transportation Association, *Public Transportation Ridership Surges in 2nd Quarter, News Release*, September 9, 2008

[23] Cortright, Joe, *Portland's Green Dividend,* A White Paper from CEOs for Cities, July, 2007

[24] Litman, Todd, *Evaluating Public Transit Benefits and Costs,* Victoria Transport Policy Institute, 2006

[25] Campaign for Efficient Passenger Transportation, Dollars and Sense: The Economic Case for Public Transportation in America, June 1997

[26] Bailey, Linda, *Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil,* ICF International, January 2007

[27] Litman, Todd, Valuing Transit Service Quality Improvements, *Journal of Public Transportation*, Vol. 11, No. 2, 2008

[28] National Bus Rapid Transit Institute Web site, http://www.nbrti.org/ , accessed 10/1/07

[29] Shoup, Donald, *Evaluating the Effects of Parking Cash Out: Eight Case Studies*, prepared for the California Air Resources Board, 1997

[30] National Research Center, Boulder Valley Transportation Survey: Comparison of Survey Results, prepared for the city of Boulder, 2005

[31] Shoup, Donald, In Lieu of Required Parking, *Journal of Planning Education and Research*, 18:307-320, 1999

[32] Transit Cooperative Research Program, *Bus Transit Service in Land Development Planning*, TCRP Synthesis 67, 2006

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		ACHIEVEMENT LEVELS				
		Bronze (Good)	**Silver (Better)**	**Gold (Best)**	**References/Commentary**	**Code Examples/Citations**
 City of Boulder, CO. Transit Village Plan	**Remove Obstacles**	▪ Minimize planning and discretionary review time for projects in transit zones that are transit supportive ▪ Establish agreements to facilitate the location of transit facilities such as benches, trash cans and transit shelters in the public right-of-way with clear understandings for maintenance and capital replacement	▪ Allow or encourage the transit agency to participate in development reviews relative to the location of transit amenities ▪ Remove or greatly reduce use restrictions within the zoning code to create mixed use environments allowing a variety of needs to be met locally as a pedestrian	▪ Implement best practices for pedestrian facility design and maintenance to provide safe access to transit facilities (*see Pedestrian and Bicycle Systems chapter)* ▪ Remove parking minimum requirements from the zoning code *(see Parking chapter)*	▪ Nabors et al. (February 2008). Federal Highway Administration. *Pedestrian Safety Guide for Transit Agencies*. online. Retrieved March 17, 2009. ▪ For multimodal corridor descriptions that include community character and land use see Redmond, Washington's Transportation Master Plan. online. Retrieved March 17, 2009. ▪ Tri-Met, Portland, Oregon's regional transit agency, has a coordinated plan for bus stop management covering design, partnerships and maintenance: Bus Stop Guidelines 2002. online. Retrieved March 17, 2009. ▪ WalkBoston,a local non-profit, conducts a bus stop audit program to improve safety and access	Silver ▪ City of Portland. *Zoning Code, Section 33.130—Commercial Zones* (see Mixed Commercial/Residential Zone). online. Retrieved March 17, 2009.
  Bicycle carrier on bus, Boulder, CO	**Create Incentives**	▪ Provide enhanced transit information at locations throughout the community ▪ Reduced impact fees for transit oriented development	▪ Create a transit fare free zone for the downtown or other major activity centers ▪ Allow for reductions in off-street parking requirements over time that correspond to increases in development based on the changing character of the area, Transportation Demand (TDM) programs and travel behavior change ▪ Take actions to maintain transit travel times, such as transit signal priority	▪ Within transit overlay zones, provide incentives to landowners for pedestrian and transit supportive development by reducing off-street parking requirements, encouraging shared parking, and allowing for increased density and a mix of uses	▪ Transportation Research Board, Transit Cooperative Research Program. *Understanding How to Motivate Communities to Support and Ride Public Transportation, TCRP Report 122.* online. Retrieved March 17, 2009. ▪ Jeffrey Brown et al. Fare-Free Public Transit at Universities. *Journal of Planning Education and Research,* 23:69-82. ▪ Harriet Smith et al. (May 2005). Transit Signal Priority (TSP) A Planning and Implementation Handbook. *USDoT.* ▪ Bus Rapid Transit: A Handbook for Partners. (Feb. 2007). *CalTrans*.	▪ Williams, Kristine M. and Seggeman Karen E. (April 2004). National Center for Transit Research. *Model Regulations and Plan Amendments for Multimodal Transportation Districts.* See Section 11: Incentives and Section 5 Parking. Available online. Retrieved March 17, 2009. ▪ City of Mountain View, CA. *Zoning Ordinance, Article III, Section. 36.22B. Transit (overlay) District*. online. Retrieved March 17, 2009.
		Bronze (Good)	**Silver (Better)**	**Gold (Best)**	**References/Commentary**	**Code Examples/Citations**

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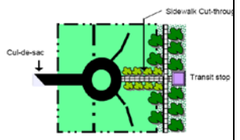
Bus shelter with amenities



Pedestrian cut through to transit stop

Enact Standards

- For developments producing an established threshold of trips require transit stop enhancements such as weather protection, system information, bicycle parking and lifetime maintenance guarantees
- Require a high quality pedestrian design environment within major destinations and in the transit service area
- Require a complete and connected grid of streets at a pedestrian oriented scale of 300-400 foot block faces; alternatively, establish a maximum block perimeter of, for example, 1320 feet
- Alternatively, achieve a street grid density of greater than 30 (centerline miles/square mile)
- For blocks greater than 660 feet in length, require a pedestrian and bicycle mid-block connection
- Increased density and housing choices in transit zones
- Include transit level of service in the traffic impact assessment required through the development review process

- Require that buildings front the street with visible and accessible entrances serving pedestrians and transit patrons
- Add on-street parking to bring activity to the street and define the pedestrian space. On street parking is essential to supporting business entrances fronting the street
- Implement transit overlay zones within high service transit corridors to incentivize transit supportive development (see Incentives section)
- Specify minimum densities or height requirements in select areas in the immediate transit zone

- Include an ongoing TDM program in development review requirements, including continued funding and monitoring of progress.
- Establish parking maximums and unbundled parking requirements in transit overlay zones.
- Establish and expand paid parking at major destinations with high levels of multimodal access.

- Shoup, Donald. (2005). *The High Cost of Free Parking*. Chicago: American Planning Association.
- Litman, Todd. (2006). *Smart Transportation Investments II, Reevaluating the Role of Public Transit for Improving Urban Transportation.* Victoria Transportation Policy Institute. online. Retrieved March 17, 2009.
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- City of Boulder, CO. *Transit Village Area Plan*, This richly detailed plan provides very clear guidance for future development, including enhanced bus stops and ways for mitigating the impact of park-n-ride lots. online.
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- City of Portland. *Zoning Code, Section 33.130.242 Commercial Zones, Transit Street Main Entrance*. online. Retrieved March 17, 2009.
- City of Mountain View, CA. *Zoning Ordinance, Article III, Section. 36.22B. Transit (overlay) District*. online. Retrieved March 17, 2009.

Strategic Success Factors

Regulatory tools must be grounded in solid comprehensive policy planning and accompanied by competent administration and supportive programs.

PLANNING POLICY

1. Include public transit policy in the comprehensiv plan and transportation plan
2. Plan to ensure that adequate land is available for transit support facilities.
3. Include transit agencies in all relevant development review processes
4. Incorporate mobility oriented policies in all transit and transportation planning policy efforts.

PROGRAMS & ADMINISTRATION

1. Support transit promotions such as fare free days or free transit service for special events.
2. Target promotions for transit based on research and values that resonate in your community.
3. Create or support a subsidized transit pass program allowing businesses and neighborhoods to buy annual passes in bulk.
4. Create a community transit pass program providing an annual transit pass to all residents and employees in the community.
5. Create comprehensive and sustainable transportation demand management (TDM) programs as part of transit overlay zones that manage parking and promote walking, biking and transit use
6. Create a dialogue between city planners and city transit organizations to help plan transit stops and sites most likely to benefit from TOD
7. Work with transit providers to ensure frequent, high quality service and implement improvements in travel time and reliability
8. Capital investments can also be made to maintain or enhance bus-based transit service. These operational improvements are intended to either improve bus travel times to increase competitiveness with the auto, or to maintain travel times to preserve the frequency of service without needing to add additional vehicles. Techniques that can be implemented by a local jurisdiction include:
   a. Dedicated bus lanes or bus/bike lanes that remove the bus from congestion;
   b. Signal priority/preemption which gives the bus priority through signalized intersection;
   c. Queue jump lanes allowing the bus to move to the front of the queue at signalized intersections; and,
   d. Improved passenger loading facilities to reduce stop dwell time such as level boarding platforms or prepaid fare facilities.