Toward Sustainable Communities

Revised Edition

Resources for Citizens and Their Governments

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CHAPTER 9

Transportation Planning and Traffic Management

In 1970, Americans collectively drove a trillion miles per year, and by the mid-1990s this figure reached more than two trillion per year. There are more than 220 million registered automobiles in the US alone, and their numbers will soon overtake the country's population.

As cities sprawl farther into distant suburbs, an hour per day in the car has become the national norm. The average family takes 10 car trips a day. Our obsession with the automobile is clearly unsustainable, and has become an addiction.

The National Transportation Board predicts that delays caused by congestion will increase by 5.6 billion hours between 1995 and 2015, wasting 7.3 billion gallons of fuel; 70 percent of all daily peak-hour interstate travel now occurs under stop-and-go conditions, with a measurable "rush hour" stretching through most of the day (Motavalli, 2002).

Unsustainable transport systems not only are a major contributor to atmosphere change, but also lead to increasing congestion, longer commuting times, increasing demands for shorter work hours to compensate for longer travel hours, and higher prices due to reduced worker productivity. In fact, the primary objective of conventional traffic management has been to move vehicles in and around communities as rapidly and efficiently as possible using strategies such as designation of one way streets, synchronization of traffic signals, road widening, and construction of left-hand turn bays.

Governments face increasing difficulties in funding expansion of transportation infrastructure to meet these continuous increases in demand. Even if the enormous financial challenge of meeting demand for such infrastructure could be met, our transportation dilemma would be far from solved. In the words of Whitelegg (1966): "If we build a freeway system or an extended airport system to meet some prediction of future demand, then we should not be surprised to discover that these investments hasten our progress in that direction. Our plans and analyses boomerang so that our efforts are rewarded by the return of the problem, usually with some force and destructive impact."

The term "automobile dependency" was coined in the 1980s by Australian researchers Peter Newman and Jeffrey Kenworthy to help define our transportation

challenges. Rather than try to eliminate cars altogether, an idea which few people consider realistic, we should focus on breaking our addiction to, or dependence upon, the automobile. Almost 88 percent of daily commuters use private vehicles, and the majority of drivers want to move at the same times of day. In 2000, less than 5 percent of all commuters traveled by public transit (Downs, 2004). This chapter examines the costs, both environmental and social, of our current transportation system, the myths of technical fixes, and ways to move toward sustainable transportation.

TRUE COSTS OF DRIVING

Driving a car incurs more costs than gas, insurance, maintenance and parking. For the US as a whole, the total costs from motor vehicles (e.g., air pollution, crashes, noise, time stuck in traffic, run-off into waterways, pollution from manufacturing vehicles, tires, and batteries, and pollution from disposing of them, etc.) include: $20 billion in taxpayer subsidies; $290 billion in social and environmental damage; and $415 billion in costs borne by drivers. The total cost is $725 billion annually (Komanoff, 1995).

There is no clear relationship between the benefits of a car trip and the social costs incurred. Car-related taxes paid by motorists can add up to much more than government spending on roads, but the taxes are usually levied on the car itself, not on its use. One of the most significant barriers to more sustainable transportation systems is the manner in which motorists pay (or are subsidized) for their motor vehicle use. Higher fixed costs of motor vehicle acquisition combined with lower incremental user costs (e.g., free parking, free roads, and in some countries like the US, very low motor fuel taxes) encourage rapid growth of motor vehicle use (Replogle, 1996).

Perhaps our age will be known to the future historian as the age of the bulldozer and the exterminator; and in many parts of the country the building of a highway has about the same results upon vegetation and human structures as the passage of a tornado or the blast of an atom bomb. Nowhere is this bulldozing habit of mind so disastrous as in the approach to the city. Since the engineer regards his own work as more important than the human functions it serves, he does not hesitate to lay waste to woods, streams, parks, and human neighborhoods in order to carry his roads straight to their supposed destinations (Mumford, 1964).

How Fast Are We Really Going?

There may be more costs involved in driving than most of us realize, but at least we get high-speed mobility for our pains, don't we? One study (B. McCann, 2000) found that households in more automobile dependent communities devote more than $8,500 annually, or 20 percent of household expenditures, to surface transportation. Communities with more diverse modes of transportation spent less than $5,500 annually, or 17 percent. Canadians spend over $9,000, on average, to travel 18,000 kilometres with their cars per year (Canadian Automobile Association, 2004).

Traffic, Health and Sprawl

During the 1990s, there was no standard definition for sprawl. Experts compared it to obscenity: "hard to define, but obvious when you see it" (Schmidt, 2004). Urban sprawl is having profound impacts on human health and traffic management, yet it is only recently that sprawl is more clearly defined and studied.

In a landmark report in 2002, "Measuring Sprawl and Its Impact," sprawl included the outcome of related factors, including limited options for walking or biking. The report ranked 83 metropolitan areas according to a "sprawl index" derived from 22 separate measures (Schmidt, 2004).

Another area of growing interest is the link between sprawl, commuting times and health (McCann & Ewing, 2003; Frank, Andresen, & Schmidt, 2004). In communities where people are more likely to drive than to walk, residents are generally less physically active. The less active these residents are, the more they weigh and the worse their health.

Planners and health professionals are starting to advocate for smart growth and urban growth boundaries to keep sprawl in check while offering more opportunities for residents to enjoy physical activity, however their efforts are often met with resistance. Researchers have found that for every 30 minutes added to a daily commute, drivers have a three percent greater chance of being obese than those who drive less.

According to a study by the Texas Transportation Institute, the average US driver spent 51 hours stuck in traffic in 2001; up 4 hours from 1996. The study estimated the cost in wasted time and gas at $69.5 billion. Los Angeles led the list of most congested cities, with 90 hours per driver, followed by San Francisco (68 hours), Denver (64 hours), and Miami (63 hours) (*Miscellaneous Facts, 2004*).

Americans continue to own more cars and drive more miles in them [than their European or Japanese counterparts]: the average American car driver travels almost 20,000 kilometers (about 12,400 miles) a year, whereas the European one does only 14,000 kilometers. This does not have much to do with the size of the country: most trips are urban, with an average length of about 14 kilometers, the same as in Britain and somewhat less than in Germany. Part of the answer is that buses and trains in America account for barely 3 percent of travel mileage, whereas in Europe the figure is over 15 percent. The rest of the answer lies in the sprawling low-density structure of American suburbs, which involve greater distances between homes and shops, schools and other amenities (Economist, *1996).*

Traffic and Social Networks

Street reclaiming: Street reclaiming involves reducing vehicle traffic volumes and speeds and creating more attractive street environments. It is a process for increasing the social, cultural, recreational and economic activity in neighborhood streets. Street reclaiming is intended to change way that people think about and use public streets by encouraging interaction and increasing residents' involvement in their community. Key components encompass a resident-led interactive planning process with transportation, aesthetics, and participatory interactions to guide street design and neighborhood development (Engwicht, 1999).

Aging and Mobility

Current transportation priorities focus almost entirely on driving. As people grow older, they often become less willing or able to drive, making it necessary to depend on alternative methods of transportation. As the number of older people increases, so too will their mobility needs. Alternatives to driving are sparse, particularly in some regions and in rural and small town communities. Unfortunately, the United States is currently ill-prepared to provide adequate transportation choices for its rapidly aging population.

A recent report by the Surface Transportation Policy Project presents their findings based on the National Household Transportation Survey of 2001 and places them in the context of other research on mobility in the aging population (STPP, 2004).

The City of Vancouver constructed a Wellness Walkway that incorporates ideas for enhancing accessibility in the public realm for people with physical challenges related to sight and mobility. Features of the walkway include sidewalk tinted "sandstone" to reduce glare and aligned curb ramps with directional grooves. Corner bulges installed on all corners to shorten crossing distances, accessible benches enabling easier transi-

tions for people with walking disabilities, and a variety of street trees, fragrant flowering plants and shrubs to enhance sensory stimulation (Duncan, 2000).

TECHNICAL FIXES

Ah, but soon we'll have electric cars, low- or zero-emission vehicles, alternative fuels, hydrogen buses, smart highways, mental telepathy, the transporter from Star Trek ("Beam me up, Scotty!").

Segway

When an American inventor unveiled the Segway human transporter in 2001, it was supposed to herald a transport revolution. As it turned out, in the first two years only 6,000 human transporters were sold. Predictions that the Segway would prove to be as significant a breakthrough as the personal computer were evidently wide of the mark.

Technology and TDM

The history of transportation consists, in part, of faster modes that expand human activities: steamships, railroads, bicycles, automobiles and air travel. Some faster modes are likely to become more common in the future, yet we should consider the overall value these modes can provide to society, and the problems they create.

Can technology address common transport problems such as road and parking congestion, crash risks to motorists and pedestrians on local streets, and provide adequate travel options for non-drivers? It would be wasteful for a community to devote an excessive portion of its resources to these modes, when more fundamental transportation problems exist.

Perhaps the next trend in transportation is not a new mode or service, but a paradigm shift in how to think about transportation problems and solutions. Perhaps this shift is an incremental approach that consists of management innovations that result in more efficient use of existing transportation systems. This is not as radical as it may sound. Many important revolutions result from more effective use of existing technologies and resources, rather than new technology.

This means that the best solutions to transport problems may consist of management innovations that encourage efficiency and improve basic mobility services (for example, walking and cycling conditions, road system management and public transit services), rather than a new mode or breakthrough technology (Litman, 2004). Transportation Demand Management (TDM) is how we may achieve this.

Telecommunications

Now that the era of electronic communications is in high gear, many large employers are implementing or considering options for telecommunications. Telecommuting has potential to substitute for some of the commuting that goes on in and between our communities, and so may lead to a reduction in vehicle trips generated. Telecommuting also has potential to *increase* vehicle trips in our communities. People

The amount of road space to be provided in a city is not an engineering question. It is first and foremost a question of social justice. Auto-dominated cities create a group of people we may call 'access-to-exchange-disadvantaged' (ATED). People who are ATED are often elderly, poor, disadvantaged, handicapped, children, parents without access to a second car and those who choose not to own a car. Between 40 and 60 percent of the population in most Western cities are ATED (Engwicht, 1993).

working from home may need to make more trips per day than they would simply going to the workplace and having all their working requirements in one place. Working from the "electronic cottage" may also encourage flight from urban centers and thus promote further sprawl development of the countryside with its attendant problems. Therefore, telecommuting should be incorporated as only one component of a comprehensive commuter trip reduction program.

REDUCING AUTOMOBILE DEPENDENCY

Automobile dependency is defined as high levels of automobile use, automobile-oriented land use, and a lack of travel alternatives (Newman & Kenworthy, 1991, 1999).

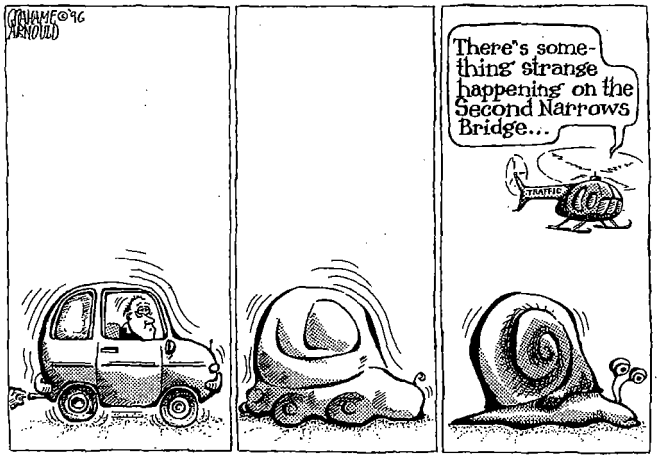
*Four forces are at work to influence the choice of fuel for the future: oil depletion, global warming, urban pollution, and urban congestion (*Economist, *1996).*

Efforts to relieve traffic congestion alone do little to reduce polluting emissions or the amount of fuel consumed. Cities must now stress reduction of single-occupancy vehicle trips as the only sound way to achieve improved air quality, reduce energy consumption contributing to atmospheric change, and relieve traffic congestion.

Sustainable transportation planning and traffic management initiatives are usually motivated by goals to reduce the number of automobile trips; increase opportunities for non-automobile trips; increase opportunities for non-auto transportation including bicycles, walking, rail, buses, and alternative vehicles; and reduce the use of gasoline and diesel fuel in conventional buses, autos, and trucks.

Sustainable transportation policies reduce reliance on fossil fuel burning and single-occupancy motor vehicles. They also favour a broader mix of active (or self-propelled) transportation, public transit, ride-sharing and car-pooling, and clean-powered vehicles (BEST, 2004).

Sustainable transportation is to development what preventive medicine is to health — anticipating and managing problems before they arise. Sustainable transportation requires us to rethink how we measure transportation and integrate land management along with communication strategies. Transportation planners and engineers receive professional rewards for implementing capacity expansion projects, but are seldom acknowledged for finding ways to avoid the need for such projects. Sustainable transportation focuses on quality of access, rather than simply measuring quantity of access. Mobility is seldom an end in itself (VTPI, 2004).



A comparison of global cities over the period 1980-90 reveals large differences in automobile dependence with strong implications for the future sustainability of cities in different countries. The study demonstrated there are significant statistical relationships between key transport and land-use variables. Urban density is a key determinant of auto and transit use, as well as the relative role of transit (auto use increases and transit decreases with decreasing density). Road provision, parking, and non-motorized mode use are all also strongly associated with the pattern of auto-dependence across cities. To reduce automobile dependence, the follow-

ing directions should be pursued:

- *Land-use objectives*: more transit-oriented, higher density, mixed land uses, which help to halt the growth in auto-based development;
- *Private transport objectives*: stabilized or lower car use and less emphasis on infrastructure for cars;
- *Public transport objectives*: higher quality transit systems, especially rail, which are more competitive with cars; and
- *Non-motorized mode objectives*: greater safety and amenity for walking and cycling and increased use of these modes (Kenworthy and Laube, 1996).

In general, local initiatives should aim to encourage transit over personal automobile use by: reducing the subsidies to private vehicles; identifying means for managing transportation demands, especially of commuters; and emphasizing bicycle and pedestrian networks as valid components of a regional transportation strategy.

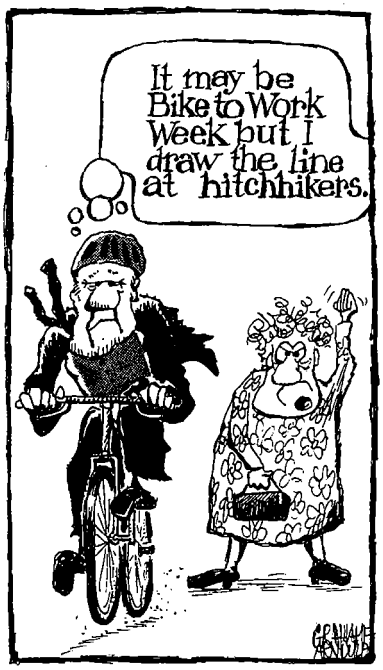
Management Strategies

Transportation system management (TSM) is one option toward more sustainable transportation. TSM aims to affect the supply of transportation services by attempting to increase the person-carrying capacity of the road system without building additional road capacity, or by simply allowing congestion to worsen, thereby discouraging vehicle travel. Measures such as high occupancy vehicle (HOV) and transit-only lanes, queue jumpers, preferred parking for HOV vehicles and toll-free privileges for HOVs help to increase the person-carrying capacity of the road system without the need for additional road capacity.

HOV and transit-only lanes are the most common means of increasing road capacity. However in congested urban centers, transit-only lanes are more efficient since they have the capacity to carry far more people. At freeway speeds, for example, a full bus or rail car can carry as many people as a lane of car-pool traffic up to a kilometer long (Leman et al., 1994).

Walkable Communities

Walkability is a key to an urban area's efficient surface transportation. Walking remains the cheapest form of transport for everyone as every trip usually begins and ends with walking. The design and construction of a walkable community provides the most affordable transportation system any community can plan and maintain. Walkable communities put urban environments back on a scale for the sustainability of resources (both natural and economic) and lead to increased social interaction and physical fitness, while diminishing crime and other social problems. Walkable communities are more livable communities and lead towards the whole, happy and healthy lives of every resident (Walkable Communities, 2004).



Transportation Demand Management

Transportation Demand Management (TDM) offers many potential benefits. In fact, many transport problems are virtually unsolvable without some form of TDM strategy. Conventional solutions, such as increasing roadway capacity or improving vehicle design, often reduce one problem but exacerbate others, particularly if they increase total vehicle travel. When all costs and benefits are considered, an integrated TDM program that includes an appropriate set of complementary strategies is often the most cost-effective way to improve transportation.

Many transportation professionals are skeptical that TDM is effective because it requires consumers to change their travel behavior. They argue that North Americans have a love affair with cars, and so will not voluntarily reduce their driving. As a result, they favor technological fixes (for example, wider roads, increased parking capacity, vehicle design improvements) over TDM strategies. However, given appropriate options and incentives, people are often willing to shift their behaviours (VTPI, 2004d).

For distances under 2 kilometers (1.2 miles) pedestrian traffic can play a large role if provided with safe and attractive conditions. Pedestrian improvements should not be limited to small islands in the form of pedestrian zones, but rather should be included as part of the area-wide road network.

Cycling

Bicycles are ideal for use in highly congested urban centers and thus can play an important role in sustainable transportation strategies. They avoid air pollution and high levels of fuel consumption associated with low-vehicle operating speeds and short distance, cold start trips. Bikes also help reduce congestion since they demand far less space than motor vehicles. Experience in Davis, California and Toronto, Ontario suggest that where cycling facilities are improved, the number and frequency of cycling trips increases dramatically (Toronto City Cycling Committee, 1994).

Best practices for employee cycling program development include the following: creating a clear, consistent and positive message about the benefits of non-motorized travel; identifying and overcoming barriers to non-motorized transport; finding opportunities for cooperation with other organizations; working with local planners, employers and employees who cycle to design and improve cycling facilities and services; utilizing cycling, walking and recreational organizations to enlist volunteers; emphasizing cycling skills and safety education (Cleary & McClintock, 2000).

Since 1956, the League of American Bicyclists has declared May to be National Bike Month in the US (TLAB, 2004). In Canada, Bike Month is traditionally held in May or June. Communities, corporations, clubs, and individuals are invited to join in sponsoring bicycling activities in order to increase awareness and acceptance of bicycling.

The Thurston County, Washington State Bicycle Commuter Contest encourages individuals to bicycle to work, to school, and to run errands throughout the month of May. The contest is a participatory event for Thurston County residents and employees since 1988. Participants keep track of how often and how far they commute by bicycle,

and win prizes in a variety of categories. In 1999, 574 participants rode a total of nearly 15,000 miles (Climate Solutions, 2004).

Eugene, Oregon has a well-planned and well-used cycling network that includes 30 miles of off-street paths, 89 miles of on-street bicycle lanes, and 5 bicycle/pedestrian bridges spanning the Willamette River. This has resulted in 8 percent of commute trips by bicycle (Eugene, 2004).

It is a daunting challenge for many communities to find the space or finances to build separate bicycle paths. But many communities have a large network of quiet residential side-streets running parallel to main arteries. These residential streets can provide the basis for a network of bicycle routes that will be both safe and perceived as safe — leading to a significant increase in cycling.

Tools and Initiatives

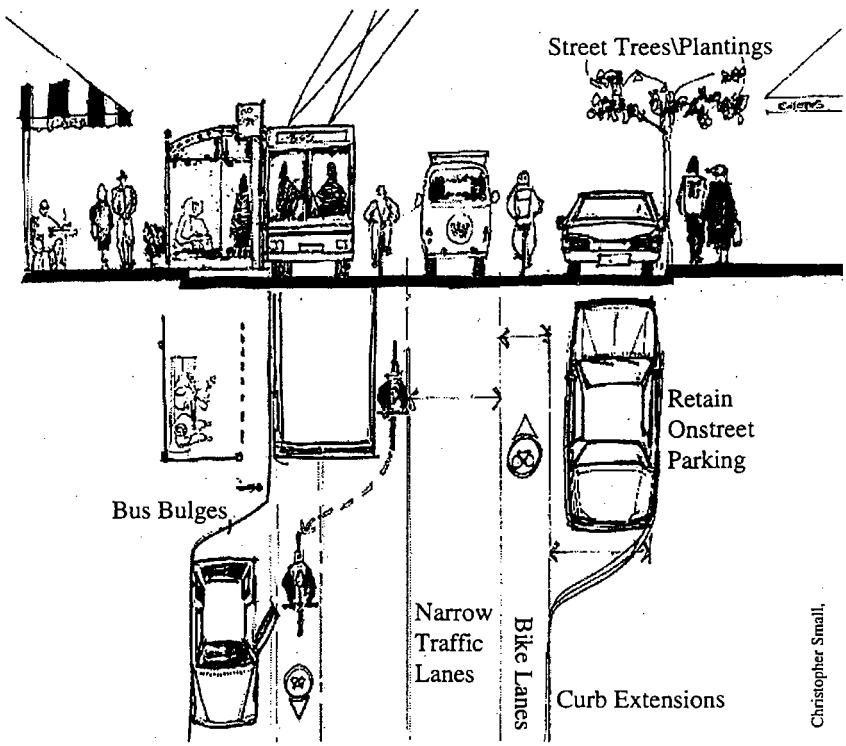
Automobile Restrictions

Car Free Living: Freiburg, Germany — Lunchtime at the Vauban kindergarten, and parents start pulling up to pick up their children. But there's no convoy of minivans or station wagons. Despite a bitter cold wind, these moms and dads roll to the door on bicycles, helmets on their heads and pant legs wrapped with reflective bands. Not because their cars are in the shop, but because they're not welcome in the neighborhood.

The Vauban development — so far, 280 new homes on a former military base — is Germany's biggest experiment in "auto-free living." Once dismissed as an "eco-freak" fantasy, the concept is moving off the drawing board and winning real-world converts, even in the land of high-speed autobahns and the Volkswagen "people's car."

"I simply like it better," says Ruthild Haage-Rapp as she bundles two fidgeting 2-year-olds, Simon and Maria, into their seats in a green-and-pink trailer attached to her dusty bicycle. "The children can play in the street," she says. "It's quiet. You can stand by your kitchen window without all the noise from the street. Then the inconvenience is worth it." (Geitner, 2000).

Traffic calming on a commercial street



Traffic circles work to slow traffic in residential neighborhoods. This Vancouver traffic circle was built by the city and planted by local residents

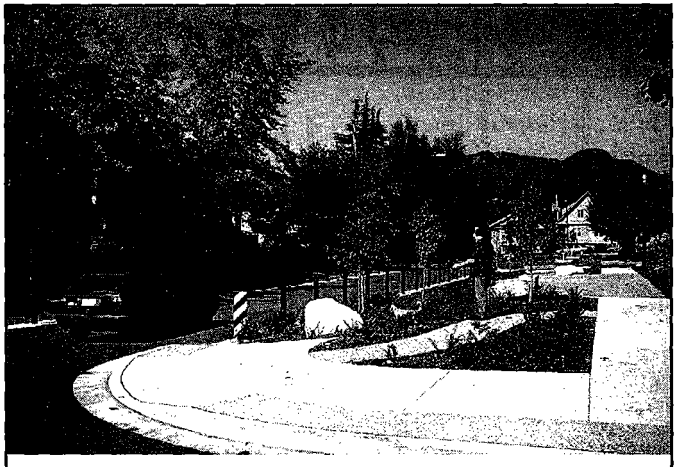
Car Sharing

Car sharing has become increasingly popular within the last decade with the service available in many North American cities (sometimes called car co-ops or car clubs). In Bremen, Germany, the car-sharing program *Cambio* has taken the concept one step further by collaborating with the city's transit authority and was the same pass for the transit system as an electronic key to Cambio's cars. In the future the electronic key will also act as a payment card for taxis (Fenton, 2003). Other car sharing programs include <www.carsharing.com>, <www.zipcar.com>, <www.flexcar.com> and <www.cooperativeauto.net>.

Road Pricing

Road pricing that reduces total vehicle travel can reduce road and parking costs, increase road safety, protect the environment, and encourage more efficient land use. The central London congestion charging scheme has reduced car congestion by 30 percent, and the volume of traffic within the zone was reduced by 15 percent, with a 28 percent reduction in crashes. Direct impact of congestion charging on business activity has been small, with reduced road traffic emissions and fossil fuel consumption (Transport for London, 2004).

Express Toll Lanes: State Route 91 in Orange County, California has 10 miles of express toll lanes privately constructed and funded by variable electronic tolls on State Route 91. The Express Lane uses "FasTrak" electronic transponders to collect tolls that vary from $0.75 to $3.50 per trip, depending on the level of congestion. In 1998, more than 9 million tolled trips were made on the facility, resulting in revenues of approximately $20 million (State of California, 2000).



This formerly two-lane road was "calmed," and the excess road space converted into park space

Traffic Calming

Traffic calming is used widely in Europe and Australia, and increasingly in North America. Traffic calming measures include installation of stop signs, speed bumps, and/or traffic circles to slow or calm traffic, allowing roads to better accommodate a range of different road users and activities.

Former West Germany's traffic calming schemes have multiplied into the thousands since they were started in the 1970s. Originally intended for residential areas, the technique is now spreading over whole cities. Traffic calming greatly improves the quality of life in neighborhoods where it is implemented, and is gathering popularity in many countries, including Italy, Japan, Australia, Sweden, and Switzerland. Such restraints are so well-received in

Denmark that local residents themselves are often willing to pay for the measure. The city of West Palm Beach, Florida (population 80,000) has developed "second generation traffic calming." Rather than considering traffic calming design as an added feature, traffic calming measures are designed when a street is built or reconstructed. This approach has proven to be more cost effective and equitable, toward improving a community's walkability.

Collision Decrease: Residents in neighborhoods with suitable street environments tend to walk, cycle and take transit more, and drive less. Traffic roundabouts which replace conventional intersections, raised landscaping in center medians, and speed reduction strategies can reduce total crashes by 39 percent, injury crashes by 76 percent, and fatal crashes by 90 percent (VTPI, 2004e).

Layout Change: For more than two decades Dutch cities like Delft, Groningen, and Maastricht have calmed traffic by changing the layout of the residential street, transforming it into a *woonerf*, or "living yard." In the *woonerf*, cars are forced to navigate slowly around carefully placed trees and other landscaping. Since motor traffic cannot monopolize the entire breadth of the street, much of the space becomes more open to walking, cycling, and children's play. Automobiles are free to enter the *woonerf*, but only as guests, while non-motorized traffic has priority. Experience with traffic calming has shown that it is most effective if widely implemented, so that motor traffic problems are not simply diverted to nearby streets. Traffic has been calmed on over 30 percent of residential roads in Maastricht.

In the US, each car consumes 4,000 square feet of parking space (including at home), which is almost three times the living area of the average family home (Renner, 1988).

Parking Measures

Ending the widespread employer practice of providing free or heavily subsidized parking to employees is a promising option for relieving both congestion and air pollution. By one estimate *free parking induces more travel than free gasoline would.* Parking costs can be considered unfair if applied selectively. For instance, if parking costs are imposed on lower income employees in commercial centers, but are not passed on to higher income employees or those working in suburban sites.

Parking charges represent a greater share of income for lower income motorists, but are not necessarily more regressive than alternative sources of paying for parking facilities, such as general income taxes. Higher-income people tend to receive the majority of parking subsidies since automobile ownership and use tends to increase with income (VTPI, 2004b).

Reduction in Required Parking: Several cities have found that parking programs pay. Sacramento, California grants developers a 5 percent reduction in required parking for providing bicycle facilities, 15 percent reduction for providing marked car/van-pool spaces, and 60 percent reduction for purchasing transit passes for tenants of new offices.

Preferential Parking for Car-Pools: Portland, Oregon and Seattle, Washington are leaders in on-street preferential parking programs for car-pools. Among the incentives: poolers are allowed to park downtown all day at specific metered locations; are exempted from hourly parking limits and meter fees; and enjoy spaces closest to building entrances.

Increased Parking Rates: The Canadian federal government increased its parking rates for federal employees in Ottawa, resulting in: a 23 percent reduction in employees driving to work; a 16 percent increase in transit ridership among federal employees; and an increase in average vehicle occupancy from 1.33 to 1.41 passengers.

HOV Pricing Strategies: Preferential high-occupancy vehicle (HOV) pricing strategies are also highly effective. Differential parking rates paid by the employer are applied, with two-person car-pools receiving a 50-percent reduction, three-person car-pools discounted 75 percent, and van-pools reduced 100 percent. A California study found that HOV lanes carry an average of 2,518 passengers per hour during peak hours, which only represented two-thirds of their capacity (substantially more people than a congested mixed-flow lane and roughly the same number of people as a typical mixed-flow lane operating at maximum capacity). Other studies indicate that HOV lanes produce mode shifts to ridesharing (VTPI, 2004a).

Area Wide Traffic Management

The aim of area wide traffic management is improving transportation efficiency by reducing over-reliance upon motorized vehicles within urban centers (VTPI, 2004f). Components of area-wide traffic management are also emerging in North America. Some cities have closed off streets to cars or designed pedestrian malls that offer no access to vehicles. In Canada, Calgary has several blocks devoted to a pedestrian mall, and more than 16 kilometres of passages connecting many buildings in the downtown area. Montreal has 30 kilometres of underground car-free passages that link about 60 large commercial, administrative, and apartment buildings in downtown.

The demand for traffic control was recognized at least as early as the first century A.D., when congestion caused Julius Ceasar to ban wheeled traffic from Rome in the daytime (Rajan, 1996).

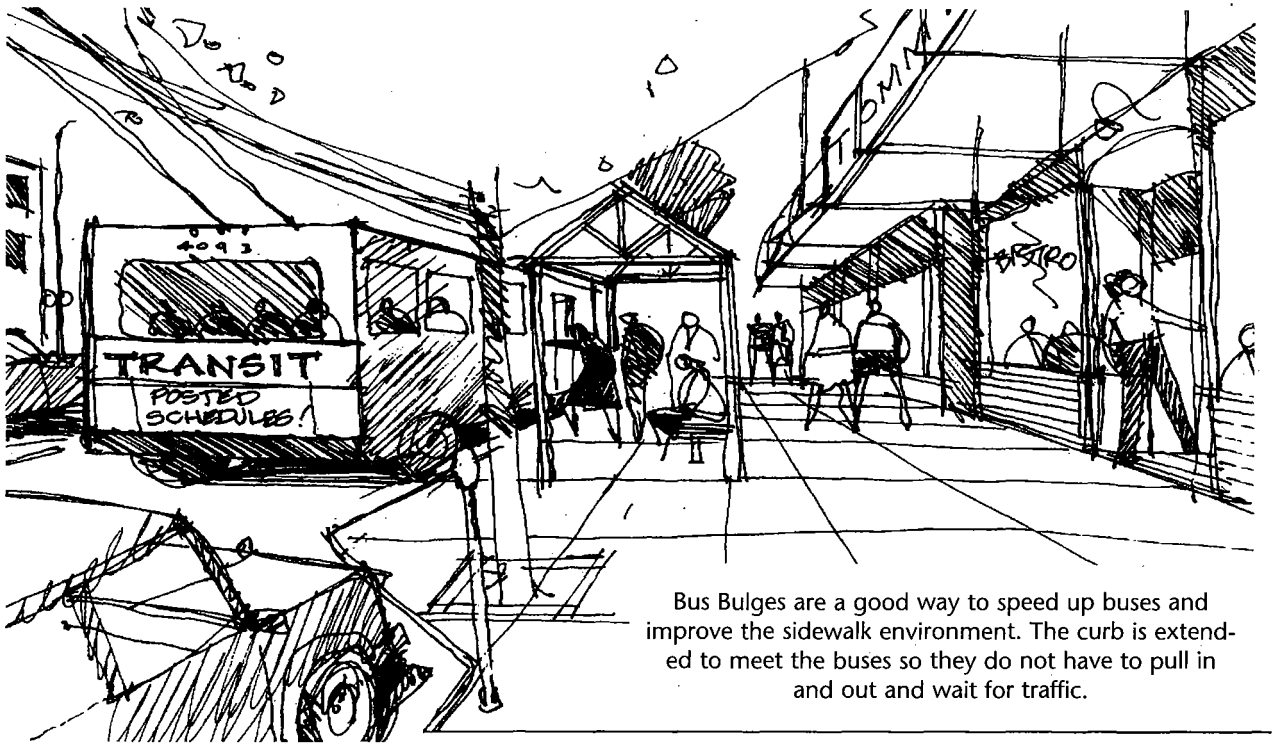
In the United States, Minneapolis, Minnesota has 8 kilometres of enclosed overhead passageways in the commercial/retail heart of the city. Stanford University in California has designated 16 blocks on campus as car-free during the day, with only pedestrians, bikes, and some buses allowed. The heart of the commercial district in old downtown Boston and New Orleans includes several car-free streets ("People Over Cars," 2004).

Go Green Choices: In the workplace, Go Green Choices (GGC) provides training, education and support to companies in Greater Vancouver. Strategies are outlined with participants, or Go Green Coordinators, who are encouraged to use a range of comprehensive transportation strategies to address their organization's unique needs and realities. Strategies include: cycling, walking, transit, ridesharing, telecommuting, variable work hours, parking management and various types of incentives.

The key to the program's success is its ability to get people talking about alternatives to driving alone and exploring their transportation choices. Since the program's inception in 1997, GGC has trained over 300 Coordinators and currently supports over 100 businesses in Greater Vancouver (BEST).

SMART Movement: The SMART Movement is designed to "Save Money And The Air". They guide large organizations to reduce employee car trips and are based in Toronto, Halifax and Victoria, Canada (SMART Movement).

TravelSmart Australia: TravelSmart Australia brings together the many community and government based programs that request commuters to use alternatives to traveling alone (Australia).



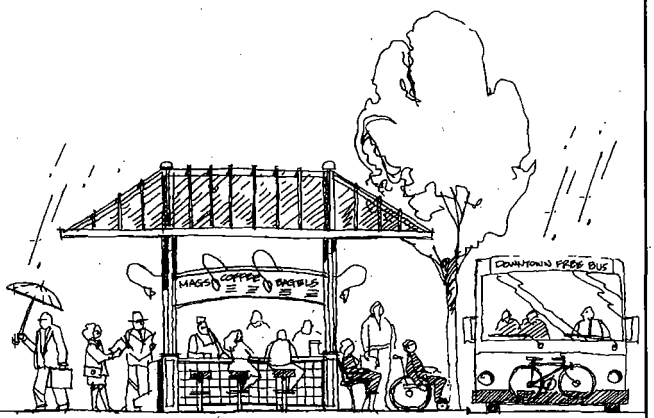
Bus Bulges are a good way to speed up buses and improve the sidewalk environment. The curb is extended to meet the buses so they do not have to pull in and out and wait for traffic.

Transport Innovation

Improved transportation efficiency hinges upon improved public transport. Substantial volumes of car traffic can potentially be transferred to bus and rail; yet a number of different strategies are needed, including service innovations, payment innovations, and rail system development.

Curitiba, Brazil: One of Curitiba's best-known planning successes is its urban transportation system, which is a model for cities around the world wanting to implement eco-efficient transportation with environmental benefits. The city pioneered the idea of an all-bus transit network with special bus-only avenues that were also used to channel the city's growth. The transit system is rapid and cheap, and is currently being integrated within the metropolitan region, which encourages people to leave their cars at home. (Curitiba has more car owners per capita than anywhere in Brazil.) Since 1974, when the city boasted a single bus line, the population has doubled, yet auto traffic has declined by 30 percent. Curitiba has the highest public ridership of any Brazilian city (about 2.14 million passengers per day), and registers the country's lowest levels of ambient pollution and per-capita gasoline consumption (MacLeod, 2004).

In addition, an inexpensive "social fare" promotes equality, benefiting poorer residents settled on the city's periphery. A standard fare is charged for all trips, meaning



Encouraging wheelers, walkers, and bus riders helps make a pleasant street environment
From: City of Vancouver (1996)

shorter rides subsidize longer ones. One fare can take a passenger 70 kilometers.

After 25 years, Bogotá, Columbia has instituted a Curitiba-type transit system; and now 83 world cities are replicating the Curitiba bus system, including Seoul, Korea (Lerner, 2004).

Transit Marketing

Discounted Transit Passes: Discounted passes may encourage occasional riders to use transit more frequently and if implemented when fares are increasing, may avoid ridership losses. Discounts and targeted promotions that provide information on services and incentives may increase transit ridership by up to ten percent or more (VTPI, 2004e).

Regional Transit: Waterloo's regional transit system provides a seamless network and fare structure across three cities, including specialized transit service to three rural communities. The Grand River Transit has increased ridership from 4 to 12 percent in ridership jurisdictions (FCM, 2001).

Tax Exempt Transit Benefits: Commuter Check is a transit fare savings program that operates through employers. Commuter Checks are purchased by employers as either a company-paid benefit or by using pre-tax employee paid contributions. For example, the San Francisco Bay Area Commuter Check program began in 1991 and has expanded by approximately 35 percent per year. However, since pre-tax employee-paid options became available in 1998, the rate of growth has exceeded 100 percent. In 1999, over 35,000 employees and 2000 employers participated (Commuter Check).

They say everyone has a BMW in Curitiba. You know, BMW: Bus, Metro, Walking (Lerner, 2004).

U-PASS Progam: Since 1991, the U-PASS program has provided the campus community in Seattle, WA with an array of flexible, low cost transportation choices. Despite 12 years of population growth, university-related peak traffic levels remain below 1990 levels. Over three quarters of the campus population commutes using an alternative to driving alone. Because the U-PASS program reduces vehicle trips, the university has saved over $100 million in avoided construction costs of new parking spaces. The U-PASS program prevents roughly 8.2 million vehicle miles traveled and 3,300 tons of carbon dioxide from being emitted annually. The U-PASS program is a model for other regional pass programs and has set the standard in the region (U of W, 2003).

Free or Inexpensive Transit

Eliminating Fares: In November, 2000, residents of the Forest Glen neighborhood in the city of Boulder voted to form a General Improvement District (GID) to provide RTD transit passes for all neighborhood residents. All Forest Glen residents are eligible to receive an RTD Eco Pass, including home owners and renters. These passes are paid for by residents in Forest Glen as part of their annual property tax. The RTD Eco Pass

allows unlimited riding on all RTD buses, Light Rail service to Denver International Airport, and Eldora Mountain Resort buses (VTPI, 2004a).

Non-Motorized Modes

Bike Stations: Chicago has joined Berkley, Palo Alto, Long Beach and Seattle with bike stations, as bicyclists are now enjoying an important and much sought-after cycling amenity: the new Millennium Park Bicycle Station.

The bicycle station, the first such facility in the MIdwest, opened as part of the Millennium Park grand opening. The 16,448 square foot heated facility includes free indoor parking for 300 bikes; showers and lockers; bicycle rental and repair; and a cafe. Chicago has earned an international reputation for promoting and improving bicycling, and was named best large city for cycling in Bicycling magazine in 2001 ("New Millennium Park Bicycle Station Opens", 2004).

BikeShare: BikeShare is a bike lending program launched in 2001 by the Community Bicycle Network. BikeShare pass holders can sign out a bike from one of several hubs in the downtown Toronto area, use the bike for up to three days at a time, and return it to their choice of hub. An online database is used to track the location and use of each bike. In 2004, the project offered 170 bikes at 14 hubs, and expects to operate at its capacity of about 450 pass holders (CBN, 2003).

Berkeley, California has developed such a good public transportation system that it continues to deliver almost one in five residents to work every day — four times the national and state average.

RESOURCES

Alt-Transp List is an Internet list to exchange information with 200 plus alternative transport professionals and activists. Members send and receive e-mail messages concerning transport related issues. To subscribe, e-mail *Majordomo@flora.org* with the body (not subject) of the message being: *subscribe alt-transp*, followed by your e-mail address. For more information, simply send the message: *help*.

Better Environmentally Sound Transportation (BEST) strives to make our communities healthier places to live by promoting sustainable transportation and land-use planning, and pedestrian, cycling and transit-oriented neighbourhoods.

Website: www.best.bc.ca

The Center for Neighborhood Technology has a unique mission: To invent and implement new tools and methods that create livable urban communities for everyone. TravelMatters offers a trio of resources — interactive emissions calculators, online emissions maps, and a wealth of educational content — to emphasize the close relationship between more efficient transit systems and lower greenhouse gas emissions.

Website: www.travelmatters.org/

Cities and Automobile Dependence: An International Sourcebook, by Peter Newman and Jeffrey Kenworthy (Gower Technical, 1989; 1999), is based on extensive research. This landmark study examines urban form, transport and energy use in 32 cities in North America, Europe, Asia, and Australia.

The data cover approximately 100 parameters for 1960, 1970, and 1980, and include parking, car ownership and use, roads, congestion, public transport, modal split and energy consumption; city form is characterized by central, inner and outer area population and employment data. The study confirms that the shorter distances inherent in medium- and high-density urban areas correspond with much more walking and cycling. For example, West European cities, averaging 85 people and jobs per hectare (2.47 acres) walked or cycled to work 21 percent of the time compared to Australian and American cities, which indicated only a 5 percent walking and cycling rate.

Newman and Kenworthy have produced numerous smaller studies based upon more recent census and other data, which update the original work. They are affiliated with the Institute of Science and Technology Policy at Murdoch University in Western Australia.

Conservation Law Foundation offers an interactive web site focused on sustainable transportation, and includes downloadable resources, electronic discussions, and a library of related sites.

Website: www.tlcnetwork.org/index.html

The Create a Commuter Program, envisioned, designed, and implemented by the Community Cycling Center, is the first comprehensive project in the USA designed to provides low-income adults with fully-outfitted commuter bicycle in Portland, Oregon.

Website: www.communitycyclingcenter.org/create-a-commuter.html

Environmental Defense Fund's National Transportation Program has an excellent resource site with many US transportation case studies.

Website: www.edf.org/

Institute of Science and Technology Policy was established in 1988 to help create a better understanding of the roles and effects of science and technology. Search for their materials in your library or through their web site.

Website: wwwistp.murdoch.edu.au:80/istp.html

Sustrans — the sustainable transport charity — works on practical projects to encourage people to walk, cycle and use public transport in order to reduce motor traffic and its adverse effects.

Website: www.sustrans.co.uk

US Department of Transportation's Bureau of Transportation Statistics has a web site that links many US transportation problems and solutions, such as the US Surface Transportation Policy Project. The site's table of contents is a massive library of transportation-related statistics and reports.

Website: www.bts.gov/

Vélo Québec is working to make Québec more bicycle-friendly and is a leading cycling organization in North America.

Website: www.velo.qc.ca

Victoria Transport Policy Institute specializes in progressive transportation decision making theory and practice. Their goal is to develop practical tools for incorporating social and environmental values into transportation decision-making. These tools include documents available free for downloading, documents for sale, and transportation cost-analysis software. This Institute is an extremely useful resource to bring a sustainability perspective into a transportation debate.

Website: www.vtpi.org

Walkable Communities, Inc. is a non-profit corporation, established in the state of Florida in 1996. It was organized for the express purposes of helping whole communities, whether they are large cities or small towns, or parts of communities, i.e. neighborhoods, business districts, parks, school districts, subdivisions, specific roadway corridors, etc., become more walkable and pedestrian friendly.

Website: www.walkable.org/

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