

Building Communities With Transportation

By Dan Burden, Director of Walkable Communities
Distinguished Lecture Presentation
Monday, January 8, 2001
Transportation Research Board
Washington, D. C.

Important change is sweeping across villages, towns and cities worldwide. This change is happening in rural hamlets, middle burgs and huge metropolises. While some folks are just getting from feet into mechanical transport for the first time in their civilization's history, others are learning to return to their feet and to build with proper scale and proportion in land use. My lecture focuses on the early steps of returning towns and people to sensible, smart growth, sustainable, people-focused transportation and land use practices. I will reflect on what is going on in both urban and suburban places.

More Research Is Needed. Researchers too rarely focus on walking, bicycling and basic urban activities that matter to them the most. It is my hope and intent in my presentation today to strike deep and stir the hearts of all researchers to come to the aid of neighborhoods, towns, states and nations. We need to help document the problems of and engender new and better qualities of streets and public place -- to create places not to just walk, but to live with civility, pride and passion, and to celebrate urban life. Having attended TRB sessions for the last 20 years (never once delivering a paper myself) and having been in the field meeting with thousands of engineers wanting to do more for their towns, I have come to respect the importance of research to help bring and support change and overcome fears of doing something different.

There are major holes in the research milieu explaining the issues involving Livable Communities. For example, there is significant research on street features like trees being dangerous to motorists. But there

is limited or no research to document the positive impacts of trees, such as their effects on reduced speeding, increased reaction time and other safety benefits to motorists, pedestrians and bicyclists; as well as effects on aesthetic, air quality, and pavement life. Indeed, if all research applied to making highways safe and efficient were taken in a community, the town would end up stark, barren and void of meaningful life. Research of the future must be holistic and relevant to town making. In short, transportation research must have heart and soul, as well as substance and purpose. Our towns are hurting and our researchers are in one of the best positions to start the healing.



Decades of research achieved the roadway efficiency and safety shown in the top photo. The below scene applies a holistic community building approach. Researchers of the future will be measured on how well they help towns heal. This requires high levels of public involvement. Researchers must ask "What do people and communities want and need?" Projects must be evaluated on their town-building quality and performance.

If societies in all places of the world are to remain stable and healthy for centuries to come, we must learn to move more on our own... shorter distances and with less impact

on resources of the planet. Not only are we approaching peak world oil production {estimated to peak in 2005) and feeling early impacts of global warming from emissions, but our lifestyle of auto-based travel is becoming disruptive in virtually all households. New terms are being coined to reflect our declining civility – road rage is directly related to things not working and not likely to work with our present course.

Transportation and urban planners say there are no easy answers. There is no end to growing urban traffic congestion. Even in small places I visit like Livingston, Montana, and Littleton, New Hampshire, people are saying that congestion and delays are unbearable to many residents. Meanwhile large metropolitan areas, such as Houston, Atlanta and Detroit, where autos and highways have their fair share of heavy financial support, are finding serious degradation in quality of life. The average Atlanta resident spends more than 12 hours a week stuck in traffic. These are prime hours that might be better spent with family, at leisure or in other meaningful activity. And after arriving home many of these commuters are complaining about the speed and volume of traffic where they live and the long distances they must travel to get basic products and services. A growing number now want peacefulness where they live and an end to the sprawl they bought into.

Urban areas, no longer relying on walking and bicycling as travel choices, are becoming unfit and unhealthy. The U.S. Center for Disease Control is highly concerned that convenient daily physical activity, especially walking, is lacking in American life. There are fewer and fewer towns in America where people feel welcomed to walk. Many newly built towns have little civic or public space. Poor planning and policy have made it impractical in many cities to conduct even simple trips without dependency on cars. The trend toward larger and larger stores, parks, schools and even churches eliminates the possibility of short trips. Our responses to these poor land use decisions include building wider and wider streets and intersections, further dividing

towns. In some towns conditions are so extreme that children are bussed distances of less than 300 feet because they cannot safely cross primary streets. Many people get into their cars just to get to the store on the opposite side of the street. Our children are growing up dependent on their parents for almost all of their travel. Many parents welcome the day when they are no longer the taxi drivers for their children.



Above: To make his presentation Dan Burden drew from his experience of working in 950 communities, walking the streets, taking with people, and seeing these streets and communities through their eyes. To acquire knowledge, one must study; But to acquire wisdom, one must observe.

What is my role? For much of the past twenty years, both while working inside Florida DOT as the state pedestrian and bicycle coordinator, and now working independently, touring America steadily, I have served as a journeyman, adventurer, photographer and recorder. I have felt this change directly and through the eyes of impacted people and place. I have also seen the problem through the eyes of many people in many professions. Architects, landscape architects, engineers, planners, economists, elected leaders and developers each have part of the answer. But as long as these groups are not working in unison, much needed solutions will not be created. From these experiences I have assembled personal feelings, suspicions and images. In this presentation I celebrate those making early accomplishments where walking, bicycling and other non-auto transport have been overlooked and are now being addressed.

Walking and Sensing Change in America

Four and a half years ago I began a planned ten-year journey, primarily through North America. I take urban walks for a living. My walks are sponsored – so far by 850 towns, villages and cities – in all regions of the U.S. and Canada. And as I walk, I photograph impacts of decisions we have made. I also validate suspicions people have and prepare communities for change that is coming and that they are beginning to make. There is unrest as this change is building. Many of you already feel this unrest. You want to know why it exists and what you can do about it. You can do a lot. I will celebrate with you today the new heroes and heroines in transportation. These people, our peers, are in our audience. I will introduce them to you.

My presentation to you today is my view of what is drawing so many people in so many places back to their feet and back into action. This view comes to you with a holistic focus, a broad lens aimed at both transportation and land use. In the recent past we addressed transportation and land use as independent elements. It turns out that they are highly interdependent, and the solution for each is found by addressing both together. There is only one answer to solving our problems...work on both issues together.

David Engwicht, the author of *Reclaiming our Towns and Villages*, from Brisbane, Australia, describes the link between transport and land use in his statement about the purpose of cities.

Cities are an invention to maximize exchange (goods, services, culture, friendship, ideas and knowledge) and to minimize travel.

David goes on to say:

The role of transport is to maximize exchange



In the early 1900's America had many transportation choices. The past 80 years have seen these modes dwindle, leading to dependency and congestion. Research plays a key role to return transportation balance and roadway performance.

Note that during the 4000 years of recorded civilization almost all decisions minimized travel and maximized exchange. It was not until the past 50-60 years that things went askew. With vast wealth and technologies, it was believed that modern nations could afford to be less efficient. Sprawl pattern development made it easy to get away from problems, like crime, air pollution, noise and urban decay. The new problems that would be created were not understood at the time. We are now learning the folly of “escape our woes” planning. In the end all problems must be faced. Unfortunately, about 80% of the built form in the U.S. came during these joyous, easy-answer, fifty years, when unwise land use planning took place. Fixing these problems will not be easy. The piper is waiting to be paid.

Too many roadways are being constructed and reconstructed and too much land is in process of development to not apply early lessons as rapidly as possible. Meanwhile, highly focused research on important, overlooked issues must be addressed.

It is my hope that you will see from this paper a need for everyone to recognize how everything in transportation and land use is connected to a much bigger, very interconnected picture.

Part One

Key Principles of Building Healthy Communities

Great towns, villages and cities in all parts of the world are based on simple, easily understood principles. The people who built these great places had ordinary minds. They worked as much from common sense and their hearts as anything else. Once we understand these principles, we know what kind of streets to provide.

In the case of already built, unhealthy towns, we can make corrections using these same principles. In 1970, Portland, Oregon, supported 60,000 jobs in the downtown. Over 75% of those going to these work centers drove single occupant vehicles. Traffic congestion and parking demand were strangling the city. If the pattern of auto-dependency continued, the future for a healthy downtown was bleak. Parking needs, alone, would degrade the city environment.

Under the leadership of then mayor Neil Goldschmidt (who later became the U.S. Secretary of Transportation), Portland citizens and officials chose to diversify and support more ways for people to reach the downtown. By 1996, Portland's promise as a place for people, not cars, paid off; there were 102,000 jobs downtown. Fewer than 48% of those reaching downtown came by car. Portland did many things to reclaim status as a great city. Most of their efforts were and continue to be focused on the principles that follow.

Portland made many mistakes in the post WW-II era, such as building and supporting typical sprawl pattern outward from the center, cutting itself off from its river front with freeways, and adding more and more lane capacity to speed the nightly flight. But this central city had "good bones." The original town founders built the center with the proper scale and proportions. Block lengths were kept short. Distances to most needs were at walking scale.



A key measure of walkability and livability is the number of children walking or bicycling to school. In Pre-WWII days virtually all children walked and bicycled to school. Today, fewer than 20% do. Returning mobility and personal trips to children is one of the highest measures of livability.

Other towns, like fully suburban Thornton, Colorado, a place of 50,000 people, built by developers who knew little about town form, face more difficult challenges. In a recent visit I made to Thornton, it was clear that there was little sense of identity, no recognizable focal point or identity as a place, few linkages, and no identifiable blocks. A striking visual scene, a park with portable toilets under permanent shelter peaked my curiosity. Asking officials who were showing off their park with pride when the restroom would be completed, I was told that they were finished. "We use portable toilets," they explained, because our children would deface and destroy anything permanent." Children in Thornton, like those in nearby Columbine, have been raised in a placeless town with little to do, no early independence to foster responsibility, and lack civic identity and pride. Thornton, like Portland, will need to reinvent itself. Of the two urban places, Thornton's lack of place and identity will be the greater challenge. Both Portland and Thornton, like all other towns and cities must rebuild using the following principles.

Principle 1. Build for Everyone. All towns built before automobiles were designed to be multi-modal. A scene of Grand Rapids, Detroit, or any other city at the turn of the last century was packed with people, horses, bicyclists, trolleys, trucks and autos. Today, many urban streets are void of all human life.

Bicyclists and pedestrians are few in number; while disabled people are a rarity. Buses and other transit are nonexistent, or skimpy service is offered in places where walking distances are too great.

An all too shocking personal experience brought this oversight home to me. In 1993 I was selected as one of five people from around the world to serve on a United Nations Technical Advisory Team on bicycling to assist China. In studying the situation before traveling there, I learned that a recent 3-volume transportation improvement study for China by the World Bank Organization never once mentioned the word bicycle. I was dumbfounded. A nation where the mode of travel providing the greatest freedom of movement, most affordable, easiest to park, most efficient, and most popular (63% of all movement) had not been mentioned even once. After arriving in China, my second expedition there, our entire team was shocked by officials who told us we were there to help them solve the “bicycle problem.” We tried to correct them, stating that the bicycle was not the problem for China, it was the solution. Our words were to no avail. My point is that many countries, the U.S. included, have turned their backs on the most workable, sensible, basic forms of transportation, labeling them problems and not thinking of them as solutions. Let all nations be warned, high tech planning and engineering applications for the most basic human needs, ignoring the most fundamental tools, is folly in any country. Common sense must always dictate design.

The health of a place is determined both by numbers of users, and by the diversity of people coming and going, lingering and exchanging. Urban centers should have many young children and teenagers present. Many older adults and disabled people should be common.

Principle 2. Scale For People Towns and portions of towns identified as neighborhoods must be planned and assembled to walking scale. Towns are built of many intact neighborhoods. History has proven that distance of a quarter-mile radius forms the near perfect place for people to interact. Both small villages and trolley stops were planned and built to this scale. No other scale works as well. This scale allows people to reach most primary destinations in five-minute walks. It is possible to get completely across the entire area in 10-minutes. Until recent years, all modes of transportation were best supported and most functional due to this scale.



Littleton, New Hampshire had too little money and too much common sense to build sprawl. “Good Bones” of interconnected streets, mixed use development, and walkable scale keeps Littleton one of America’s most livable communities. Minor, low-tech, transportation improvements (a pedestrian bridge across the river, and a mechanical lift up the hillside) will double the number of households that can conveniently walk into the downtown.

Suburban towns, like Thornton, must learn to convert faceless shopping plazas into village centers. Each village needs to be scaled to a walking radius. Streets must be added, while parking lots are removed. Brea, California, in the heart of traffic-choked Los Angeles (Orange County) has applied these principles to older shopping plazas, laying out a new downtown and a number of healthy public places, with mixed uses and many links to adjacent single family neighborhoods.

Principle 3. Create Many Linkages.

Towns and portions of towns need many links. For this linkage to happen, most new streets must be kept short, 400 to 600 feet long. By keeping block lengths short, as well, traffic speeds are also held in check. People walking, bicycling, using transit, or driving need many route choices to move from one place to another.

Where dysfunctional street patterns are already in place, new linkages can be created. Although it is rarely possible to retrofit streets in established neighborhoods, it is often possible to make use of natural land features, utility corridors, waterways and other open space to create walking and bicycling trails. These linkages make it possible and practical for people to walk or bicycle to parks, schools, libraries and commercial centers. In Seattle and King County, Washington, conversion to public space is measured in the hundreds of millions of dollars for land acquisition and construction. These steps are key to greatly increased mobility -- walking and bicycling. In the past ten years the city and region have seen steady increase of these modes.

Principle 4. Streets have Multiple

Uses. Streets perform many missions in addition to moving and storing vehicles. Both main streets and neighborhood roads serve as "outdoor living rooms." Well-constructed streets elicit appropriate behavior, increasing neighborliness, association, belonging, acceptance, pride and play. When roadways become focused for inappropriate motorist volumes or behavior, streets become problems, breeding crime, litter, disrepair of properties and other social problems. Streets teach young people life skills. They allow seniors and people with disabilities to interact with others. Well-designed streets provide safe and efficient movement of all vehicles, while also providing for sanitation, utilities and timely emergency response. Quality design of streets determines property values.

When streets are engineered for fewer purposes, focused on moving traffic and little else, they fail the greater needs of a city. One



Neighborhoods lacking easy pedestrian links produce high levels of auto dependency. Simple links increase walking and bicycling to stores, transit, parks and schools. (Courtesy, Florida DOT)

of the greatest challenges to any town or city is identifying, funding, and bringing together a coalition of stakeholders to revive decaying and unhealthy urban streets.



I have yet to find anyone in any person in any audience that wants their home street to have anything but low speed, low noise, and low traffic volumes. All research and design must lead to meeting the most basic values people hold for their residential streets and communities. Holistic, focused research will help.

Principle 5. Sidewalks Must be

Comfortable. Sidewalks were rare before the speed and volume of traffic became challenging. As mitigation for auto-impacts, sidewalks are essential urban and suburban tools. Sidewalks need adequate width, buffers, continuity, connectivity and edges. Too few town officials understand these needs. Most towns permit sidewalks to be built in pieces. A house or store is built, and a portion of sidewalk is built. In contrast, roads and utilities are built in advance of an entire commercial center or neighborhood. Only well designed and complete sidewalk systems will work.

Sidewalks cannot be narrow.

Sidewalks must comfortably carry two people walking side-by-side in one direction at a time. This requirement calls for sidewalks with minimal widths of 5 feet. Lesser widths result in many people walking in the street. When set next to curb lines minimum width sidewalks are six feet. With higher speed and volume roadways, attached sidewalk comfort is achieved with bike lanes, on-street parking or some other physical buffer. Commercial streets have even greater needs. For more comfortable walking, and higher volumes of pedestrians in commercial and school districts, sidewalk widths are typically 8-12 feet. Large, successful downtowns demand 20-30 foot widths. Highly successful downtowns and most pleasing settings of all call for 50/50 ratio of street and sidewalk width, including edge treatments.

Sidewalks require buffers and edges. In suburban areas planter strips of 4-6 feet, with landscaping and trees create ideal street buffers. Fencing, shrubs and other features facing the private property side form edges to parking lots, open lots or other areas that must be traversed. Visual preference work performed throughout the nation reveals that all people of all socio-economic groups and in all regions want these edges and buffers. In downtowns, where sidewalks are often built to curb lines, parked cars form important physical and psychological buffers between people and moving traffic.

Sidewalks require maintenance. Streets are routinely swept, patched, reconditioned and serviced. Sidewalks in the same cities are often ignored. Sidewalks demand snow removal and occasional resetting of slabs. Although significant sidewalk repairs are not necessary for prolonged periods along a given block, for sometimes 50-60 years, eventual repairs are essential. Healthy neighborhoods have adequate measures to identify and correct maintenance problems.



People walk the way they sit in a vehicle, side by side. Thus, the minimum width for a comfortable sidewalk is 5 feet. Nothing less will do. The eight-foot sidewalk above is more comfortable yet. Ramps are the full width of the sidewalk. Corner radii keep turning speeds low, crossings safe. Research for pedestrians and bicyclists is not measured by saturation (LOS), but by comfort.



In the past 50 years America's roads have become wider, longer and faster, with little provision for street crossings. Today research is underway to place long overlooked midblock crossings. If walking and bicycling is to work in your community, you must research, locate, build, then evaluate convenient crossing points.

Principle 5. Streets Must be Crossed with Ease. Pedestrians seek means to cross many streets without going more than 150 feet out of the way. For this reason, well-designed towns orchestrate convenient crossing points each 300 feet. This spacing is especially important on main streets. When fewer organized crossing points are established, sporadic or spontaneous street crossings by frustrated pedestrians create unsafe, unpredictable movements. One of the most serious omissions in traffic engineering, since it was developed nearly 70 years ago, is the failure to address adequate street crossings. Guidance for establishing crossings at signalized intersections exists. At non-signalized intersections guidance is weak, and at mid-block crossing points it is almost nonexistent.

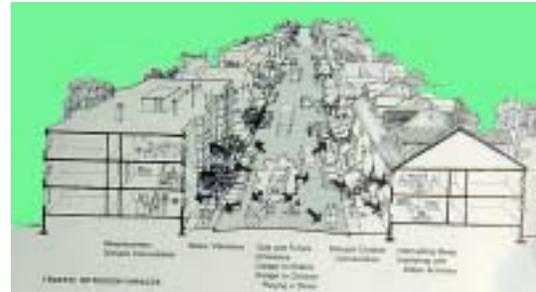
Recent Federal Highway Administration research and applications point to creative and helpful ways to assist pedestrians in crossings. Dispersal and testing of these principles, however, is still limited. Both urban and suburban areas, like Seattle, Portland, Chicago, Grand Junction and University Place are building and testing highly successful mid-block crossing points. Some roadways are purposely narrowed to two-lanes with medians. Multiple-lane roads need advanced stop bars, signing, enhanced crosswalk markings, improved lighting, and some call for mechanized systems.

Principle 6. Keep Urban Traffic Dispersed and Low Speed. A general reduction in quality of life and property value has resulted from overly high urban traffic speeds. Neighborhood and main street speeds should be kept low. Although speeds should still be factored with the functional and regional traffic movement needs, there is rarely justification for traffic to move at speed above 30 mph in most areas, and 20 mph in some. As towns make the switch to safer, more appropriate urban speeds, they are learning to stop traffic less and maintain overall trip times. Towns taking aggressive actions to curtail speeding, especially many European communities, are achieving injury reductions from 30-70%, and greatly enhancing walking, transit, bicycling and other modes of travel.

Pioneering work in the early 80's by Donald Appleyard in Berkeley, California, measured the impacts of traffic on livability. Streets with an average of 2000 autos per day provided residents with an average of 3.0 friends and 6.3 acquaintances. Streets with traffic volumes at 8,000 per day saw numbers of friends and acquaintances drop to 1.3 and 4.1. For streets with 16,000 per day the numbers of friends and acquaintances dropped to .09 and 3.1. The level of pride, sense of ownership and sense of place dropped dramatically as the traffic volumes rose.

Working with this information, Sacramento, California, recently altered traffic in a central town neighborhood to balance the volumes

and speed of traffic. Overall results are now being measured. A general increase in overall quality of life and property values is anticipated.



Donald Appleyard, one of the 1970's traffic calming pioneers, who later died from an out-of-control drunk driver, studied traffic impacts on neighborhoods. As volumes and speed increases friendships and associations, as well as pride and property value, drops. Adaptive response sends people to the backs of their houses, and results in street life abandonment. Today, Donald's son, Bruce, is dedicating his life to transportation research.



Towns largely built during post-WWII times are finding they must make serious efforts at rebuilding, remarking or otherwise adapting their streets for lower induced speed. Rarely will just one strategy or design feature work. Among those tools being applied most widely are:

Road Diets. Towns like Portland, Oregon; Santa Monica, California; Seattle, Kirkland and University Place, Washington; are keeping traffic moving while reducing the number of travel lanes. The most common lane reduction is removing two lanes on a multi-lane highway, replacing the two travel lanes, with turn lanes or medians with turning pockets, bike lanes and edge treatments..

Prudent drivers set the speed. The road looks narrower, and most drivers accommodate the changed conditions. These changes can occur using just paint or with rebuilt roadways. Volumes of 16-20,000 vehicles per day are common, while some communities are pushing upper limits with roads of 24-30,000 vehicles per day. In many cases, crashes are reduced 30-70%. Traffic rarely moves to adjacent or internal neighborhood streets.

Lane-Width Reductions. Many towns are finding that narrower travel lanes in urban areas can also reduce speeds. Although there is no change in speed when lanes are reduced from 12 feet to 11 feet, a further reduction to 10 feet, and in some cases as little as 9 feet, is showing speed reductions and measurable improvements in personal injury rates and safety. Although these changes must be carefully measured according to traffic type and other factors, there is significant promise. When remarked, the additional width gained is usually placed in bike lanes (giving greater turning radii for vehicles at corners) and added border width. Bellevue, Washington's SE 148th Street is a significant 4-lane, median divided parkway that moves 41,000 vehicles per day with 10-foot travel lanes. The roadway has an impressive safety record and has been operating this way for 20 years.

Bricked Streets. Many towns paved over older brick or paver-stone streets. This treatment was done largely to reduce short-term maintenance costs and to speed up traffic. Orlando, Florida, brought back 3.1 miles of brick streets (out of 351 miles available) and is improving the value of homes in the central urban area. Residents are agreeing to pay 75% of the road reconditioning costs. Brick streets generally reduce speeds to 20 mph, enhancing safety and promoting livability. The program has proven so popular that Orlando has a several year waiting list for converting streets. Ionia, Michigan, recently re-bricked its original bricked street following 70 years of service. The new pavers are expected to last 100 years. Town officials report that they are saving money in the long run by not having to repave on a more frequent basis.



*Livingston Avenue, in Orlando, Florida was re-bricked and dropped from 3 lanes to 2 lanes to reduce speeding and maintain traffic flow. Area residents paid for 75% of the costs. Orlando has retrieved 3.1 miles of brick streets (out of 531 available), and has a several year waiting list for this popular treatment. Many roads are candidates for the treatment. Orlando was listed ten years ago by *Bicycling Magazine* as the second most dangerous city in the nation for bicycling. Today Orlando is now considered one of the best.*

Principle 7. Keep Traffic Moving.

Motorists are less bothered by the speed at which they travel than the numbers of times they must stop and wait. A proliferation of stop signs, traffic signals and other delays, due to lack of access management and other reasons has led to high levels of motorist frustration. Measures to keep motorists in motion are important aids to bicyclists and pedestrians as well, who highly prefer lower motorist travel speeds. A balance is reached. Today, towns are taking stronger measures to retool areas that have proliferations of unwarranted stop signs and signals.

One of the most powerful tools for keeping traffic in motion is the roundabout. States like Florida and Colorado have as many as 100 roundabouts in design or on the ground,

while dozens of other states, like California, Washington, Oregon, Michigan, Maryland and Missouri have built and are testing many new designs. Florida's newest and largest roundabout, in Clearwater Beach, moves 60,000 vehicles and 8,000 pedestrians on peak days. This roundabout has encouraged many more pedestrians, who enjoy the newly created public space. Raleigh, North Carolina is narrowing its highly congested Hillsborough Street, from four lanes to two, and adding medians and roundabouts to keep motorists in motion.



Salt Lake School, Honolulu, Hawaii Roundabout. Roundabouts are popular vehicle and people-friendly intersection tools now being placed in many parts of Honolulu. The converted intersections slow traffic for pedestrians, narrow crossing widths, keeping motorists in motion. This roundabout solved many problems near a local elementary school.

Principle 8. Build Green Streets. For far too many years American cities have either allowed existing urban street trees to deteriorate and die, or they have failed to plant them on new streets. Pedestrians have great need for green, shade and ambiance. Motorists, too, are affected by the presence or absence of street trees. In general, motorists use urban trees to help assess and gauge their speeds. Trees make roads feel more wholesome. Measures in places like in Birmingham, Michigan, show reduced speeds of 10-15 mph when street trees are present on same width streets. Landscaping is now considered a primary component of traffic calming. Although expensive to maintain, street trees are a major measure to convert and reduce impacts of harmful auto emissions. They tend to cool street temperatures by 4-7 degrees, and they help lengthen the life of asphalt where full canopies are allowed to emerge. The U.S. Forest Service documents that a single urban tree pays back \$58,000 in dividends to a community.



These two scenes are of the same street in Birmingham, Michigan. The street section with trees produces speeds of about 20 mph. The one without trees produces speeds 10-15 mph faster. Greater safety is achieved with lower speeds and added reaction time. More research is needed on the positive effects of street trees on safety, pavement life, aesthetics, and increased property values.

Principle 9. Build Bike Lanes.

Pedestrians and bicyclists consider many suburban streets built in the past fifty years overly wide. Beginning in 1991 the Florida Department of Transportation and its officials committed to convert most of urban and rural highways of the state to new designs with shoulders and bike lanes. For safety and efficient movement of all modes of travel, bike lanes and shoulders are a no-brainer. Oregon Department of Transportation officials document 24 benefits from shoulders



Bike lanes are an essential component of healthy streets. The Oregon Department of Transportation lists 22 benefits of bike lanes. Only 2 are for bicyclists. As traffic volumes and speeds increase bike lanes or paved shoulders become essential. and bike lanes, only two of which are for bicyclists. Today many western states and a

growing number of eastern states are realizing that the most efficient, safe and workable roadways include paved shoulders or the same physical space marked as bike lanes.

Bike lanes are both practicable and often essential when 4-lane roadways are converted to 2-lane. Placing the width into marked areas to the sides allows not only for improved bicycling and buffers for people walking, it gives motorists many advantages. It allows space for vehicles to temporarily store while fire vehicles pass, adds to turning radii and improves sight triangles.

Principle 10. Build Compact

Intersections. It is not always possible or desirable to keep traffic in motion with roundabouts. More and more intersections are being designed to remain compact and efficient to maximize pedestrian crossings. Washington D.C.'s Pennsylvania Avenue, and "K" Streets are national showcases for highly efficient designs accommodating a rich mix of tens of thousands of cars, trucks, buses, bicyclists and pedestrians daily. Pennsylvania Avenue offers 8-lanes of travel during peak hours, while "K" Street moves six lanes. Both offer good signals, markings, crosswalks, lighting, turning radii and other essentials that are examples worthy of world study.

Channelized islands and medians. Some overly wide, complex intersections require added features such as channelized islands and median noses. Use of channelization separates conflicts in time and place, slows motorist turning speeds to acceptable levels, and creates islands of safety between conflicts. Median noses reduce left turn speeds to safer levels.

Post mounted and masthead signal placement. Many western states are maximizing use of driver and pedestrian friendly signal heads that are positioned for maximum detection. Older, cheaper, poorly positioned diagonal and even some strain pole placements are now viewed as less safe and less functional. Older pedestrians are not able to detect Walk/Don't Walk signals more than 60 feet distant.



Intersections designed for pedestrians should be compact, and produce low turning speeds. When care is not taken pedestrians are exposed to risks they cannot handle. Pennsylvania Avenue in Washington, D.C. is a model of excellenc. Meanwhile, this lower photo in Watsonville, California illustrates a missed opportunity. A channelized island location is indicated by debris markings.

Stop bar placement. Lack and placement of stop bars using present guidelines can induce unsafe and inappropriate motorist queuing. Often motorists pull over crosswalks. Public works departments in Honolulu, Hawaii, and St Petersburg, Florida, have been setting stop bars back 10 or more feet at downtown locations, with successful stopping and yielding results.

International Crosswalk Markings. Many towns are learning the advantage of using high visibility (International style) crosswalk markings. The higher the speed and volume of traffic, the more important high visibility markings become. Although too little research is being addressed to this key issue, it is clear that motorists are more likely to yield to pedestrians when they have early and clear indications of places to anticipate crossings.

Principle 11. Provide ADA Access.

Meeting ADA is not only a U.S. Civil Act requirement; it is the best way to meet the needs of all people of all abilities. The world's best engineers are often stymied by the myriad of challenges posed by adapting current streets to meet the needs of people with disabilities. There are no easy technological fixes. Although new guidelines are being written and tested, the issues are highly complex. A simple street crossing should be made in a way to help people navigate to a crossing point, make easy entry, detect the exit, find no barriers along the way, and make convenient and efficient exits. Simple in concept, the many elements of streets make this treatment hard to achieve.

Driveways pose severe problems.

When sidewalks are placed connected to streets, without the aid of planter strip buffers, each driveway becomes an extreme challenge to all people. Although the simple answer is to build planter strips, some locations make this impractical. Ramping down at each driveway, splitting the elevations, and other solutions must be tested and applied. Often the best solutions must be generated and tested in each locality. Finding competent construction teams that can handle the many angles, cross-slopes, materials and other elements is essential.

Principle 12. Build Public Space. All humans seek, crave and need places near their work and living quarters offering pleasant settings for interaction and storehouses of events and memories. These places can be simple, such as well-designed corners, intersections, or they can be elaborate centrally located parks. Public space is where we celebrate being alive; share anniversaries and birthdays, assemble for neighborhood or town festivals. Public space creates essential visual symbols and mental images of our neighborhood and town, and serves as a depository for the fondest memories of people and a town. Public spaces allow our greatest political rallies or public events to be held. They are also simple places to share pleasant days with children, friends, or strangers. The public space is the glue that holds society together. The street and



Arterial road in Grand Junction, Colorado A median with a diagonal cut improves pedestrian access. Higher volume roadways require added crossing support. Note the added storage space, diagonal cut measures keeping pedestrians focused toward the traffic threat, and reductions in time of exposure.

other public space is where political ideas and human dreams and ideals are shared among strangers and friends. Where important ideas are worked out in civil ways. Public space is where we see and experience people different than ourselves. They are places where tolerance and acceptance is learned. They are places that we see and witness the need for physical as well as social change. The challenge and importance of building and maintaining good public space is critical to the success of a neighborhood or downtown, and



Public streets comprise more than 90% of public space in most communities. Many streets must serve as the key neighborhood or community place for festivals, public assembly, gossip, markets and other essential social and democratic exchange. Designs and actions to identify, create and preserve these interactions are not well understood by the engineering community. Research is needed.

to civic life and ownership of responsibility. Indeed, it is highly unlikely that a strong society or civilization could maintain itself long-term if public space were to seriously erode.

Transportation officials must be highly attuned to the workings of public space, since they manage most such space. Most urban public streets should be built and maintained as public place. The highest rated livable city in the world, Melbourne, Australia, requires all homes to be within 1/8th mile of a public park. Often there can be a small areas, such as pedestrian spaces known as pocket parks. The importance of this detail of creating the necessary ambiance, low traffic noise, easy street access, and such cannot be downplayed. People greatly increase their association with others and their use of parks when walking distances are no more than 3 minutes.

Principle 13. Build With Proper Size and Scale. Suburban and urban areas are challenged to build and maintain small realms. It is always easier to provide one or a few 15-30 acre parks, than 30 to 60 small half acre or acre parks. Today churches, many businesses and even schools are designed large and regional. Big box retail shops of 40,000 to 120,000 square feet are more profitable than small-scale operations. Postal services have been stripped from downtown settings to make way for greater postal efficiency or added parking. Unfortunately, these trends shatter the ability of most people to walk, bicycle or otherwise conveniently reach these services. Where it was once possible for a family to make as few as 2-4 trips in a car daily, the number has climbed to 10-12 trips. Not only is there no way for road systems to handle this demand, it compromises the concept of neighborhoods, village style living and sustainable communities.

Towns and regions are beginning to adopt code, zoning regulations, guidelines, policies and practices to maintain proper size and scale of buildings and services. The North Carolina Department of Transportation, The Florida Department of Transportation and the California Department of Transportation are just three agencies that have full time staff fully dedicated to make cities more livable. These cities and states are able to build and maintain their most essential livability qualities. Palo Alto, California, for example, does not allow any grocery store to be more

than 30,000 square feet. New, mixed-use neighborhoods are designed to capture many daily trips, using the concept of the corner store, the friendly barber, and the small, well-managed hardware. Of greatest importance is sensitive placement and sizing of schools and community centers.

Principle 14. Provide Mixed Uses and Mixed Incomes. The most dramatic impacts on traffic of all is the zoned separation of activities. Many people can no longer live, play, work and shop at walkable distances. New neighborhood designs mix



Communities have the fewest transport problems when most trips are kept to neighborhood scale. Shops, schools, plazas and parks should be located where people live. Separation and isolation breeds travel and auto dependency. Guanajuato, Mexico illustrates a church with plaza, shops, homes and schools compromising one neighborhood. The pattern is repeated throughout the city. The bottom illustration shows conventional sprawl to the right, and older traditional (also neo-traditional) to the left. Traditional town form may generate 40% fewer auto trips. Research is needed. (Illustration, courtesy of Ramon Trias)

shopping, residential, play and even many work centers. People of various income levels live in different size homes through careful site planning. The added diversity and ability of people to live in cosmopolitan neighborhoods, where everyone has access

and the ability to go places and do things is vital to a walkable setting and healthy community. Older neighborhoods, such as the Northwest Neighborhood in Everett, Washington, built in 1892, have recently added higher density, high quality housing to its mostly single family residential stock. Some added stores add to convenience. Neo-Traditional or transit-oriented village designs are now under development in most states and are anticipated to be among the most popular places for purchase in the future. Orenco Station in the Portland, Oregon, area was built following Federal Transit Administration approval for a light-rail station in the middle of a cornfield. The new neighborhood is highly walkable and an excellent model of scale, proportion, mixed use, mixed income design. Portland officials know that their greatest opportunity with light rail is not just easing of traffic congestion, but the opportunity to spawn many urban villages at walkable scale. Each of these villages has the potential to bring up to one-billion in private investments.

Part Two Implementation

My travels reveal that most towns struggle not with design issues, but with techniques for implementing change. Research is needed to address the best methods and processes for overcoming fear of change... methods for gaining public participation and support, developing models, and disbursing information widely and quickly on the success of these new models.

In town after town I learn that compromises on design erode the livability, function and viability of streets. People are finding their values in conflict with their actions. Often when I start a workshop, I ask people to clearly state the values they hold for their community. Working independently people develop common issues like family, safety,



Small, intimate neighborhood stores reduce auto trips. But by how much? Another transportation research topic? These stores provide a gathering place in each neighborhood. They reduce the number of times that auto engines are started to get a bottle of shampoo, postage stamp, or carton of milk.

beauty, natural, open space and eco-tourism. Sometimes people state they want an area to be attractive, friendly, prosperous, fun and festive.

I have also learned that most engineers and transportation planners are eager to see change, but uncertain how to initiate specific project change or alteration. Often there are conflicting local ideas. Some people may want bike lanes or medians. Others say that such changes would get in the way. Much of the literature on pedestrian and bicycle design is difficult to track down and not listed in plain black and white choices. Nor should the choices be so simple. The issues and choices are complex and need to be highly



Modern day public process events now include many fun events to enliven and engage participants, draw out their ideas, and listen. These methods achieve essential consensus and ownership for transportation and community development projects. Huntington, New York residents agreed to take out downtown parking lots to build a missing public plaza. Children were used in the events.

customized. Thus, the process of setting up pedestrian and bicycle committees, making sure that everyone goes through state-of-the-art training and instruction, and have the willingness to develop models is important.

More evaluation is needed. One purpose of my presentation is to illustrate the great variety and success of these well-tested features, as well as brand new methods of street crossings, intersection design or lane widths. In most towns I travel to, I find that people are seeking validation. They want to hear and know that people in Madison, Topeka, or Issaquah have already tried this method or that and that everything worked well.



Walking audits are proving to be one of the best ways to get planners, engineers, architects, landscape architects, city council members, police and fire administrators to see and understand how any why they must work together. The police officer in this scene is seeing her town through pretend eyes of an eight year old.

Unfortunately what often becomes built has little or nothing in common with these values. The role of implementers is to guide participants in friendly ways to design tables where they can act on their values and overcome mediocrity. I have never seen a group of citizens design something that is either overly complex, impractical, overly expensive, or dysfunctional. Some of the methods proven successful in getting people to think with their hearts rather than their fears include:

Walking Audits. These 90 minute to 4-hour sessions allow groups of 8-10 people gain perspective of downtowns, waterfronts or neighborhoods by walking, talking and role playing what it would be like to use the space as 8-year-olds, 80-year-olds or person in wheelchairs. It is best when groups are diverse, including realtors, retailers, engineers, architects and council members. Tours can be either all walking or combine some van or bus supported windshield audits of nearby neighborhoods.

Orientation, Brainstorming and Prioritizing. Other workshop events for citizens allow a bit of presentation on what similar communities are doing to embrace change as they design roads. Best practices are shown to introduce a common vocabulary of medians, bike lanes, sidewalks, and a variety of intersection designs. Once given the chance, stakeholders put forth a list of those things they want to consider in their corridor, downtown or neighborhood. Once a list of 20 or more items are listed, participants receive dots for voting. From this list it is possible for designers to see the importance of common community consensus items. In some communities, positive features such as trees, medians, sidewalks and bike lanes far outweigh “noisy wheel” issues like “don’t restrict any driveway access.”

Case Studies and Best Practices

Bridgeport Way, University Place, Washington. Ben Yazici, P.E. took on the redevelopment of Bridgeport Way, a former five-lane suburban style roadway, as a central spine for a new downtown for his community of University Place. The roadway had a poor safety record, and it was experiencing significant delays in traffic. Walking and bicycling were treacherous. The highway offered no sense of place. Orchestrating a successful downtown along and adjacent to this roadway would not be easy. Using a highly interactive set of public visioning activities, known as a charrette, Ben, the city manager and newly elected officials were able to gain consensus to rebuild this street as a four-lane, median divided road with bike lanes, sidewalks, planter strips and tree canopy.

Resistance. Within weeks of the announced vision, a small, talented resistance group formed, bringing out 200-400 people at a time to oppose the project. At stake was whether this new group could force the city council out of office over the Bridgeport Way issue.



Bridgeport Way, University Place, Washington. Before conditions, poor roadway performance and high crash rates.

Ben and the town leaders worked extended hours, days and nights for the next six months to design and ready a parallel street (Grandview Avenue) for construction. Their mission was to prove that sidewalks, bike lanes, medians, and



Ben Yazici, P.E. and other University Place, Washington officials endured public fear and ridicule to build the converted section of Bridgeport Way. The median divided road, complete with bike lanes and sidewalks has reduced crashes 50%, increased roadway efficiency and achieved an aesthetic, people focused place for a new downtown. Today the town is celebrated in the local and statewide press. As a result of these efforts the new town went from a \$450,000 annual public works budget to \$30 million in state and county funded projects, with eight of the projects under construction. All will be bike and pedestrian friendly models for the state. Area engineers are conducting extensive evaluations.

even roundabouts would prove popular in the new corridor. The Grandview Avenue project was completed under budget, under deadline, and opened four weeks before the election. The result; residents loved the new treatments and



Bridgeport Way, University Place, Washington. After conditions, improved traffic flow, crashes cut by 50%. Strong community approval

overwhelmingly voted the incumbents back into office. In just two years Ben and his staff orchestrated the funding, design, construction and completion of this first model portion, plus two additional segments of Bridgeport Way, three added projects on Grandview Avenue, including five more roundabouts,

and two road diets in other areas of town. This is an amazing feat considering that the town of 30,000 had just been incorporated two years earlier and had no reliable external source for transportation funding. They had to prove their expertise to many. From a town that had a meager yearly budget of \$450,000, they anchored over \$30 million in committed state and regional funds.

Hillsborough Street, Raleigh, North Carolina. Nina Szlosberg, citizen activist, served as the leader of rebuilding this town and gown connection street. Hillsborough Street, one of the state's oldest, most historic roads, had become highly unsafe (second most dangerous pedestrian street in the state), ugly and dysfunctional. The intersections and corridor struggled to move peak hour traffic in four lanes. A small group of neighborhood and street stakeholders banded together under Nina's leadership in 1999 to rebuild Hillsborough Street into an attractive public space. They teamed and partnered with North Carolina State University, City of Raleigh, North Carolina DOT, area neighborhoods and other stakeholders. A five-day public process (charrette) was held, and a strong working vision for a 2-lane corridor, medians, turning pockets, bike lanes and roundabouts emerged. The vision resulted in a highly energized team of both local and state implementers. The activities sparked fresh enthusiasm in the city engineer, as well as key planning and community development people. Further action brought more advanced leadership in the North Carolina DOT, and in the state legislature. Today there is an active Smart Growth committee in the state legislature working to improve towns throughout the state. The group found funds from the state legislature, city council and through a number of other sources. A contract has been let for the design and construction of the new corridor. Once built, their corridor will have numerous crossing points for pedestrians and manage intersection traffic at roundabouts with speeds of 18-20 mph.



Nina Szlosberg (above, right) served as the spark plug to achieve neighborhood consensus on narrowing historic Hillsborough Street in Raleigh, NC from 4-lanes to 2-lanes, median, turning pockets, bike lanes and a dozen roundabouts. The street modifications will return civil behavior, attractiveness and new public and private investment to the North Carolina State town gown connection.

Evaluating Programs

To improve conditions for motorists, bicyclists and pedestrians the greatest need is for researchers to measure and monitor existing conditions. Local, state and national research needs to be improved and practiced in all areas. Research needs to be highly localized. There are too many variables in making cities livable to rest on research at national or state levels. Every town has unique qualities, each street special circumstance. There are easily a dozen great masters of research focused highly on walking and bicycling. I encourage all researchers to acquire and study the methods of these men and women who present topics on walking and bicycling each year at TRB. Even more, I encourage that these and improved methods be fine tuned and applied locally.

I have learned several techniques that help me evaluate community walkability. Similar measures can be developed for bicycling.

Step-Out Survey. John Moffat, the Governor's Highway Safety Administrator for Washington State, and the former police Captain who managed traffic in Seattle, uses a simple procedure – by stepping into a crosswalk while motorists are on points of approach where they should and can yield, he determines a general percentage of correct responses, completing his crossing as it is safe. As I conduct step-out surveys many times a day in hundreds of communities across the nation I am able to learn a relative courtesy rate. As a result of my observations, I am able to rate communities with high numbers of pedestrian-friendly street designs as responsive and effective.

Cities in all regions of the nation are found with high levels of motorist courtesy. Example towns and cities include: Victoria and Vancouver, British Columbia; Santa Barbara, San Luis Obispo, Palo Alto, Santa Cruz and Davis, California; Portland, Oregon; Seattle, Kirkland, Redmond and Bellevue, Washington; Cambridge, Massachusetts; Boulder, Colorado and Clearwater Beach, Florida. I single out Clearwater as an example. There are few places in Florida where motorists show courtesy to pedestrians. But in this beach community, where officials have been careful to design a low speed corridor great numbers of Florida drivers (who show little or no courtesies elsewhere) alter their behavior.

Indeed, I can find levels of high courtesy in almost any community where effective traffic calming strategies are being applied. The opposite corollary also applies. Even the most pedestrian or bicycle-friendly motorists will not be courteous if the design of the roadway corridor is overly fast. There is a decline of courtesy starting at 25 mph, a significant drop at 35, and little observed courtesy at speeds of 40 and higher.

Numbers of pedestrians or bicyclists. My second measure of the level of success of a community or neighborhood is the number of

pedestrians and bicyclists that are present. I measure how many hours a day people are present, the variety of people, and their body language. Really successful towns and



Reno Sting Operation. Reno, Nevada motorists have learned to yield to pedestrians. The Reno Police Department invoked a program to gain high levels of motorist compliance with pedestrian crossings. Motorists choosing to not yield to a plain clothes police officer receive traffic citations from other officers waiting downstream. With a one-year effort yield rates in all parts of town are quite high. Most motorists state that they are far more aware and genuinely courteous to pedestrians.

to portions of towns are clearly evident by the numbers of people seen. Evaluate your own community by noting the way people use physical space. In some towns where designs of streets and buildings are uneven there is clear indication of comfort and discomfort. In Bridgeport, Nevada, for example, I walked the main street four times. Each time I noted all pedestrian activity was on just one side of the street. A combination of factors was in effect. First, the attractive courthouse, more interesting stores and continuously snow shoveled sidewalks were on the sunny side of the street. Although there were some attractions on the opposite side and many houses, the continuous line of comfort was only present on one side. People adapt to the built and maintained environment.

Are educational and enforcement programs effective? More than half of my life has been devoted to bringing changes in motorist, bicyclist and pedestrian behavior. Clearly there are highly effective education and enforcement efforts bringing change. The most continuously effective programs are in places like Seattle, Washington; where

pedestrians show high levels of courtesy and expect high levels of courtesy from motorists. One of the most effective programs, which can be offered as training in any community, is the pedestrian sting operation, designed and applied in Redmond, Washington. After three city staff were killed by a motorist in this small town, Officer John Miner assembled a team of officers to combat the lack of motorist awareness. A set of officers in plain clothes would attempt legal crossings in marked crosswalks. Motorists who failed to yield were issued warnings. This program was done with significant media coverage. The next week motorists were cited. The program had far reaching effects. We have conducted this training in to officers in dozens of police departments. A year later, when conducting a similar course in Reno, Nevada, the officers showed us their pedestrian sting operation. We were alerted that more than 1000 tickets had been written that year. Special signs are posted alerting motorists that a sting operation was in effect. Crosswalks were marked with high visibility markings and signs. On the street where we observed the sting operation, speeds were in the 35-40 range on a 7-lane urban highway. Over 14 officers were lined up ready to make stops. As hundreds of motorists passed by each ten minutes, the great majority always yielded when they saw a pedestrian crossing the street. The 5-10% of motorists who failed to yield were written tickets and appeared highly apologetic. Weeks later, walking and crossing in many other parts of Reno, I was favorably impressed how consistently motorists showed courtesy to me, an average pedestrian.

Conclusion

Effective town development programs are already underway in most regions of the nation. At the heart of building and measuring livable communities is the presence of people walking, bicycling, sitting, exchanging. The best way to begin is to take on a local project as a model. Of the 850 towns that I have visited in these past four and a half years, I never found a place where there was not already a cluster of people who seek significant improvements for walking and



Engineers, architects, economists, planners and others lead Barcelona children of all ages on tours. Children are taught why their city is special. All towns and cities need to teach their children how to design and care for their communities in much the same way that we learn to care for our bodies.

bicycling. Although most towns lacked organized efforts, the people that would take action were already present. Indeed, it would be hard for me to name a town where there was little or no interest shown in these issues. I am convinced that, as researchers, you will find while taking walks or bike rides in towns you love to visit the most, you will be able to see and evaluate for yourselves powerful new treatments that can be applied to a main streets, school zones, neighborhoods or roadway reconstruction projects that will serve as powerful models for your own towns and projects.

I am also firmly convinced that the spark plugs that ignites these small clusters of people to action come from any profession, group or other source. In one town the leader may be an historic preservationist, in another the city manager, in another a police officer or TV producer. As Dorothy in the Wizard of Oz learned, there is no place like home. It is not necessary to flee to someone else's towns to find livability. I find that just as with the scarecrow in Frank Baum's classic story, the knowledge of how to build great place already exists out there. As with the tin man, the heart of passion of people to create better place is there as well. What has been lacking in far too many places I visit, as with the cowardly lion, is Courage. Overcoming the fear of change takes the greatest measures of courage.