working paper 3

Community and Social Benefits of Transportation Investment

NCHRP Project 8-36, Task 22 Demonstrating Positive Benefits of Transportation Investment

prepared for

National Cooperative Highway Research Program
Transportation Research Board
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prepared by

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Preface

The objective of NCHRP Project 8-36, Task 22 is to produce an easily understandable document that effectively communicates the positive impacts of investments in this nation's transportation system. The work will be used by AASHTO in its TEA-21 reauthorization efforts.

To achieve this goal, Cambridge Systematics has prepared four working papers, each covering an important aspect of the positive impacts of transportation investment, as follows:

1. Economic Benefits of Transportation Investment;

2. Environmental Benefits of Transportation Investment;

3. Community and Social Benefits of Transportation Investment; and

4. The Benefits of Reducing Congestion.

Table of Contents

Working Paper 3: Community and Social Benefits of Transportation Investment

Introduction

Investments in our nation's transportation infrastructure can yield important community and social benefits. They can increase mobility and access, provide a greater choice of travel modes, improve safety, enhance the visual appearance of our communities, cities, and natural landscapes, and increase community cohesion. In short, transportation investments can improve the quality of life. While social benefits are more difficult to quantify than economic and environmental benefits, they are nonetheless every bit as important. Making a neighborhood, city, or region more livable can spur economic development by making it more attractive for businesses and residents to relocate there.

But what defines a "livable" community? While the term means different things to different people, most can agree that, at the very least, a livable place is one that is safe, clean, and healthy; offers a variety of stable job opportunities; has adequate housing, retail, and community services; has a sense of neighborliness; and offers cultural and recreational opportunities close at hand.[1]

With this broad definition in mind, it is easy to see why transportation investment can influence livability. A highway built through a rural community has much the same effect today as did a new railway line a century and a half ago. Overnight, the isolation ends; the community becomes a part of a network, and the number of destinations within an hour's travel time increases many fold. Similarly, an attractive, tree-lined main street, complete with wide sidewalks and "street furniture" – benches, bus shelters, trash cans, and the like – is a source of community pride and a magnet for walkers, shoppers, and tourists. In this way, both places become more livable – they become places where people want to be. Of course, transportation investment can make a place less livable as well if not done sensitively.

[1] Project for Public Spaces, *The Role of Transit in Creating Livable Metropolitan Communities*, Transit Cooperative Research Program (TCRP) Report 22 (Washington, D.C.: Transportation Research Board, National Academy Press, 1997).

In recent years, transportation professionals have begun to emphasize "context-sensitive design": projects that respond to the particular needs of a community, reflect local values, and are compatible with the natural or man-made environment.[2] Attention has been shifting from giving priority to moving motor vehicles as quickly as possible to improving accessibility through integrated land use and transportation actions, and through enhancing movement by all modes including non-motorized travel. Effective transportation planning also addresses the needs of low-income and minority groups so that they share in the benefits of transport investments and do not suffer high and adverse environmental impacts.

"Context-sensitive design is a way to integrate highways and communities. This concept encourages designers to balance the transportation goals of mobility and safety with community values by enhancing and preserving a community's cultural and natural resources, while not establishing any new geometric standards or criteria. Context-sensitive design is supported by provisions in the ISTEA, NHS Act, and TEA-21, which emphasize the importance of good transportation design that is sensitive to the human-made and natural settings."

– *Transportation and Environmental Case Studies*
U.S. Department of Transportation

Motorists, pedestrians, bicyclists, and transit riders all benefit from thousands of recently-completed transportation projects, from new bridges, highways, and rail lines to redesigned streetscapes featuring attractive sidewalks, street furniture, and public art displays. Using specific examples from the 1990s, this report describes how well-planned transportation investment is improving the quality of life for Americans.

The community and social benefits of transportation investment can be divided into five general categories, discussed in detail in this paper.

1. **Transportation investment increases mobility and access –** It is important to note that mobility and access, while often used interchangeably, are not the same. A strong, multimodal transport network helps overcome distances (greater mobility). It also helps us reach desired social and economic activities (better access).

2. **Transportation investment in a wide variety of modes provides is ensuring a more balanced transportation network –** A more balanced network provides travelers with less stressful alternatives to driving and flying while helping to reduce pollution and congestion.

3. **Transportation investment improves safety –** Redesigning roads and intersections, constructing pedestrian and bicycle facilities, improving education, and deploying a variety of intelligent transportation systems can help reduce crashes, which in 1999 claimed the lives of 44,000 people in the U.S. and injured 3.3 million more.

[2] Project for Public Spaces, *How Transportation and Community Partnerships Are Shaping America, Part II: Streets and Roads* (Washington, D.C.: AASHTO, 2000).

4. **Transportation investment can improve the appearance of an intersection, a street, or an entire neighborhood –** Across the nation, new and rehabilitated infrastructure is being designed with aesthetics as well as function in mind.

5. **Transportation investment can increase community cohesion and inspire a sense of togetherness –** It can stimulate social interaction, increase civic participation, foster closeness among neighbors, and increase people's sense of safety.

Government Initiatives and Funding Programs

Several government initiatives and funding programs are providing social and community benefits. These include:

- **The Transportation Enhancement Program.** Created in 1991 with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA), the Transportation Enhancement Program provides funding to help expand transportation choices, increase recreational opportunities, improve aesthetics, promote historic preservation, and mitigate pollution. ISTEA stipulated that 10 percent of federal funds distributed to the states through the Surface Transportation Program were to be dedicated to "enhancements." TEA-21 continued this commitment and increased funding by 40 percent, so that annual spending now averages 630 million dollars. Since 1991 more than 2.4 billion dollars has been invested in 12,000 enhancement projects. Bicycle and pedestrian facilities (including rails-to-trails projects) have made up more than half of programmed funds, followed by historic preservation and preservation of historic transportation facilities (22 percent), and landscape and beautification (14 percent).

  Since 1991 more than 2.4 billion dollars has been invested in 12,000 Transportation Enhancement projects.

- **The Transportation and Community and System Preservation (TCSP) Pilot Program.** The TCSP, created by the Transportation Equity Act for the 21st Century (TEA-21) and administered by the Federal Highway Administration, provides money to state, local, and tribal governments to develop innovative strategies that use transportation to build livable communities. Over the first three years of the program, nearly 200 grants have been awarded to all 50 states and the District of Columbia.

- **The Federal Transit Administration's Livable Communities Initiative.** The Livable Communities Initiative is designed to improve mobility and the quality of services available to residents of neighborhoods by strengthening the link between transit planning and community planning. It seeks to provide better access to employment, schools, and other community destinations through community-oriented transit nodes. Eligible recipients are transit operators, metropolitan planning organizations, city and county governments, states, and planning agencies. The active participation of non-profit, community, and civic organizations is also encouraged.

- **The Federal Highway Administration's National Scenic Byways Program.** This program recognizes roads across the nation that are significant from a scenic, historic, recreational, cultural, or archeological point of view. Today, there are a total of 15 All-American Roads and 57 National Scenic Byways, including the Big Sur Coast Highway in California, the Las Vegas Strip in Nevada, Historic Route 66 in New Mexico, the Blue Ridge Parkway in North Carolina, the Merritt Parkway in Connecticut, and the Acadia Byway in Maine. A voluntary program, anyone may nominate a road for inclusion in the list, but the nomination must be submitted through the state. The National Scenic Byways Program has benefited from about 139 million dollars in federal funds, with about 25 million dollars available annually through 2003.

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1.0 Mobility and Access Benefits

In the 19th and 20th centuries, transportation investment – first in railways and streetcars, then in highways – greatly expanded the areas that can be reached in a given travel time. This investment has made it easier to visit friends and family and to access a broad range of work, shopping, educational, health care, and recreational opportunities. A resident of Indianapolis is within an hour's drive of many of the nation's leading hospitals and universities, thousands of potential employers, and two million potential friends. Long-distance opportunities are as important as local opportunities. In a weekend, the same resident can drive to southern Indiana for fall foliage, take the train to Chicago to see an art exhibit, or fly to Philadelphia to visit his parents. New projects today may lack the magnitude of the opening of the transcontinental railway or the first non-stop transcontinental flight, but they are still of tremendous importance at a regional or local level.

"Until communities and businesses have access to markets and resources, until workers are able to reasonably commute to jobs, and until patients can be within safe reach of doctors and medical care, the people of Appalachia will never have a full seat at the table of American prosperity. The Appalachian highways are more than a road in the mountains – they are very much a lifeline."

– Jesse L. White, Jr.
Appalachian Regional Commission
Federal Co-Chairman

In Appalachia, a 3,000-mile highway system traversing the mountainous terrain of 13 states is slowly taking shape. To date, approximately 2,500 miles of the system, known as the Appalachian Development Highway System (ADHS), have been completed or are under construction, with a goal of 2,700 miles completed by the end of the decade. The ADHS has evolved in response to geographic necessity; because of the high cost of building roads through Appalachia's rugged landscape, the Interstate Highway System bypassed much of Appalachia completely. As a result, the

region has remained relatively isolated. As new segments of the ADHS are opened, development follows. For example, Corridor G (U.S. 119), linking Charleston, West Virginia and Pikeville, Kentucky, has helped attract a new industrial park and shopping center to Charleston's outskirts. For residents of the small towns to Charleston's southwest, Corridor G means improved access to education and health care. Southern West Virginia Community College has four campuses that serve residents in nine nearby counties. Instead of commuting two hours to take classes, some students have cut their commute to 15 minutes. Meanwhile, the time needed to reach emergency hospitalization has dropped from as long as two hours to just 30 minutes.[3]

In some parts of Appalachia, the time needed to reach emergency hospitalization has dropped from as long as two hours to just 30 minutes.

The H-3 highway in Oahu, Hawaii is another example of a recently-completed highway that ensures fast, efficient travel through mountainous terrain. The 16-mile, four-lane roadway, which opened to traffic in December 1997, connects the western and eastern sides of Oahu, Hawaii's most populous island. Designed to alleviate congestion on Oahu's other main roadways and stimulate trade and economic growth, the H-3 is by all accounts a success; within months of its completion, it was handling almost 30 percent of the vehicles crossing the Koolau Mountains. The H-3 enhances national security as well, providing direct access between the Pearl Harbor Naval Base and Kaneohe Marine Corps Air Station. An engineering marvel, the H-3 crosses over – and through – some of the most rugged and beautiful terrain in the United States. Extreme care was taken during the design and construction phases of the 1.3 billion dollar project to minimize its impact on the environment, making it a model for other environmentally-sensitive transportation projects.

Recent investments in transit have also resulted in greater ease and speed of travel for Americans. During the 1990s, three high-speed catamarans went into service in San Francisco Bay. Cruising at speeds of 45 mph (38 knots), the vessels have cut the travel time between San Francisco and its northern suburbs dramatically. Today, the *MV Del Norte* makes the run from the Larkspur ferry terminal in Marin County to San Francisco in just 30 minutes, compared to 45 minutes for a conventional ferry. Faster service means faster turnaround times, and hence more frequent daily service. Today, 43 trips a day are scheduled on this route. Harried commuters, anxious to escape gridlocked traffic, have responded by packing the ferries to capacity. Annual ridership on Bay ferries has increased 50 percent, from 2.6 million to 3.8 million. Further increases are likely when a fourth catamaran, the *MV Mendocino*, enters into service in late 2001. The

"There's been such tremendous growth that the congestion just keeps getting worse. At this point ferries look like the only way to travel."

– Michael Fajans
Project Manager, San Francisco Bay Area Regional Ferry Plan

[3] Fred D. Baldwin, "Appalachian Highways: Almost Home but a Long Way to Go," *Appalachia* (May-August 1996).

new 8.5 million dollar vessel, now under construction, will carry up to 400 passengers, 75 more than the *Del Norte*. The Metropolitan Transportation Commission, which oversees public transport for the Bay Area, is calling for five new high-speed catamarans, several new routes, and major terminal improvements in the coming years.[4]

Investment in transit systems can dramatically increase mobility and accessibility for the young, the elderly, the poor, and the disabled. Investment in ADA-compliant light rail systems, fixed-route bus services, or demand response (dial-a-ride) services ensures their personal mobility. It gives them access to jobs, education, shopping, health care, and family and friends, particularly as development in the suburbs continues to outpace development in the older urban centers. Transit can break the social isolation felt by adolescents who are too young to drive, and by the elderly and disabled with impairments that make it impossible or unsafe for them to drive. For the elderly especially, access to transit can make the difference between being able to live independently or in an assisted living facility. Because a disproportionate number of people who depend on transit service are elderly, minorities, and low-income, transit investment also helps reduce social and economic inequality. For example, fully 94 percent of welfare recipients do not own an automobile.[5]

In recent years, a number of transit services have been expanded or improved to offer greater accessibility. Transit agencies around the country are replacing their aging buses – and even streetcars – with new low-platform vehicles that make entry and exit easier for the elderly and disabled, and for people with small children or baby carriages. Others are adding "access-to-jobs" service to make major regional employers accessible by transit.

For example, in late 1999, a route expansion took place in greater Cincinnati, where the Southwest Ohio Regional Transit Authority (SORTA) joined forces with the Butler County Regional Transit Authority (BCRTA) and Warren County Transit to provide a new service called JobBus. JobBus is a "reverse commute" program designed primarily to help low-income city residents reach good-paying jobs that have moved to the suburbs. It uses regular Metro and Butler County Regional Transit Authority service to take workers from downtown Cincinnati to five transfer locations, where passengers can transfer at no cost to smaller circulator vans and go directly

Transit helps reduce social and economic inequality. Fully 94 percent of welfare recipients do not own an automobile.

[4] Richard Martin, "Water Cure for Transport Ills: High-Speed Catamarans Revolutionize Commuter Ferries," ABCNEWS.com, 22 June 1999.

[5] *Using Public Transportation to Reduce the Economic, Social, and Human Costs of Personal Immobility*. TCRP Report 49 (Washington, D.C.: Transportation Research Board, National Academy Press, 1999): 3-13.

to their job sites in southern Warren County, Fairfield and Sharonville.[6] JobBus and other reverse commute programs are especially important because they increase job access for minority groups that suffer disproportionately high-unemployment rates.

2.0 Benefits of Alternative Travel Modes

For a variety of reasons – historical, geographical, economic, social, and political – the transportation infrastructure that suits one city, state, or region well may be less suited to another; some communities may choose to spend more on transit and less on highways, and other communities may choose to do the opposite. ISTEA and later TEA-21 have given communities the flexibility to make these choices, thereby maximizing the social benefits they receive from transportation investment. By providing communities with greater leeway to set their own transportation spending priorities, and to reject a "one size fits all" solution, transportation policy is swiftly evolving to reflect local values.

"Investing in rail can benefit all modes. Think of our national transportation system as a three-legged stool. For the stool to stand, all three legs – highways, aviation and rail – must be strong and sturdy. Today, too much of the weight of travel demand rests on the highway and aviation legs, when a healthy and more efficient balance could be struck with the development of rail choices and alternatives in many markets."

– George D. Warrington
President and CEO, Amtrak

For several decades now, we have invested heavily in roadways and aviation and as a result most Americans enjoy a relatively high degree of mobility using these two modes. Now opportunities exist to increase mobility using other modes as well: rail, transit, bicycling, and walking. Investments in these modes provide a greater degree of balance to our transportation network, offering travelers less stressful alternatives to driving or flying while helping to reduce pollution and congestion. This, in turn, provides benefits for those who continue to drive and fly. A more balanced transport network is also in the nation's strategic interest, as the September 11 attacks on the World Trade Center and the Pentagon demonstrated. Following the attacks, air traffic ground to a halt and road access into and out of parts of New York and Washington, D.C. was sharply restricted. Had it not been for the availability of bus and rail service, many travelers would have been stranded.

[6] SORTA information and press releases, available at www.sorta.com as of July 2001.

In other cities across the U.S., including St. Louis, Dallas, Salt Lake City, and Denver, new light rail lines have opened in recent years. Denver's new line, completed in June 2000 at a cost of 178 million dollars, provides a fine example of the maxim, "Build it and they will come."[7] The five-stop Southwest line runs from Interstate 25 and Broadway south nine miles to Mineral Avenue in Jefferson County. There, it connects with the existing Central Corridor that runs from Broadway through the downtown to 30th Avenue. On an average weekday, as many as 14,000 people ride the line – 66 percent more than the original projections of 8,400. On the very first day of service, the Mineral Avenue and downtown Littleton station parking lots were filled to capacity before 8:00 a.m., with dozens of cars parked illegally nearby and others parking at an undeveloped overflow lot west of Mineral Avenue Station. To ease the overcrowding, the Denver Regional Transportation District (RTD) is adding parking lots, including a multi-level garage at Mineral Avenue, and is awaiting the delivery of 12 new light rail cars it has ordered at a cost of 30 million dollars. The Southwest line is successful not because it has lured riders from the bus, but because it has attracted new riders who did not take public transport in the past; fully 60 percent of riders surveyed admitted they had not used RTD's bus system.[8] Today, a new, 41 million dollar, two-mile extension of the system, that will connect to the Central and Southwest Corridor lines near Colfax Avenue and continue on to Denver Union Station.

Salt Lake City's new light rail line, TRAX, opened in December 1999, running 15 miles from Sandy to downtown Salt Lake City. Today, ridership averages over 20,000 passengers each day, 43 percent above projections. A 2.5-mile extension to the University of Utah campus is underway, and is expected to be completed by 2002 when Salt Lake City hosts the Winter Olympic Games.[9] In Dallas, an 860 million dollar, 20-mile light rail "starter system" opened in 1996. Ridership has outpaced forecasts by 30 percent, and the stations are serving as a magnet for new residential and commercial development. Over 1,100 apartments and lofts have been built around two light rail stations, with restaurants, shops, theaters, and a large entertainment complex planned or under construction. In 2000, the new line's popularity helped convince voters to pass a 2.9 billion dollar long-term financing bill. As a result, 53 more miles of light rail will be added to the system by 2013.[10]

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In Des Moines, Iowa, traffic congestion and parking shortages prompted the City of Des Moines and the Des Moines Metropolitan Transit Authority to commission a new park-and-ride facility. The facility, which was built one-half mile north of the central business district on Center Street, includes parking for 1800 vehicles, retail stores, and a daycare

[7] "Denver Ridership Hits Target," *Light Rail Progress*, July 2000.

[8] Cathy Proctor, "Light Rail Draws More Riders," *The Denver Business Journal*, 22 December 2000.

[9] Utah Transit Authority information and press releases, available at www.rideuta.com as of July 2001.

[10] Tony Hartzel, "Getting a Head Start on DART," *The Dallas Morning News*, 15 August 2000.

center and playground in a park-like setting. LINK buses circulate through an attractive shuttle station inside the building at five to 10-minute intervals, taking commuters to the central business district. The Center Street Park-and-Ride's elegant design and high-quality construction have earned it a Design for Transportation National Award from the U.S. Department of Transportation in 2000.[11]

Offering non-motorized travel choices – whether for transportation or recreation – is just as important as offering motorized choices. Walking and bicycling can greatly improve both our health and our quality of life. According to the Centers for Disease Control and Prevention, nearly two-thirds of Americans are not regularly physically active, and more than half are overweight or obese. Each year, 300,000 Americans die from diseases associated with a sedentary lifestyle, including coronary heart disease, hypertension, colon cancer, diabetes, and depression. Yet as little as 30 minutes of moderate-intensity exercise, such as cycling or brisk walking, can reduce health risks dramatically.[12]

A 1996 study in Santa Barbara, for example, showed that the number of cyclists on streets where bike lanes were added increased by 47 percent, compared to just one percent of streets without bike lanes.

While many trips are too far to make non-motorized travel an option, a surprising number are not. In urban areas, two-thirds of trips are five miles or less – suitable for cycling – and nationwide one-quarter of all trips made are one mile or less – suitable for walking. But how many of us have driven across the street from the parking lot of one shopping plaza to the parking lot of another, simply because no sidewalks or crosswalks were available?

Transportation investment in a variety of design features can encourage non-motorized travel for short trips such as these. In recent years numerous street redesign projects across the country have been completed with one or more of the following "pedestrian-friendly" or "bicycle-friendly" improvements: 1) wide sidewalks that permit pedestrians to walk side by side and carry on a conversation; 2) traffic lights that give pedestrians a "WALK" signal or green light within requiring excessive waits; 3) clearly painted "zebra stripe" crosswalks at intersections make pedestrians more visible to motorists; 4) tight intersection curb radii that shorten crossing distances for pedestrians and encourage cars to slow down as they round the corner; 5) benches, bicycle racks, shade trees, good lighting, and other amenities that make non-motorized travel more pleasant; and 6) painted bicycle lanes between the travel lane and the parking lane.

Painted bicycle lanes legitimize the presence of cyclists on the road. They also make the actions of both cyclists and motorists more predictable, leading to higher comfort levels and an increased perception of safety. A 1996 study in Santa Barbara, for example,

[11] *Design for Transportation National Awards 2000* (Washington, D.C.: U.S. Department of Transportation, 2000), 34.

[12] U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, *Physical Activity and Health: A Report of the Surgeon General Executive Summary*, Washington, D.C., 1995.

showed that the number of cyclists on streets where bike lanes were added increased by 47 percent, compared to just one percent of streets without bike lanes.[13]

Boulder, Colorado, is an example of a city that has built an extensive network of pedestrian and bicycle facilities. The most critical part of the network is the popular Boulder Creek Path, a 10-foot-wide mixed-use trail that parallels Boulder Creek and provides direct access to the city center. Several miles of on-street bike lanes have been striped on major north-south and east-west roads in the downtown area, and barrier-protected bicycle boulevards connect to off-street bike paths. Signs inform cyclists which way to turn to find the best bicycle route, and at several intersections turns for motor vehicles are prohibited but allowed for bicycles. An aggressive traffic calming program has led to the installation of traffic circles, speed humps, narrowed streets, necked down intersections, brick crosswalks, and diverters, making walking safer and more inviting.[14]

"The serendipity of walking means that we interact with our friends and neighbors more often, thereby creating a sense of community that not only makes us feel good, but also helps motivate us to support schools, parks, and other public necessities and amenities. Without a sense of community, we retreat to our cocoons, and become less likely to unite against societal challenges. And our cocoons become breeding grounds for fear and suspicion."

– Dom Nozzi
Urban Planner, Boulder, Colorado

In Cleveland, Ohio, the Greater Cleveland Regional Transit Authority has improved walking conditions by building an elevated pedestrian walkway connecting Tower City Center, the main train station, with the Gateway Sports and Entertainment Complex. The Complex includes the 42,000 seat Jacobs Field, home of the Cleveland Indians, and the 21,000 seat Gund Area, home of the Cleveland Cavaliers. The 1,000-foot long structure is climate-controlled and offers scenic views of the Cuyahoga River. It provides convenient, safe access to buses and trains, making it possible for sports fans to leave their cars at home on game day. Over 60 percent of Gateway Stadium attendees use the walkway, and over 25 percent use the public transit system. Just 16 months after the walkway opened, it had attracted more than 940,000 users.[15]

Another example of a facility that enhances pedestrian/bicycle access to transit is the 10-mile Minuteman Commuter Bikeway northwest of Boston. The multi-use trail extends through the towns of Bedford through Lexington and Arlington to an important subway and bus terminal in Cambridge. The Bikeway was the 500th rails-to-trails conversion in the U.S. and after its first year of operation was one of the busiest. On weekdays, hundreds of

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[13] Rails-to-Trails Conservancy and the Association of Pedestrian and Bicycle Professionals, *Improving Conditions for Bicycling and Walking* (Washington, D.C.: Federal Highway Administration, 1998): 24.

[14] Dom Nozzi, "City of Boulder Planning," available at http://user.gru.net/domzbldr.htm as of September 2001.

[15] Federal Highway Administration, *Innovations in Transportation and Air Quality: Twelve Exemplary Projects* (Washington, D.C.: U.S. Department of Transportation, 1996): 12–13.

people use the trail for commuting, and on weekends more than 10,000 people use it for recreation.[16] Because rail-trails separate motorized and non-motorized traffic completely, they provide a more relaxing experience for their users while greatly reducing the risk of fatalities.

Outfitting trains, buses, and stations with bike racks and bike lockers reinforces the attractiveness of both transit and cycling. Lockers offer commuters the flexibility of riding a bike either from home to the station and back, or from the station to work and back, without fear that their machine will be stolen or vandalized in their absence. Racks on transit vehicles allow commuters to take their bicycles with them for use at both ends of their trip.

"The popularity of the Minuteman Commuter Bikeway is breathtaking – on some days it looks like the start of the Boston Marathon! People are literally voting with their feet – and their wheels – for a transportation infrastructure that welcomes bicyclists and pedestrians instead of intimidating them."

– Tom Fortmann
Vice President, BBN Technologies
and long-time bicycle commuter

Several transit agencies have installed bike racks on their vehicles in recent years. Caltrain, the 70-mile passenger rail line connecting San Francisco with Silicon Valley, has equipped its cars with onboard racks that accommodate 24 bicycles per train. Bikes are allowed on every train, every day, at no additional cost and without a permit. As a result, Caltrain carries almost 2,000 bikes each weekday. So popular is the program that on some days Caltrain must turn riders away for lack of rack space. Bike lockers can be rented at most Caltrain stations for a nominal fee. Caltrain even offers a "two-for-one" promotional that encourages bikers to rent two lockers, one at their origin and one at their destination station. This way, by buying a second bike, commuters do not need to bring their bikes with them on the train.[17]

3.0 Safety Benefits

In 1999, approximately 44,000 people died and another 3.3 million were injured in transportation-related accidents in the United States. The vast majority of fatalities (80 percent) were motor vehicle operators and passengers although a significant number (14 percent) were pedestrians and bicyclists struck by motor vehicles. The remaining six percent were various transport users, including recreational boaters, railway workers and passengers,

[16] "Commuting on the Minuteman Commuter Bikeway," Briefing by Tom Fortmann, 19 March 1997, Alewife MBTA Station. Available at www.tiac.net/users/bingham/lexbike/fortmann.htm as of July 2001.

[17] Caltrain bicycle information, available at the Caltrain web site, www.caltrain.com as of July 2001.

airline passengers and crew, and passengers and pilots in small planes. Although significantly lower than the 56,000 deaths recorded in 1970, the present figure is a grim reminder that much work is needed to improve transportation safety.

Generally speaking, infrastructure investments that result in grade separation, the reduction of intersection conflict points, and the elimination of intersections entirely reduce fatalities and injuries; the safest roads are those with limited access. In 1999, urban interstate highways averaged 0.61 fatalities per 100 million vehicle miles traveled, compared to 1.28 fatalities on urban local roads. Rural Interstates averaged 1.23 fatalities, compared to 3.7 on rural local roads. Shifts to other modes will also generally improve safety. In 1999, 40,000 deaths involved motor vehicle occupants, but just 58 involved bus occupants (school, intercity, and transit), and 14 involved passengers on trains.[18]

A study of 11 intersections in the U.S. where modern roundabouts have been constructed showed a 37 percent reduction in the number of crashes and a 51 percent reduction in the number of injuries.

In 1999, according to the National Highway Traffic Safety Administration, approximately 8,500 fatal crashes took place at or near intersections.[19] Many of these occur when a vehicle traveling in one direction does not yield the right-of-way to a vehicle traveling in another. Signalized intersections can be especially dangerous because traffic does not slow down through the intersection during the green phase and red light running is an all-too-common occurrence. One innovative solution that is becoming increasingly popular among traffic planners in the U.S. is the roundabout. Not to be confused with the older, often chaotic rotary found mainly on the East Coast, the modern roundabout originated in Europe in the 1960s, where today they are widely used. The safety of a modern roundabout resides in its ability to slow down traffic entering the circle by channeling it and deflecting it around a center island. This reduces both the probability and severity of a crash. Moreover, there are fewer conflict points within a roundabout compared to a four-way intersection where left turns across traffic are permitted, also reducing the chances of collision. Because traffic moves through a roundabout with fewer delays, drivers are less likely to become frustrated and aggressive, further reducing the likelihood of an accident. Statistics attest to the safety of roundabouts: a study of 11 intersections in the U.S. where modern roundabouts have been constructed showed a 37 percent reduction in the number of crashes and a 51 percent reduction in the number of injuries.[20] For example,

In 1999, urban Interstate highways averaged 0.61 fatalities per 100 million vehicle miles traveled, compared to 1.28 fatalities on urban local roads. Rural Interstates averaged 1.23 fatalities, compared to 3.7 on rural local roads.

[18] Bureau of Transportation Statistics, *National Transportation Statistics 2000* (Washington, D.C.: U.S. Department of Transportation, 2001): 99, 108, 130.

[19] National Highway Traffic Safety Administration, *Traffic Safety Facts 1999* (Washington, D.C.: U.S. Department of Transportation, 2000): 66

[20] Georges Jacquemart, *Modern Roundabout Practice in the United States, National Cooperative Highway Research Program Synthesis of Highway Practice 264* (Washington, D.C.: National Academy Press): 25.

in 1993, in Lisbon, Maryland, a roundabout replaced a conventional four-way intersection of two state highways that had been marked by a two-way blinking red beacon. The number of accidents fell from an average of 7.4 each year before the roundabout to just 1.4 each year after the roundabout was constructed.[21] For this reason, the Insurance Institute for Highway Safety and State Farm Insurance, the nation's largest auto insurer, encourage the widespread use of roundabouts.[22]

Safety can also be improved using Intelligent Transportation Systems (ITS). For example, loop detectors embedded in the roadway, together with surveillance cameras mounted on major traffic arteries, provide early warning of accidents, reducing response time of emergency vehicles. Such a system was deployed in San Antonio, Texas beginning in 1995. Called TransGuide, the system was developed by the Texas DOT with federal funding. TransGuide uses loop detectors, high-resolution color video cameras mounted on poles, variable message signs, lane control signals, and a digital communications network to transmit data to an operations control center. The loop detectors measure the speed and density of traffic on each highway lane and detect any disruptions in flow. This information is displayed graphically on color-coded maps. Incident managers in the control center use this data, coupled with the live video feed, to notify emergency response personnel, and also to adjust the variable message and lane control signals to notify travelers as soon as an incident occurs. Before TransGuide, an average of 100 accidents occurred each day on the city's highways, and emergency vehicles took an average of 18 minutes to reach the scene of an accident. With the new system in place on the first 26 miles of San Antonio's highway network, accidents fell by 15 percent and emergency response times fell by 20 percent. Eventually, TransGuide will cover 191 miles of highway around San Antonio.[23]

After the TransGuide vehicle detection system was implemented on the first 26 miles of San Antonio's highway network, accidents fell by 15 percent and emergency response times fell by 20 percent.

The Georgia DOT has also deployed an early detection system. Known as Navigator, the Atlanta-based system covers 220 highway miles, making it one of the largest ITS programs in the country. Hundreds of cameras and dozens of radar speed sensors provide real-time images of road conditions, plus information on average speed, traffic volume, and vehicle classification. The cameras not only detect many accidents as soon as they occur, they

[21] Ibid., 42-43.

[22] "Many Crashes Could Be Avoided With Low-Cost Improvements," article available at State Farm Insurance web site, www.statefarm.com/media/lowcost.htm as of July 2001.

[23] "ITS and Public Safety: How Technology and Collaboration Can Save Lives," *Public Management* 80 (September 1998). Using the Internet, motorists can check the TransGuide web site (www.transguide.dot.state.tx.us/index.php) before leaving for work in the morning or before leaving the office at the end of the day to learn of any delays due to accidents or congestion. A glance at the color-coded map of the highway network will show delays and average travel speed on any given segment of roadway covered by the system. Live camera images are also displayed. Much of this information is also disseminated over a local television station.

help prevent secondary accidents from occurring by directing motorists away from congested roadways or accident sites. Prior to the introduction of Navigator, emergency response times on Atlanta's highways averaged 15 to 35 minutes. In 1997, with the new system in place, response times averaged just 12 minutes.[24]

The Kansas Highway Patrol has recently equipped 60 of its patrol cars with an automatic location system that allows the vehicles' movements to be precisely tracked from a dispatch office. The global positioning system identifies the latitude and longitude of the cars to an accuracy of 100 meters, then relays this information via the existing two-way radio system. The positions of the vehicles are automatically updated every two minutes. The troopers can also activate a special "pursuit mode" that increases the accuracy of the positioning to 10 meters and the frequency of the updates to seven seconds. The automatic vehicle location system increases both the safety of Kansas state troopers and the precision of crash location information.[25]

To improve safety for pedestrians and cyclists, context-sensitive design is often the key. Even modest increases in spending will yield tangible results; nationwide, a little over five percent of all trips are made on foot, yet 13 percent of all traffic deaths are pedestrians. However, the states spend less than one percent of their federal transportation funds on pedestrian facilities.[26] The most important safety enhancement for pedestrians is the construction of wide, well-lighted sidewalks and crosswalks. Other recent efforts to improve pedestrian safety have focused on "traffic calming," that is, redesigning a street in a neighborhood where pedestrians and children are present to slow the speed of traffic. The investments in amenities discussed in Section 2.0 above – those that encourage people to walk or bike to work, to shops, and for exercise and relaxation – also tend to calm traffic. Narrowing or eliminating travel lanes, adding parallel parking on both sides of the road, installing pedestrian-friendly traffic signals at intersections, and building bulb-outs, refuge islands, mini-roundabouts, and textured crosswalks make walking and biking more attractive in part because they make these activities safer. Traffic calming enhances safety for motorists as well by obliging them to travel the posted speed limit.

In the early 1990s, traffic sped through the near-empty downtown of Lake Worth, Florida at speeds as fast as 55 mph. Pedestrians rarely walked the narrow sidewalks or mustered the courage to cross Lake and Lucerne Avenues, each three lanes wide. In 1994, in response to community requests for more pedestrian space, slower speeds, and more parking, the Florida DOT undertook an experiment. Using only paint, it narrowed both avenues to two lanes with a third lane for parallel parking. In just one year, accident rates fell by 44 percent. As a result, the changes were made permanent, and the two main

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[24] "ITS and Public Safety." Like TransGuide, Navigator can be accessed over the Internet at www.georgia-navigator.com.

[25] Federal Highway Administration, *Intelligent Transportation Systems in the Heartland* (Washington, D.C.: U.S. Department of Transportation, 2001), 7.

[26] Barbara McCann and Bianca DeLille, *Mean Streets: Pedestrian Safety, Health, and Federal Transportation Spending* (Washington, D.C.: Surface Transportation Policy Project, 2000): 19.

streets of downtown Lake Worth were given narrower lanes with bulb-out intersections, curbside parking, wide sidewalks, decorative light fixtures, planters, benches, and trash containers. A roundabout was also constructed to calm traffic and serve as a gateway to Lake Worth's center. Traffic moves more slowly on Lake and Lucerne Avenues, but the level of service remains unchanged. The number of accidents has fallen by half, and the downtown has been transformed into a thriving shopping district with virtually no commercial vacancy. The city with a population of just 30,000 now attracts more than 100,000 people to its annual downtown street painting festival.[27]

"Traffic moves more slowly, but hey, it's a downtown, not a highway."

– Gene Nowak
City Planner,
Lake Worth, Florida

Although the Lake Worth project cost between 25 and 30 million dollars, mostly in state and federal funds, not all traffic calming measures require significant capital outlays. In St. Petersburg, Florida, a simple experiment designed to improve pedestrian safety at three intersections yielded positive results. Pedestrians were given a three-second head start to engage the crosswalk before motor vehicles enter the intersection, in order to minimize conflicts with turning vehicles. This head start, called a "leading pedestrian interval" was programmed into the signal phasing at three St. Petersburg intersections at which the "WALK" signal had previously been concurrent with the green signal for turning vehicles. Careful monitoring of the intersections showed that prior to the reprogramming, the number of conflicts per 100 pedestrians averaged 3.0, 2.1, and 3.3 for the three intersections. After the three-second leading pedestrian interval was introduced, conflicts were virtually nonexistent. Once pedestrians had engaged the intersection, motorists were more likely to acknowledge their presence and yield the right-of-way.[28] While many signalized intersections in the U.S. already provide a three-second leading pedestrian interval, many do not, leaving considerable room for safety enhancement along these lines.

Better signal timing can also improve safety for cyclists. In Davis, California, one major intersection near the edge of the university campus had peak-hour flows of over 2,300 cars and 1,100 cyclists. During one two-year period, 16 car-bike accidents occurred. To reduce conflicts, the city installed traffic signals with special bicycle symbols and a 30-second "bikes only" phase in the signal timing. These allowed bicyclists to clear the intersection before the cars were given a green light, minimizing conflicts for everyone. One year after the new signals had been installed, no accidents were reported at the intersection. As a result, bicycle signals have been installed at six other intersections in Davis. Another means of providing cyclists with a head start at intersections involves restriping the intersection to make a separate stop line

Offering pedestrians a three-second head-start at signalized intersections can virtually eliminate motorist-pedestrian conflicts.

[27] Project for Public Spaces, *Transportation and Community Partnerships*, 6-7.

[28] Rails-to-Trails, *Improving Conditions*, 30.

for cyclists ahead of the stop line for cars. This allows cyclists to engage the intersection first.

The most effective way to ensure a cyclist's safety is to build off-road trails that are completely separated from vehicular traffic. Often, these are constructed along abandoned rail rights-of-way. The Rails-to-Trails Conservancy estimates that a total of 1,000 rail-trails exist nationwide, with at least one in every state. Another 1,200 rail-trail projects are in progress, with new ones beginning every month. While many trails are primarily used by recreational cyclists, others attract commuters as well. The Minuteman Commuter Bikeway, described above, is one such example. Another is the 11-mile Capital Crescent Trail that connects downtown Washington, D.C. with the suburbs of Bethesda and Silver Spring, Maryland. Since it opened to the public in 1993, it has become a popular route into the nation's capital, heavily used by commuters in the morning and the evening and by recreational riders on weekends. The 35-mile Pinellas Trail in St. Petersburg, Florida is used by 90,000 people each month, nearly a third of whom are commuters. The Cedar Lake Trail in Minneapolis is also heavily used by commuters, as it gives suburban cyclists an easy commuting link with downtown. The Cedar Lake Trail has been called the nation's first "divided-lane bicycle freeway" because users enjoy two 10-foot-wide asphalt lanes, one inbound and one outbound. Pedestrians have a choice of a six-foot-wide asphalt path or an adjoining three-foot-wide strip of crushed limestone designed to give runners a softer cushion. Well over a thousand riders use the trail on an average weekday.[29]

The Rails-to-Trails Conservancy estimates that a total of 1,000 rail-trails exist nationwide, with at least one in every state.

When accidents do occur, transportation investment – particularly investment in ITS – can help reduce emergency vehicle response times. Today, an average of 5.2 minutes elapses between the time an accident occurs and the time it is first reported. The Fatal Accident Reporting System estimates that if this time could be reduced to just two minutes, fatalities on urban Interstates would fall by 15 percent, saving an average of one life each day.[30] In Albuquerque, New Mexico, ambulances are guided by a map-based computer-aided dispatch system that pinpoints the exact location of an accident. Since the new system has been installed, emergency response times have declined by 10 to 15 percent. In Palm Beach County, Florida, a new Priority One traffic preemption system is being installed that overrides the normal traffic light sequence and allows emergency response vehicles to go through intersections without stopping. Priority One relies on the global positioning system and vehicle transponders that automatically interrupt the normal light cycle, changing red lights to green or preventing green lights from changing

Reducing average accident response time on urban Interstates from its present 5.2 minutes to two minutes would reduce fatalities by 15 percent, saving an average of one life each day.

[29]Rails-to-Trails Conservancy web site, www.railtrails.org.

[30]Federal Highway Administration, *Intelligent Transportation Systems: Real World Benefits* (Washington, D.C.: U.S. Department of Transportation, 1998), 7.

to red. When system installation is complete, emergency response times in Palm Beach County are expected to fall by as much as 20 percent. Other traffic preemption systems are being installed in cities from coast to coast.[31]

4.0 Aesthetic Benefits

Transportation investment can improve the visual appearance of a neighborhood. Some projects, like the Golden Gate Bridge, are so spectacular that they can rightfully be called works of beauty. They become the symbols of a community or a city. Most projects are more modest in scale and ambition, and seek only to improve the appearance of a city block or short stretch of roadway. Collectively, however, they contribute to the overall visual impression one has of a city, a state, and ultimately the entire country. Across the nation, new and rehabilitated infrastructure is being designed with aesthetics as well as function in mind.

East Main Street in Westminster, Maryland retains much of its 19th-century charm, with white-painted brick and wood houses set close to the narrow street. By the early 1990s, however, the very qualities that had led to the downtown's designation as a National Register Historic District were threatening to erode its attractiveness as a tourist and shopping venue. Successive road repavings had raised the street's center, resulting in sloping parking spaces that caught car doors on curbs. The lack of storm drainage caused puddles to linger in the street after each rainfall. The sidewalks – where they existed – were narrow, cracked, and caving in. Utility poles and lines had displaced most of the stately old trees. As a result, many retail and office spaces were vacant. In response to local requests, Maryland DOT agreed to double the sidewalk width and narrow the travel lanes slightly. Some 34 of the 42 mature trees were saved and 104 new trees were planted. New concrete sidewalks were given a brick-like texture and color, and 11 pedestrian-friendly areas with landscaping were created. Concrete curbing provided a continuity of texture and helped define the edge of the roadway. Westminster's historic "street furniture," such as boot scrapers and hitching posts were preserved. Work on the one-mile stretch of East Main Street was completed by the end of 1994 at a cost of three million dollars. Today, business in the downtown is again thriving.[32]

Not far from Westminster, another Maryland neighborhood suffering from visual blight has been given a dramatic makeover. Before 1998, motorists entering the Baltimore

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[31] Federal Highway Administration, *Intelligent Transportation Systems Benefits: 1999 Update* (Washington, D.C.: U.S. Department of Transportation, 1999), 40; Federal Highway Administration, *Enhancing Public Safety, Saving Lives: Emergency Vehicle Preemption* (Washington, D.C.: U.S. Department of Transportation, 1999).

[32] Federal Highway Administration, *Flexibility in Highway Design* (Washington, D.C.: U.S. Department of Transportation, 1997): 175-81.

suburb of Towson were greeted by long lines of cars waiting at a noisy, congested, five-way intersection regulated by a messy array of traffic signals. Today, in its place, is a large, neatly-landscaped roundabout. The traffic signals are gone, and so too are the noise and pollution that resulted from the lines of waiting cars. Nearby merchants are pleased because traffic tie-ups have been virtually eliminated, and traffic planners are pleased that the new roundabout handles 400 more cars each hour at peak period than did the previous signalized intersection, while lowering the number of severe accidents. What was once just another unsightly streetscape is now the new gateway to Towson. On the large center island trees and shrubs have been planted, while around the periphery new sidewalks and crosswalks have been built. Streetscape revitalization has continued westward into the center of town. At the same time, the 4.25 million dollar improvement project has become a magnet for private development, and businesses are starting to gravitate toward the newly-created "downtown" roundabout area to take advantage of increasing foot traffic.[33]

"The [Vermont Avenue Metro rail station] design is an exemplary demonstration of the value of collaboration between art and architecture. The sculptural entrance canopy and lighting create a strong, clear image in the midst of urban clutter. This design pushes the limits and creates a memorable public place."

– U.S. Department of Transportation
Design for Transportation National Awards 2000

New transit stations that result from the collaboration of engineers, artists, and architects can be visually appealing. In Los Angeles, California, the newly completed Vermont Avenue metro rail station has won a 2000 Transportation Design National Award from the U.S. DOT for its visually arresting appearance. The station, which serves Los Angeles City College, the Braille Institute, and numerous local businesses and residences, consists of an urban transit plaza and an underground station. A large elliptical metal canopy appears to float above one of the two entrances, while nearby a trapezoidal glass box contains an elevator. Custom-designed light poles painted bright red tower over the plaza, illuminating it at night and providing a sense of tremendous scale during the daytime. A glass block skylight is positioned over the escalator to ease the transition from bright daylight to the relative darkness of the station. The station interior is paneled in stainless steel, and a series of stainless steel elliptical louvers echo the shape of the entry canopy.[34]

Many new bridges are being designed with aesthetics as well as function in mind. For example, the handsome new Portland Avenue Bridge in Beloit, Wisconsin is credited with helping to revitalize the town's once-dingy riverfront. A recipient of the Federal Highway Administration's 1998 Excellence in Highway Design Award, the bridge was completed in 1996 at a cost of 2.5 million dollars. It has four driving lanes, two bicycling lanes, and two sidewalks. Flared overlooks allow pedestrians to view the riverfront and circular

[33] Project for Public Spaces, *How Transportation and Community Partnerships Are Shaping America, Part II: Streets and Roads* (Washington, D.C.: AASHTO, 2000): 14-15.

[34] *Design for Transportation National Awards 2000*, 47.

stairways wrap around the wingwalls leading to the river. Ornamental railings, distinctive lights, limestone surfaces, and exterior girder staining add to its attractiveness. The Portland Avenue Bridge is part of Beloit's three-mile RiverWalk, which attracts walkers, joggers, skaters, cyclists, and stroller-pushers.[35]

Two recently-constructed bridges near Columbus, Indiana are attractive structures designed as part of the 48 million dollar Front Door Project. The project was a community-initiated effort to create a striking entryway for motorists as they approached the city's historic downtown from the west. Since a number of unique architectural structures are already found in the city center and its neighborhoods, the goal was to extend the character and feel of Columbus to the Interstate 65/ Route 46 interchange. The first phase, which involved the construction of the Columbus Gateway Arch Bridge, was completed in 1997. The bridge, which forms the western anchor point of the corridor, is a unique, twin-ribbed steel arch structure that carries four lanes of I-65 traffic over Route 46.[36] The final phase of the Front Door Project was completed in 1998. It entailed the construction of the Tipton Bridge, a cable-stayed bridge across the East Fork of the White River and into downtown Columbus. As motorists cross the bridge, they see the towers of the historic County Courthouse and the First Christian Church framed within the bridge's triangular shape. The effect is deliberate; the axis of the bridge was aligned with the courthouse to make a dramatic statement.[37]

"Building architecturally significant structures adds value to this community [Columbus, Indiana]. This is a community with a vision that wants something beautiful."

– Pat Cassity
Principal Bridge Engineer,
J. Muller International

In some cases, transportation investment designed to make a project less, rather than more, conspicuous is desirable. Using flexible design methods, highways in need of improvement or restoration can be integrated into the natural landscape to reduce their visual impact. One such example is the recent reconstruction of South Broadway (Route 9) in Saratoga Springs, New York. The approximately one-mile stretch of four-lane highway is bounded on both sides by state park land, and is the southern gateway to a town famous for its historic, recreational, and cultural attractions. Originally an undivided highway without left turn lanes, South Broadway was rebuilt as a divided highway with left turn lanes and a raised grass median featuring landscaping, flower beds, and granite curbing. Decorative Victorian-style black fluted lamp posts were installed on the median and along both sides of the road, replacing the conventional – and decidedly less attractive – "cobra head"

[35] *Excellence in Highway Design 1998 Biennial Awards* (Washington, D.C.: Federal Highway Administration, 1998).

[36] "Columbus Gateway Arch Bridge," *Modern Steel Construction*, September 1998.

[37] "East Fork Cable-Stayed Bridge," Columbus, Ind.," article available at Construction.com web site as of July 2001.

streetlights. New traffic signals with fluted, pole-mounted pedestrian-activated "WALK" lights and high-visibility crosswalks were added. All overhead utilities were relocated underground. A full-length sidewalk on the east side of South Broadway was constructed, with a mixed use path on the west side. Finally, benches, bollards, flower beds, and trees were located behind the sidewalk to create a boulevard setting. The result is a highway that is far more aesthetically pleasing than the one it replaced, and a boon to the local tourist economy.[38]

5.0 Community Cohesion Benefits

Transportation investment can increase community cohesion and inspire a sense of togetherness. That is, it can stimulate social interaction among members of the community, increase civic participation, foster closeness among neighbors, and increase people's sense of safety. Any project that relies on extensive public participation and context-sensitive design principles, from a highway in Appalachia to a transit stop in Los Angeles, will also bring people together. Community cohesion is an extra benefit, a reward for respecting community needs.

State and local transportation partners are working to ensure that community impacts are consistently examined in transportation planning. This involves examining the distribution of benefits as well as the manner in which all population groups and communities may be burdened. Transportation investment can promote greater respect for communities in two ways. First, it can provide infrastructure and services that meet the needs of minority, low-income, and other populations as well as the entire public. These include access to employment opportunities and other activities, ensuring high levels of accessibility to a range of transportation services and choices, and maintaining existing roadway and public transportation investments. Second, it can ensure that adverse health and environmental impacts that might be associated with project construction do not strike particular communities disproportionately. For example, if a neighborhood will be adversely affected by transportation construction, a vigorous plan can be carried out that minimizes these potential adverse effects and also provides benefits to the affected community. A key to effectively and practically accomplishing these community design objectives is engaging potentially affected communities in a dialog throughout the planning and design process that is designed to provide community as well as regional benefits.[39]

The South Park Avenue improvement project in Tucson, Arizona resulted from a decade-long planning process that began in 1989. The objective was to improve the struggling South Park neighborhood, a low-income minority community originally settled by African

[38] *Regional Submissions for the Context Sensitive Design Award Excellence in Engineering 2001* (New York: New York State Department of Transportation, 2001).

[39] *Transportation and Environmental Justice Case Studies* (Washington, D.C.: U.S. Department of Transportation, 2000).

Americans in the 1940s. The planning process involved extensive community outreach and involvement, including town hall meetings, neighborhood "walkabouts," and in-home interviews with several respected elders in the South Park community. One of the more creative aspects of the South Park improvement project was the use of public art to enhance the streetscape along South Park Avenue and draw attention to the South Park area's history and identity as a community. For example, a number of new bus shelters featured colorful figures at each corner, their upraised arms holding up the roof of the shelter – a symbol of community spirit and willingness to help others during difficult times. In the end, the project resulted in the construction of six artistic bus shelters and one standard shelter, walls that doubled as a public art canvas, and new traffic signals, sidewalks, street lighting, and landscaping. Various other forms of public artwork became part of the streetscape, including decorative totems, bridge mosaic insets, sidewalk epoxy with random stenciled designs, and plaques with site-specific or historic information and graphics. The project was completed in 1999 at a cost of 1.5 million dollars.[40]

San Diego's mid-city neighborhood remained split for several years by 2.2-mile right-of-way, cleared to permit construction of a segment of Interstate 15. Property values fell, and with adjacent sections of I-15 to the north and south of the community already completed, traffic increased. In 1996, ground was at last broken on the remaining section, and the multi-ethnic, primarily low-income neighborhood began to recover. Enhancements to the design of the new highway segment brought many benefits including sound walls, dedicated bus lanes, transit stations, and a 25-foot below grade depression. Most importantly, an entire block was covered with a park, once again connecting the two halves of the neighborhood. Today, the high volume of traffic has been removed from local streets and placed below-grade. The neighborhood enjoys direct transit access via bus ramps and lanes, which have been designed to allow for conversion to light rail in the future. As a result, real estate values are rising and economic development opportunities are multiplying.[41]

Integrating transportation and land use planning can also increase community cohesion. This is one of the principles behind the Federal Highway Administration's Transportation and Community and System Preservation Pilot Program (TCSP), established under the Transportation Equity Act for the 21st Century. In Connecticut, a TCSP project has helped residents of Hartford's Parkville

"Because of the TCSP project, we have a better understanding of transportation issues and how they relate to the neighborhood. We are also gaining a better understanding of what to look for in the design of new development."

– Joe Langlais
Chair, Parkville Community Association,
Hartford, Connecticut

[40] Ibid.

[41] Federal Highway Administration, "San Diego, California: The PLACE^{3}S Analysis Method," Transportation and Community and System Preservation Pilot Program, Case Study #4, May 2001.

neighborhood identify pedestrian and traffic linkages, urban design strategies, and zoning changes that will better integrate planned transportation improvements and development projects with the neighborhood. It has also helped the small town of Suffield, Connecticut, plan for new transportation improvements while preserving the town's rural character and the strength of its old town center. Finally, a regionwide outreach and education effort is helping Connecticut residents understand how investing in transportation infrastructure in urban neighborhoods can reduce sprawl and congestion, preserve rural communities, and revitalize existing neighborhoods.

The Cypress Freeway replacement project in West Oakland, California is an example of a transportation investment that improved community cohesion. In 1989, a powerful earthquake struck the Bay Area, causing the double-deck Cypress Freeway in West Oakland to buckle and collapse. The local community immediately sensed an opportunity. The highway, built in the 1950s, had been a controversial project, bisecting the predominantly African American community in West Oakland, uprooting 600 families and dozens of businesses, and isolating a four-square-mile area of the very poorest part of the city from the more prosperous downtown. Over the next three decades, the area to the west of the highway withered, pressed against metalworking shops, rail yards, and the Port of Oakland. Throughout West Oakland, the noise and fumes from automobiles passing overhead degraded the quality of life for thousands. With the Cypress Freeway reduced to rubble, the opportunity arose to build a replacement farther to the west that would unite most of the neighborhood. The new highway opened in 1998. Caltrans also built an exit ramp at Market Street to provide access to local businesses and to erect landscaped sound barriers along the highway to reduce noise levels. Now attention has turned to converting the old right-of-way into a linear park that will reunite a city once cut in two.[42]

The East-West Expressway, a 10-mile limited-access highway near the central business district of Durham, North Carolina, was first planned in 1959. Nearly 40 years would pass, however, before the final section would be completed. The Crescent Street neighborhood, a poor African American community that included more than 200 households, stood squarely in the path of the proposed alignment. The North Carolina DOT put in place a plan that would keep the neighborhood intact. The Crescent Street neighborhood was rebuilt a short distance away, thereby reducing the social dislocations resulting from a move but also permitting residents without cars to continue to walk to their jobs at the nearby Veteran's Hospital and Duke University Medical Center. In the early 1990s, 65 houses were moved from the old site to the new, where they were renovated with modern conveniences. Over 100 new single-family homes were built, together with 66 multifamily units. A former school located on the new site was renovated for elderly housing. Two new parks and a community center were built, as well as new infrastructure. Today, a walk down Crescent Street reveals modern streets, sidewalks, and homes, with neatly

[42] *Transportation and Environmental Justice Case Studies*.

tended lawns and gardens. Most importantly, the neighborhood has remained whole and has not lost its cohesiveness.[43]

Conclusion

By improving our transportation infrastructure and services, our quality of life is improved in many ways, large and small. Greater ease and speed of mobility allows us to visit distant friends and relatives, and to choose between a greater number of jobs, shops, schools, and hospitals. Greater choice of travel modes and improved access provides flexibility, improved access, and opportunities for pleasure and relaxation.

Transportation investment can improve safety. When we face an emergency at home, we rely on well-maintained roads free of congestion and bottlenecks to speed the arrival of an ambulance, police car, or fire engine. Whether traveling by car, bus, train, bicycle, or foot, we benefit, sometimes unknowingly, from thoughtful road design, proper maintenance, and a variety of intelligent transportation systems.

The aesthetic benefits of transportation investment are perhaps the hardest to quantify, and yet they are among the most important when it comes to public acceptance of new projects. The most memorable projects are those that are not merely functional but attractive as well. Eye-catching streetscapes, bridges, and transit stops not only add to our enjoyment when we travel, they increase pride in community and nation. Conversely, by applying the principles of context-sensitive design, we can minimize the visual intrusion of roadways in nature, thereby better preserving the beauty of the landscape for future generations.

As a result of all of these transportation-related improvements, communities can become more cohesive. Streets that are attractive and safe for all users encourage social interaction. They encourage children to ride bicycles to their friends' houses and adults to cross the street to talk to neighbors. Efficient public transit systems allow those without cars – the young, the poor, the elderly, and the handicapped – to participate more fully in civic life, giving them a degree of independence they would not otherwise have. By understanding and addressing the unique needs of many different socioeconomic groups through early, inclusive, and meaningful public involvement, transportation facilities can be designed that fit more harmoniously in communities.

[43] Ibid.