

# Taking the High Road

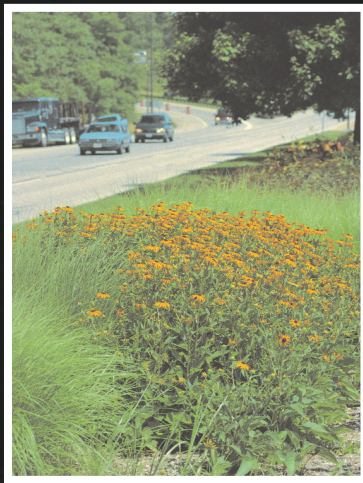
The Environmental and Social Contributions  
of America's Highway Programs



American Association of State Highway and Transportation Officials  
Center for Environmental Excellence

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and Transportation Officials

# Dear Friends,



Jobs, mobility, economic prosperity—these are the kind of benefits that we usually attribute to transportation. But there's a lot more to say about the good transportation does, not just for today, but far into the future. Good things for the environment, for historic preservation, and for the way we enjoy life.

In 2001, AASHTO created the AASHTO Center for Environmental Excellence for the purpose of promoting environmental stewardship along with encouraging innovative ways to streamline the transportation delivery process. AASHTO recognizes that the American public demands projects that not only provide mobility, but also contribute to one's overall quality of life. This report is a product of the Center for Environmental Excellence.

While considerable attention has been focused on environmental impacts that may result from transportation, little has been said about the multitude of environmental and societal benefits that do result from transportation. This report chronicles these important benefits with examples from across the country. It will likely surprise even the most experienced transportation and environment professionals with the size and scope of the positive impacts occurring in every state. Did you know that transportation is the largest investor in historic preservation of America's rich heritage? Did you imagine that highways are considered the country's top recycler? And did you know that in the past 10 years, \$5 billion has been spent in 15,000 communities for transportation enhancement projects?

Within these pages you will find the facts on how transportation makes a real difference to our quality of life through investments in:

- ▶ Transportation Enhancements;
- ▶ Historic Preservation;
- ▶ Recycling;
- ▶ Clean Air;
- ▶ Community Design;
- ▶ Brownfields Reclamation;
- ▶ Walking and Biking Trails;
- ▶ Wetlands and Water Quality;
- ▶ Wildlife Preservation;
- ▶ Sound Barriers;
- ▶ Scenic Byways; and
- ▶ Wildflowers and Native Vegetation.

For every good example shown here, there are hundreds more occurring all across the country. That's why state departments of transportation can say with pride that taking the high road is just the way they do business every day.

A handwritten signature in black ink that reads "John Horsley". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

John Horsley  
AASHTO Executive Director

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# Introduction

## Did you know?

- ▶ Highway programs are achieving a net gain in wetlands—showing a 160 percent increase in wetland acreage over the past seven years.
- ▶ Air emissions are declining, even with an increase in vehicle miles traveled and unprecedented population growth.
- ▶ Transportation is considered the number one financier of historic preservation and archeology.
- ▶ Transportation funding for bicycle and pedestrian projects has risen 80-fold since 1988—\$2.6 billion in the past 12 years.
- ▶ Transportation has funded almost 15,000 enhancement projects since 1992—providing billions of dollars for historic preservation, bicycle and pedestrian trails, landscaping, and community improvements.
- ▶ Roads and highways are recognized as one of the largest recyclers—with twice as much as asphalt pavement recycled as paper, glass, and aluminum combined.
- ▶ Transportation agencies are balancing the needs of communities and the natural environment by partnering with citizens to develop context-sensitive transportation solutions.

Across the nation, programs to construct and rehabilitate U.S. roads and highways are revitalizing communities, enhancing the environment, and improving quality of life. From preservation of historic covered bridges to recovery of the delicate and endangered Karner Blue butterfly, highway programs are balancing mobility goals with a responsibility to protect and enhance the nation's natural and cultural resources.

Environmental and social contributions of our road programs often go unrecognized, but they tell a real success story—a story of how transportation solutions benefit Americans and the environment every day.

This report illustrates the many benefits of transportation to communities and to the environment—major contributions that few Americans realize come from the transportation sector.

From new technologies for storm water runoff controls and strategies to preserve and enhance entire ecosystems, to the experience of traveling the nation's breathtaking scenic byways—this report provides a glimpse of the numerous benefits the transportation sector provides Americans.

Opposite – Mount Nebo, as seen traveling Utah's Nebo Loop Scenic Byway south from Payson.

Photo courtesy of the National Scenic Byways Program, [www.byways.org](http://www.byways.org)  
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“Our customers demand that our projects and activities fit, look good, have balance, and are sensitive to human and natural environment. Therefore, we must continue to change our culture to one that has an environmental ethic and assumes an environmental stewardship role. It is the correct approach... the right thing to do... the common sense thing to do, and our customers deserve this type of treatment.”

— James Codell, Secretary, Kentucky Transportation Cabinet and President, American Association of State Highway and Transportation Officials



## Vital Support for Environment and Communities

While called to action by 40 federal environmental laws and regulations, transportation agencies are establishing first-rate environmental programs that are credited with devising effective solutions and devoting untold resources to prevent and mitigate impacts.

In fact, the American Road and Transportation Builders Association reports that the Federal Highway Program provides more financial resources for environmental and community enhancements than any other public or private effort.<sup>1</sup>

In 1998 and 1999, working with state and local transportation departments, the highway program provided:

- ▶ \$608 million to build walkways, bike paths, and recreational trails;
- ▶ \$378 million for landscaping and soil stabilization;
- ▶ \$6.2 million to plant wildflowers;
- ▶ \$100 million to build auto emissions testing facilities;
- ▶ \$148 million to restore historic buildings and sites;
- ▶ \$85 million for noise abatement;
- ▶ \$30 million to purchase land to protect scenic and historic sites, and
- ▶ \$25 million for wetlands replacement and mitigation.

New chapters to this success story are being written every day, as highway programs continue to broaden their missions—both as public servants and as stewards of the environment. State highway officials have embraced environmental stewardship as the right way to do business, and with technical support from AASHTO’s Center for Environmental Excellence, America’s highway programs are “Taking the High Road.”

“Good stewardship of the environment is not just a personal responsibility, it is a public value. The Federal Highway Administration works with its partners in the states to take every opportunity to protect and enhance the environment while improving transportation.”

— *Mary Peters,*  
*Administrator,*  
*Federal Highway*  
*Administration*







Opposite – Various pieces of art have become popular rest stops along New Mexico’s Historic Route 66, I-40, and El Camino Real (I-25), encouraging travelers to stop and visit the communities along the way. Here, a visitor enjoys Fire and Ice, a flaming steel sculpture in downtown Grants that combines geological points of interest with a timeline of the history of the area.

Above – Transportation enhancement-funded artworks bring beauty and excitement to multi-modal Union Station Gateway Center in Los Angeles, California.

# Transportation: Enhancing Our Quality of Life

## Did you know?

Transportation is enhancing Americans’ quality of life by funneling billions of dollars, through the Transportation Enhancements Program, into projects that focus on preserving and enhancing our communities and the natural environment.

Most Americans are unaware that transportation is behind many of the improvements in everyday life they see in their communities. Since 1992, almost \$5 billion in transportation enhancement funds have been targeted to projects that improve quality of life and benefit the natural and cultural environment.

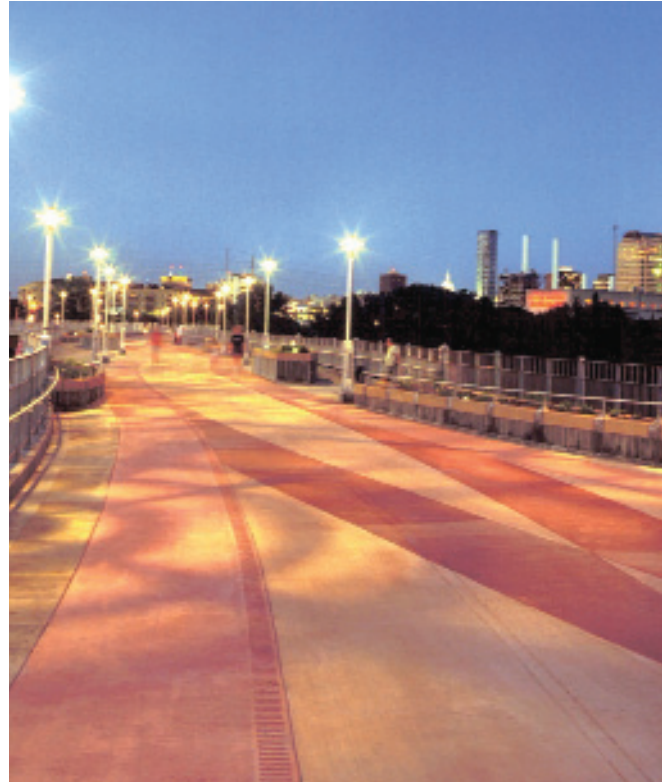
Hiking and biking paths, sidewalks, museums, tourist welcome centers, preservation of historic buildings and neighborhoods, historic markers and signs, environmental conservation projects, and beautiful landscapes and streetscapes are the results of 15,000 transportation enhancements projects under way all over the country.

The benefits go far beyond construction of new projects. Communities with transportation enhancement projects often experience increased tourism, economic growth and development, as well as immeasurable social benefits, such as healthier lifestyles, spaces to visit with neighbors, and renewed civic pride.

At the same time, transportation enhancements have helped to focus funds and attention on limiting impacts to natural resources and providing environmentally friendly transportation alternatives.

## Facts About the Transportation Enhancements Program

Established by Congress in 1991 in the Intermodal Surface Transportation Equity Act (ISTEA), the Transportation Enhancements Program has invested almost \$5 billion around the country in facilities for walking and bicycling, historic preservation, scenic beautification, land acquisition, and environmental mitigation. The program was reauthorized in the 1998 Transportation Equity Act for the 21st Century (TEA-21), ensuring that through 2003, about \$620 million in annual funds is available to state transportation agencies for these projects.



Photos courtesy of the National Transportation Enhancements Clearinghouse

Left and right – The James D. Pfluger Pedestrian/Bicycle Bridge in Austin, Texas.

Funding is dispersed across the various categories—with the largest portions going to bicycle and pedestrian projects and historic preservation efforts. The list on page 7 illustrates how states are targeting transportation enhancement funds to benefit communities.

### Looking at the Benefits

The transportation sector is using the Transportation Enhancements Program not only to improve transportation systems, but also to improve livability for residents and create enjoyable destinations for tourists. Projects create links with the past, build community identity, promote community revitalization, attract tourism dollars, and provide opportunities for healthy recreation. Through these enhancements, transportation is improving state programs and policies—including increasing the state and local tax base.

The National Transportation Enhancements Clearinghouse maintains a database of over 10,000 projects across the country in which transportation funding has made a difference in communities. Some examples illustrate the variety of ways transportation is benefiting America.<sup>2</sup>

### **In Meridian, Mississippi, transportation enhancements helped transform an old railroad station into a new, multi-modal transportation center: A catalyst to revitalizing the community's commercial core.**

All three sections of Meridian, Mississippi's Union Station have been restored thanks to a \$2.5 million Transportation Enhancements award, coupled with contributions from Amtrak, the DOT, and the City of Meridian.

# Twelve Ways Transportation Is Enhancing Communities

Transportation is enhancing America by targeting funds to a long list of eligible activities across the country, including the following:

## **Pedestrian and Bicycle Facilities**

- ▶ New or reconstructed sidewalks, walkways, or curb ramps
- ▶ Bike-lane striping, wide paved shoulders, bike parking, and bike racks on buses
- ▶ Off-road trails
- ▶ Bike and pedestrian bridges and underpasses

## **Pedestrian and Bicycle Safety and Education Activities**

- ▶ Bike and pedestrian injury prevention programs
- ▶ Programs to encourage walking and biking

## **Acquisition of Scenic or Historic Easements and Sites**

- ▶ Purchase of scenic land easements, vistas, and landscapes
- ▶ Purchase of historic properties or buildings in historic districts
- ▶ Preservation of farmland

## **Scenic or Historic Highway Programs—Including Tourist and Welcome Centers**

- ▶ Construction of turnouts and overlooks
- ▶ Visitor centers and viewing areas
- ▶ Designation signs and markers

## **Landscaping and Scenic Beautification**

- ▶ Street furniture
- ▶ Lighting
- ▶ Public art
- ▶ Landscaping and streetscape improvements

## **Historic Preservation**

- ▶ Preservation of buildings and façades in historic districts
- ▶ Restoration and reuse of historic buildings for transportation-related purposes
- ▶ Access improvements to historic sites and buildings

## **Rehabilitation and Operation of Historic Transportation Buildings, Structures, or Facilities**

- ▶ Restoration of railroad depots, bus stations, and lighthouses
- ▶ Rehabilitation of rail trestles, tunnels, bridges, and canals

## **Preservation of Abandoned Railway Corridors**

- ▶ Acquisition of railroad rights-of-way
- ▶ Planning, designing, and constructing multi-use trails
- ▶ Developing rails-to-trails projects
- ▶ Purchasing unused railroad property for reuse

## **Control and Removal of Outdoor Advertising**

- ▶ Billboard inventories
- ▶ Removal of illegal and nonconforming billboards

## **Archaeological Planning and Research**

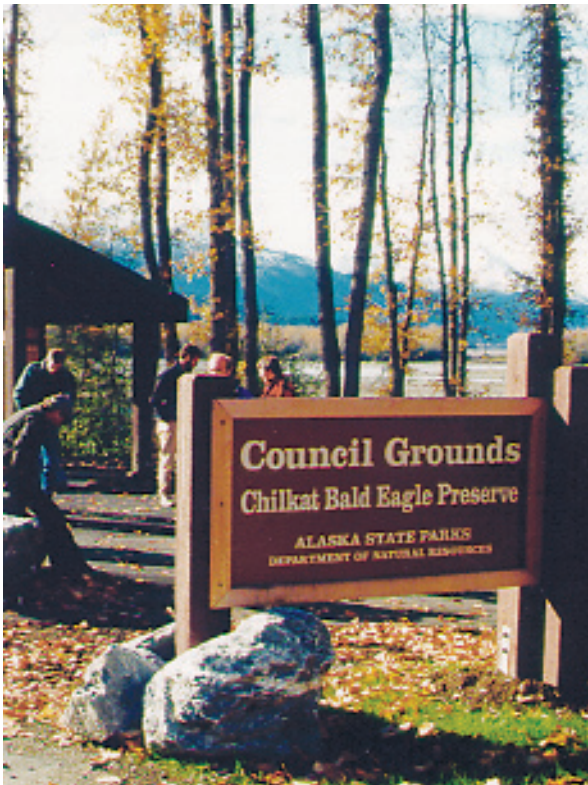
- ▶ Research, preservation planning, and interpretation
- ▶ Developing interpretive signs, exhibits, and guides
- ▶ Conducting inventories and surveys

## **Environmental Mitigation of Highway Runoff and Provision of Wildlife Connectivity**

- ▶ Runoff pollution studies
- ▶ Soil erosion control
- ▶ Detention and sediment basins
- ▶ River cleanups
- ▶ Wildlife underpasses and other crossings

## **Establishment of Transportation Museums**

- ▶ Conversion of railroad stations or historic properties to museums with transportation themes



Transportation options have increased to include Amtrak, Greyhound, the local bus system, taxis, and trolleys. The rehabilitated Union Station spurred over \$10 million in private investment in the depot district. This includes new office space, retail shops, a computer-training center, restaurants, a public records storage building, apartments, up-scale condominiums, and a railroad museum. Transportation enhancements have clearly benefited Meridian. The community is thriving socially and economically.

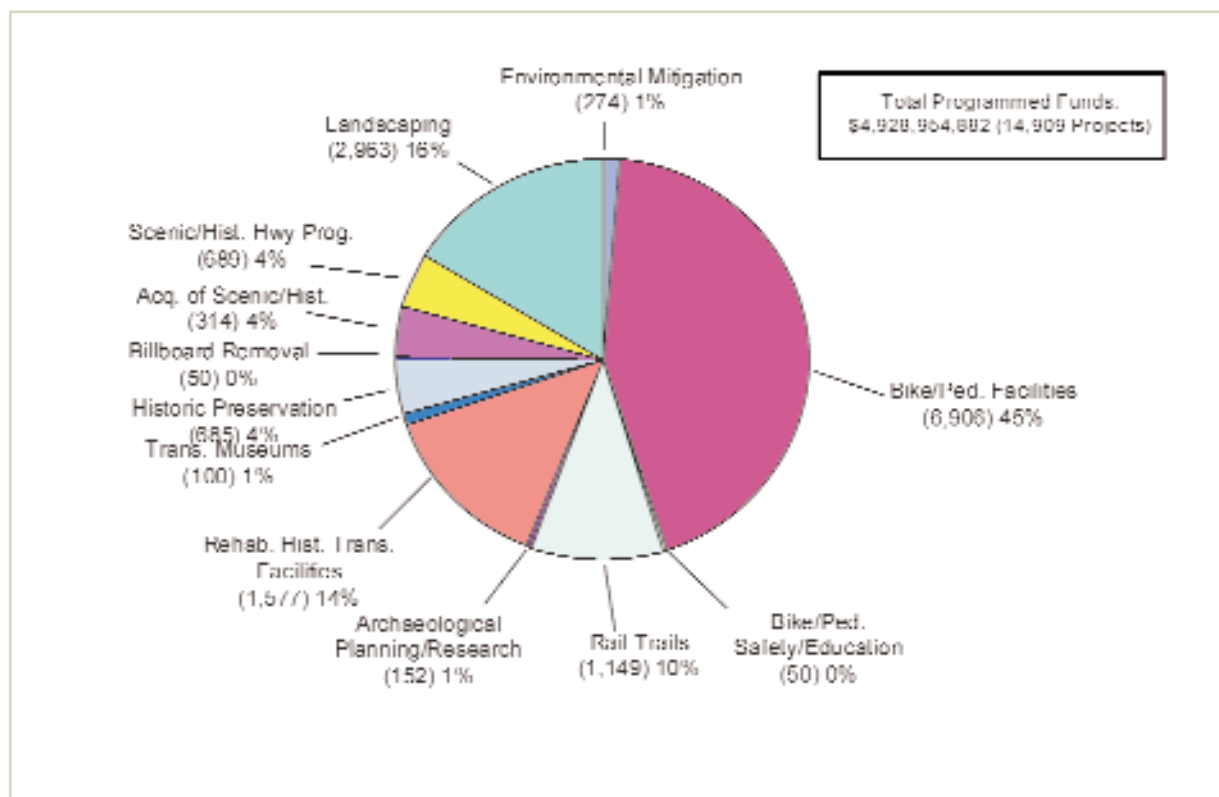
**In southeast Alaska, the Chilkat Bald Eagle Preserve and Wayside Trail provides visitors a chance to view the world's largest concentration of bald eagles.**

Before the Transportation Enhancements Program-funded wayside, trail, and interpretive facilities were built, visitors parked and walk along the highway adjacent to the preserve. The Chilkat Bald Eagle Preserve consists of two pavilions, unobtrusive parking areas, and more than 30 interpretive displays and spotting scopes. The transportation enhancement project has enhanced Southeast Alaskan tourism, ecological education, and economic development. The preserve is a regular stop for three tour companies averaging 500 to 1,000 visitors each week during the summer season. It is the site of the annual bald eagle festival held during the peak eagle viewing period of Thanksgiving to early December, and educational opportunities hosted by state park rangers. The nearby village of Klukwan incorporates the Chilkat reserve's two-mile trail in its annual '100-mile walk' focusing on health

Left and right – Chilkat Bald Eagle Preserve consists of two pavilions, unobtrusive parking areas, and more than 30 interpretive displays, and spotting scopes.

It is one of five transportation enhancement projects recognized by AASHTO and the TEA Challenge.

**Percentage of Federal Funds by TEA  
FY 1992–2001**



Source: Federal Highway Administration

awareness. The Chilkat Bald Eagle Preserve Wayside and Trail is one of five transportation enhancement projects recognized by AASHTO and the TEA Challenge.

**In Montpelier, Idaho, Transportation Enhancements Program money helped bring to life the National Oregon/California Trail Center.**

To recognize the hundreds of thousands of people who traveled west in search of a new life during the mid-1800s, Montpelier, Idaho—known as Clover Creek Encampment to pioneers traveling the Oregon and California Trails—continues to be a stopping point for travelers heading west. The National Oregon/California Trail Center is located off Highway 89 (the road connecting all the national parks in the western United States), near Highway 30, and the Bear Lake-Caribou Scenic Byway. The center guides visitors through the trail’s history with the help of costumed actors, exhibits, a theater, an art gallery, and gift store. The local Rails and Trails Museum is also housed at the center. Schools from three states bring their students to the center when studying the relationship of the Oregon/California Trail to their local history. The success of the trail center and its proximity to a current and historic transportation



Photo courtesy of the New Mexico Arts, Art in Public Places Program, Cultural Corridors Project

corridor encouraged the construction of a new hotel, and the renaming of another hotel to the Clover Creek Inn. As more travelers continue to stop at the National Oregon/California Trail Center, it becomes clear that Montpelier and its visitors will benefit from this project for years to come.

### **In New Mexico, the Arts, Art in Public Places Program Cultural Corridors Program enhances communities along historic Route 66.**

New Mexico's Arts, Art in Public Places Program Cultural Corridors Project uses Transportation Enhancements Program funds and a match of state and local funds to enhance and celebrate the communities along historic Route 66, "The Mother Road" (I-40), and El Camino Real de Tierra Adentro (I-25). Instead of typical landscaping, artists have built 10 unique public sculptures along these popular travel routes. The artwork reflects local culture, history, and other American icons. The various pieces encourage travelers to stop and visit the communities along the way. In one community, a bike path was built to connect the artwork with the city of Gallup's Sculpture Park. One of the most recent projects, Las Palomas Plaza in Truth or Consequence, New Mexico, was dedicated in 2001. This popular roadside project successfully recognizes the region's cultural history through art while increasing economic opportunities to the surrounding communities.

Above – Artist Tom Coffin created *Roadside Attraction* on the west end of Tucumcari as a homage to the American adventure along Historic Route 66. The monolithic pyramid incorporates road motifs as well as monstrous tail-lights which glow red at night.



Left – Sculptures commemorating El Camino Real, the Royal Road and Tomé Hill.

Right – A multicultural past is celebrated in this sculpture in the plaza at Socorro, New Mexico.



### **The New Mexico Archaeological Records Management Section Project aids in transportation planning.**

Several agencies in New Mexico devised the Archaeological Records Management Section project to develop a statewide geographically referenced database of archaeological sites and survey boundaries. This database aids in transportation planning and archaeological research efforts allowing cultural and historical resources to be taken into consideration at the beginning of a transportation initiative. A Transportation Enhancements Program award for archaeological planning and research was used toward the costs of project planning, data collection, programming, and staffing. It also allowed for the acquisition and integration of hardware and software. This transportation enhancement project has helped reduce the cost of cultural and historical inventory and mitigation involved with projects among government entities and private businesses.

### **In Minnesota, Transportation Enhancements Program funds have been used to restore the Stone Arch Bridge.**

Over \$2 million in Transportation Enhancements Program funds have been used to restore the Stone Arch Bridge, a former railroad bridge crossing the only waterfall, Saint Anthony Falls, on the Mississippi River. The nationally registered historic bridge dates back to 1883 and is now used



Photo courtesy of the National Transportation Enhancements Clearinghouse

by pedestrians, bicyclists, and a short-line trolley. The Stone Arch Bridge is used daily by commuters and recreation seekers in Minneapolis, nearby suburbs, and the University of Minnesota. The bridge provides access to the St. Anthony Falls Heritage Trail, a two-mile trail with an extensive array of interpretive and directional signs noting the early days of the city and the historic flour mill district. It is also one of many sites along the Grand Rounds National Scenic Byway. The restoration would not have been possible had it not been for the partnership between the Minnesota Department of Transportation, the Minnesota Historical Society, and the local Saint Anthony Falls Heritage Board.

### **In Pennsylvania, residents enjoy exercising and meeting friends along the 21-mile historic Heritage Rail Trail.**

In York County, Pennsylvania, residents exercise and meet with friends along the 21-mile historic Heritage Rail Trail. Transportation Enhancement Program funds helped build this trail that runs adjacent to existing railroad tracks through 11 municipalities, over bridges, and through the Howard Tunnel—the oldest continuously used railroad tunnel in the United States. A dinner train travels the tracks three times a week. The trail has inspired families and senior citizens to develop regular exercise programs; thus improving their health and creating a sense of community among all trail users. Walk-a-thons and bike-a-thons are also popular events along the

Above – Special events are held along the historic Heritage Rail Trail in York County Pennsylvania. The project has also helped create economic growth in the area.





Photo by Dan Burden, [www.pedbikeimages.org](http://www.pedbikeimages.org)

Above – Rhode Island’s Injury Prevention Program is designed to teach young children and their parents about safety and bicycle and pedestrian laws. Bicycle and pedestrian safety programs are one of the newer Transportation Enhancements Program funding categories.

trail. As a result of its popularity, at least six new businesses—including bed and breakfasts and bike shops—have opened since the trail was completed in 1999. Existing businesses report increased sales, extended hours, and the hiring of new staff. The Heritage Rail Trail is a great example of how a transportation enhancement project can enhance a community socially and economically.

### **In Rhode Island, the Department of Health teaches bicycle and pedestrian safety through the Injury Prevention Program.**

The Rhode Island Department of Health received a Transportation Enhancements Program award for a three-year bicycle and pedestrian safety program—one of the newer Transportation Enhancements Program funding categories. The Injury Prevention Program is designed to teach young children and their parents about safety and bicycle and pedestrian laws. The award is being used to purchase and develop bicycle and pedestrian safety literature and materials for distribution at area schools, police departments, community groups, day care centers, and social service organizations. Funds are also being used to purchase bike safety t-shirts and bike helmets distributed at bike rodeos and the statewide bike safety event held in conjunction with the Governor’s Office, DOT, and Department of Environmental Management. The Rhode Island Department of Health estimates that over 80 percent of Rhode Island cities and towns are participating in this program.

### **In Virginia, Richmond’s Canal Walk is enhanced and restored.**

The Richmond Canal Walk is a 1.25-mile walk through the historic downtown area via the Kanawah and Haxall canals and the James River. A multi-phase \$1.7 million Transportation Enhancements Program award was used towards the cost of canal floor restoration, walls, edges, and a 950-foot section of the walkway. The Canal Walk travels past a former Confederate armory, the Richmond Civil War Visitor’s Center, and Triple Cross—the intersection of three elevated railroad lines. Canal boats, festivals, concerts, the nearby Tourning Basin, Brown’s Island, and other public events on the canal have made the Canal Walk popular with the community and tourists. Plans for mixed-use development, including residences, office and retail space, and restaurants, surrounding the canal are underway. It is expected that the Canal Walk will bring an additional 6,000 jobs and \$60 million in tourism revenue to Richmond by 2010. The city of Richmond and the Richmond Riverfront Development Corporation (RRDC) combined the transportation enhancement project with the installation of a new sewer system running under the canals. The Canal Walk and combined sewer project received the nationally recognized American Council of Consulting Engineers 2001 Honor Award for their innovative canal and sewer project design.

# Transportation: Building Bridges to America's Past

## Did you know?

Transportation is considered the largest financier of historic preservation and archaeology.

While most citizens think of transportation in terms of hard-working road crews, few people know that thousands of transportation employees and millions of transportation dollars are working hard behind the scenes to preserve historic resources, undertake archaeological investigations, and document and preserve the nation's heritage.

Without a doubt, transportation is considered one of the largest financiers of historic preservation and archaeological studies—and state historic preservation officials increasingly consider their state highway department as a partner in preserving history. Transportation agencies are responsible for identifying, assessing, and protecting historic properties as well as archaeological exploration, documentation, and recovery that would never have occurred otherwise.

Kentucky Transportation Cabinet officials report spending at least \$1 million per year contracting for archaeological work alone. Texas DOT's environmental office contracts for archeology amount to at least \$2 million per year—not counting millions of dollars in funding for cultural resource staff at the agency, field office expenditures, or millions of cultural resource dollars spent by the Texas Turnpike Commission. Pennsylvania DOT estimates spending between \$5 million and \$15 million per year on its archaeological work. And in Michigan, officials say that spending on archeology accounts for at least \$1.2 million per year.

Assuming state transportation agencies average spending at least \$1 million per year on archaeological inventory, investigation, documentation, and mitigation—transportation is providing upwards of \$50 million annually to document and preserve our nation's archaeological resources.

On a national level, the Federal Highway Administration reports that:

- ▶ FHWA has obligated over \$1.3 billion in funding from the federal highway program since 1991 to support preservation projects under the Transportation Enhancements Program, plus close to \$20 million for the Historic Covered Bridge Program.



Opposite and above – Few historic preservation efforts anywhere in the United States rival that of the relocation of the 18th-century, 580-ton, two-and-a-half-story, stone King of Prussia Inn from its original location in the median of Pennsylvania Route 202, to a new and safe location just east of its original site (overlay).

The project combined historical and archaeological research with a stupendous feat of engineering to permanently relocate and protect this important colonial building, and created the opportunity to make much-needed improvements in traffic flow on the roadway.

- ▶ FHWA supports the hiring of thousands of cultural resource specialists at the state transportation agencies as well as consultants, who are directly involved in identifying and assessing historic sites, buildings, objects, districts, and structures.
- ▶ Highway agencies spend millions of dollars from project funds to rehabilitate historic bridges and mitigate impacts to historic resources.

This infusion of financial support and technical resources is preserving America's history through:

- ▶ Identification of historic structures, such as buildings and bridges, and evaluation for eligibility for the National Register of Historic Places.
- ▶ Avoidance, protection, and mitigation of historic resources.
- ▶ Development of cultural resource databases.
- ▶ Historic bridge surveys and preservation.
- ▶ Archaeological field surveys and data collection.
- ▶ Recovery and preservation of historic and archaeological resources.
- ▶ Public education.



Photo courtesy of the Kentucky Transportation Cabinet



Photo courtesy of the Kentucky Transportation Cabinet

Opposite and above – The Renaissance Kentucky initiative is designed to bring together communities and the resources necessary to revitalize and restore Kentucky’s downtowns in a focused approach.

“The Kentucky Transportation Cabinet is the single largest funder of historic preservation projects in the state.”

— *David Morgan, Kentucky State Historic Preservation Officer*

## Kentucky: A Renaissance in Preservation

The Kentucky State Historic Preservation Officer touts the fact that the Kentucky Transportation Cabinet has provided more funds for historic preservation than any other source in the state. Over the past 10 years, it has provided \$70 million for historic preservation efforts, according to David Morgan, the state’s top-ranking historic preservation official. “No one else could even come near that.”

Morgan estimates that at least 70 percent of historic preservation efforts in Kentucky are directly or indirectly funded by transportation dollars.

Kentucky leads the nation in the percentage of transportation enhancement funds obligated to historic preservation projects. These funds have played a key role in Governor Paul Patton’s program to revitalize Kentucky’s downtowns.

The Renaissance Kentucky Program is an alliance of seven state agencies working together to help communities preserve, restore, and revitalize their city’s core. To date, \$15 million of Transportation Enhancements Program funds have been designated for these communities, providing a funding source for restoring façades of public buildings, creating pedestrian- and bicycle-friendly streetscapes, preserving historic sites, protecting scenic byways, converting abandoned railroad corridors for trails, and rehabilitating historic transportation buildings into museums, visitor centers, or for modern transportation facilities.<sup>3</sup>

## Texas Department of Transportation (TxDOT): Improving the Field of Preservation

In Texas, transportation efforts have brought the field of historic preservation to a new level.

“Over the past 30 years, the communication, coordination, and preservation efforts of TxDOT and the Texas Historical Commission have grown, evolved, and improved in ways that have benefited not only those highway projects for which we have both been directly involved, but have also greatly benefited the entire discipline of historic preservation,” according to the state historic preservation agency.

TxDOT’s cultural resource management office conducts archaeological and historic property surveys, identifying significant archaeological and historic sites, structures, and districts located in the path of proposed transportation projects. Officials work with other agencies, such as the Texas Historical Commission, to avoid or minimize impacts to these resources. Where necessary, the staff conducts excavations, providing a new understanding of Texas history and prehistory. Local museums often use the information from TxDOT’s archaeological digs for educational purposes and exhibits.

Important archaeological sites that have been excavated by TxDOT include:

- ▶ 800-year-old semi-underground structures, in El Paso;
- ▶ 18th-century Mission Dolores in San Augustine; and
- ▶ 11,000-year-old Wilson Leonard site just north of Austin.

TxDOT also has coordinated the rehabilitation of many historic bridges, either for continued roadway service or to accommodate hike-and-bike trail uses. A statewide inventory of these historic bridges has been completed and includes historical information on more than 8,000 bridges in the state.



Above – Excavation of the 1795 Mission Refugio, US 77 in Texas.

Below – Recent excavation of graves in the right-of-way of SH 288, Brazoria County, Texas. Graves from this late 19th or early 20th-century African American cemetery were moved back into the cemetery proper in anticipation of highway construction.



## **Pennsylvania: Transportation “Lies Gently on the Land”**

Pennsylvania Department of Transportation (PennDOT) officials explain that it—like other state DOTs—is bound by federal and state laws and regulations to consider the effects of its actions on all aspects of the environment—including impacts on archaeological and historic properties. Transportation officials in the state have taken it a step further, demonstrating a commitment to the design, construction, and maintenance of a transportation network that “lies gently on the land.” As a result, PennDOT is the single largest source of public sector archaeological and historic resources investigations in the state. Thanks to a commitment to excellence, PennDOT’s archaeology program is not just Pennsylvania’s largest, it’s also the best.

In Pennsylvania, the Department of Transportation hosts the state’s largest public sector archaeology program. Annually between \$5 million and \$15 million are expended to identify, evaluate, protect, and learn from the buried evidence of Pennsylvania’s past along its highways. While this work is mandated by federal and state laws and regulations, the program is driven by more than legal requirements. When transportation projects produce unavoidable effects to important sites, PennDOT is committed to state-of-the-art approaches to archaeological excavation and analysis and to disseminating the results of that work to the professional community and to the public.

## **The New Hampshire Department of Transportation’s Partnership with Preservation**

New Hampshire officials tout an excellent partnership between transportation and historic preservation in the state.

New Hampshire Deputy State Historic Preservation Officer, Linda Ray Wilson reports that “New Hampshire DOT’s cultural resources survey, inventory, mitigation, historic preservation initiatives, and direct financial support are at the core of much of the current historic preservation work in New Hampshire.” Wilson describes the New Hampshire Department of Transportation (NH DOT) and the Federal Highway Administration (FHWA) as “the strongest historic preservation partners for New Hampshire’s State Historic Preservation Office program.”

For instance, the survey methodology developed jointly by the NH DOT, FHWA, and the Division of Historical Resources for transportation projects “has evolved into the foundation of our statewide cultural resources survey program, and the standard for cultural resources survey and historic preservation work conducted by other federal and state agencies,” Wilson says.

State preservation officials in New Hampshire credit their transportation agency with a litany of contributions. For example, Wilson says the DOT is providing citizens access to a consistent level of professional



Photos courtesy of NHDOT



historic preservation services whether or not a transportation project is directly involved. In cases where historic properties could not be preserved intact, the NHDOT provides extensive documentation, and high-quality research files are available to the general public, the community, citizens, and local officials.

Citizens seek access to the NHDOT survey data for National Register of Historic Places nominations, or to document requests for rehabilitation tax incentives. Other federally assisted rehabilitation projects—particularly those for affordable housing and downtown revitalization—are being expedited because the identification of historic properties has already been done for a NHDOT project.

New Hampshire DOT has moved decisively to protect the state's historic timber covered bridges from threats of human and natural destruction and is assisting in an increasing number of municipal projects for preservation of historic bridges. An unexpected result of the NHDOT crews rebuilding historic stonework on bridges has been the development of a new set of stonemasonry skills that will be available for other NHDOT projects.

The state's program also has worked hard to advance public information and education efforts. New Hampshire DOT and the state historic preservation program have been partners conducting the state historical markers program since 1961, and the department is now adding historical and archaeological interpretive panels and features as integral parts of other projects.

## TAKING THE HIGH ROAD



Above left – New Hampshire's historic Oxford Bridge.

Right –The historic Cornish-Windsor Bridge in New Hampshire is the longest wooden bridge in the United States, and the longest two-span covered bridge in the world. Maintained by the NHDOT, the bridge spans the Connecticut River, connecting the towns of Cornish, New Hampshire, and Windsor, Vermont.

## **Preservation in Vermont: Transportation Taking the Lead**

Vermont's Agency of Transportation (VTrans) has proven so effective at preserving and protecting historic resources that it has become the first in the nation to be delegated complete authority from the state historic preservation office for ensuring that road projects comply with federal historic preservation requirements.

As a result of this award-winning programmatic agreement, Vermont's State Historic Preservation office reports that transportation projects are moving more quickly and with better protection of historic resources.

"Everybody is a winner," according to Vermont Division of Historic Preservation official Nancy Boone.

Vermont preservation officials consider VTrans "a great partner" in preserving historic resources, Boone says.



# Transportation: Leading in Recycling

## Did you know?

Highways are a leading recycler—with more asphalt pavement recycled than any other product in America.

Few people realize that highways are among the nation's top recyclers—with some 80 percent of asphalt pavement being reused in the highway environment, compared with only 28 percent of recycled post-consumer goods in the municipal solid waste stream. Concrete also is routinely being recycled as a base material for U.S. roadways.

At the same time, huge quantities of industrial byproducts and other materials are put to constructive re-use in construction and maintenance of America's roadways each year. Some of these materials include:

- ▶ blast furnace slag;
- ▶ coal bottom ash and boiler slag;
- ▶ coal fly ash;
- ▶ mineral waste;
- ▶ non-ferrous slags;
- ▶ steel slag;
- ▶ tires and tire rubber;
- ▶ recycled glass;
- ▶ reclaimed Portland Cement concrete; and
- ▶ compost.

For transportation, recycling is a win-win-win proposition. It provides good stewardship of valuable resources while maintaining the high quality of America's roadways and saving taxpayer dollars.

### Asphalt Pavement: A Recycling Leader

According to industry experts, the asphalt pavement industry is the nation's leader in recycling. Each year, 73 million tons of reclaimed asphalt pavement is reused—almost twice as much as paper, glass, plastic, and aluminum combined—saving taxpayers almost \$300 million annually. The volume of recycled asphalt pavement is 13 times greater than recycling of newsprint, 27 times greater than recycling of glass bottles, 89 times greater than recycling of aluminum cans, and 267 times greater than recycling of plastic containers.<sup>4</sup>

Recycled asphalt is used not only for new roads, but also for roadbeds, shoulders and embankments. A variety of other products are recycled to



State transportation departments' recycling programs focus not only on recycling materials for use in roadway construction, but also on recycling in everyday activities of the agencies—including recycling of office paper, motor lubricant, antifreeze, fluorescent lamps, aluminum cans, scrap metal, use of mulch in landscaping, and more.

Opposite and above –  
In 2002, TxDOT paid \$500,000 to process nearly one million tires worth of rubber into fuel, crumb rubber, or other rubber products, and used more than 1.6 million tires worth of crumb rubber in various paving designs and road maintenance.

Photos courtesy of TxDOT

make asphalt pavement—including old tires, slag aggregate, roofing shingles, glass, and foundry sand.

Recycling is increasingly important in the transportation sector. The Federal Highway Administration has a leadership team focused on promoting use of recycled materials, and a number of state transportation agencies have recycling coordinator positions focused on new technologies, research, and getting the word out.

States with exemplary recycling programs include California, Massachusetts, North Carolina, Pennsylvania, and Texas.<sup>5</sup> These programs focus not only on recycling materials for use in roadway construction, but also on recycling in everyday activities of the agencies—including recycling of office paper, motor lubricant, antifreeze, fluorescent lamps, aluminum cans, scrap metal, use of mulch in landscaping, and more.

### **Texas Department of Transportation's Road to Recycling Initiative**

Since the launch of its recycling program in 1994, TxDOT has spent more than \$506 million on “green products” and diverted more than 13 million tons of materials from landfills.

The agency also has coordinated over \$1 million in research to investigate the use of recycled materials in road construction—including glass cullet, scrap tires, fly and bottom ash, crushed porcelain toilets, shredded brush, compost, roofing shingles, plastics, recycled asphalt pavement, crushed concrete, and industrial wastes. Researchers are finding a variety of uses for these materials, including road signs, roadway safety devices, embankments, asphalt and concrete pavements, soil erosion control, drainage, vertical moisture barriers, and road bases.

### **Strategic Recycling in Pennsylvania**

PennDOT's Strategic Recycling Program is a comprehensive effort to systematically identify, evaluate, and implement recycling opportunities throughout Pennsylvania.

PennDOT and the state Department of Environmental Protection are working together to reduce waste materials from transportation operations and to encourage use of recycled materials throughout transportation applications in the state.

The objective of the program is to realize economic savings and environmental enhancement to PennDOT and the entire state through the continued development of pollution prevention, recycling, energy efficiency, and sound environmental management practices. The program provides major benefits to society by reducing the amount of materials going into landfills and developing new business opportunities within the state.

### **MassHighway's Recycling Program: Closing the Loop**

The Massachusetts state transportation agency, MassHighway, takes recycling seriously and boasts impressive numbers—including a 76 percent recycling rate in 2000—more than double the state's municipal solid waste recycling rate of approximately 36 percent. Waste materials recycled



Photo courtesy of TxDOT

Road maintenance making use of recycled products.

include antifreeze, construction and demolition debris, street sweepings, and tires.<sup>6</sup>

In 2000, MassHighway reported the following impressive statistics:

- ▶ More than 15,000 tons of waste was recycled.
- ▶ More than 111,000 tons of recycled materials were used in construction projects.
- ▶ Overall, nearly \$27 million was spent on recycled-content and environmentally preferable materials and products.

The Massachusetts highway agency uses the following recycled materials in road construction:

- ▶ Blast furnace slag—for use in cement concrete;
- ▶ Compost—for use in amended loam;
- ▶ Fly ash—for use in cement concrete and controlled density fill;
- ▶ Pavement millings—for use in mulch under guardrail;
- ▶ Processed glass aggregate—for use in bituminous concrete, borrow, and sub-base course;
- ▶ Reclaimed asphalt pavement—for use in bituminous concrete;
- ▶ Reclaimed pavement borrow material—for use in base and sub-base courses;
- ▶ Recycled plastic offset blocks—for use in guardrail construction.
- ▶ Rubberized asphalt—for use in hot-poured joint sealers and stress-absorbing membrane interlayers (SAMIs); and
- ▶ Silica fume—for use in cement concrete.

### **Recycling at California's Highway Agency**

The California Department of Transportation (Caltrans) is partnering with other state agencies to minimize materials going into landfills, and the promotion and development of new business opportunities within the state of California to the benefit of all.

Caltrans recycles asphalt and concrete pavement by converting it into base and sub-base under the new road surface—and at the same time the agency is looking for new ways to use recycled materials in road surfaces.

Other Caltrans recycling activities include:

- ▶ Employee recycling of office paper waste—diverting over 360 tons per year.
- ▶ Use of safety vests that contain poly fiber made from 100 percent recycled plastic soda bottles (over 133,000 two liter bottles).
- ▶ Annual use and recycling of 122,000 gallons of re-refined motor lubricants, 14,250 gallons of re-refined anti-freeze, 4,900 remanufactured automotive batteries, and 1,800 remanufactured tires.
- ▶ Annual recycling of 5,800 fluorescent lamps, 81 tons of glass, and 69 tons of aluminum cans.
- ▶ Use of mulch (green waste) within landscaped areas, also saving water.
- ▶ Where feasible, recycling of scrap metal.
- ▶ Recycling of state surplus furniture and equipment.

# Transportation: On the Road to Cleaner Air



Opposite and above – State transportation officials are urging commuters to use mass transit, carpool, ride a bike, or to telecommute, in a campaign to help communities get cleaner air. Cities are also turning to alternative fueled vehicles as means of transportation.

## Did you know?

Air pollution has decreased significantly over the past 30 years—with the greatest success coming from on-road vehicles.

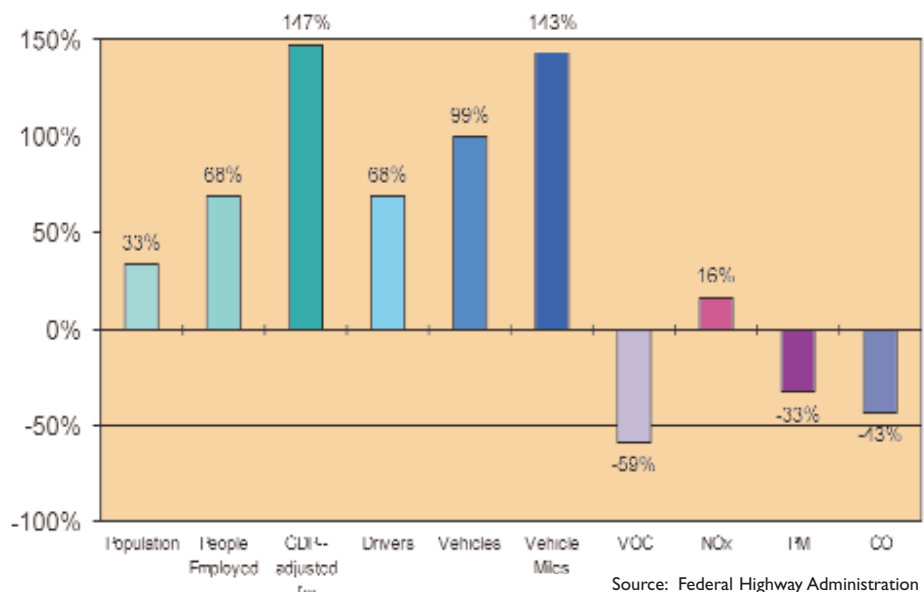
While more Americans are driving more miles than ever before, few realize that the transportation sector has contributed to a significant reduction in air pollution over the past 30 years.

The transportation sector has achieved a 77 percent drop in on-road motor vehicle emissions of so-called “criteria” pollutants, while at the same time ensuring the safety and mobility needs of a growing population.<sup>7</sup>

Thirty-eight percent more people—and 68 percent more drivers—clocked 143 percent more miles on their vehicles from 1970 to 1999. At the same time, cleaner vehicles, clearing of traffic-congestion bottlenecks, and strong emissions inspection and enforcement—often administered through state DOTs—have had a positive impact.

From 1970 to 1999, over 80 percent of the drop in emissions of the six major pollutants was attributed to cars and other on-road vehicles, according to U.S. Environmental Protection Agency data. Motor vehicles

**Percentage of Change in Motor Vehicle Emissions, Demographics, and Travel from 1970–1999**



emissions of carbon monoxide were reduced by 43 percent, particulate matter emissions were down 33 percent, and volatile organic chemical emissions dropped 59 percent. And, while nitrogen oxide (NOx) emissions have increased, NOx emissions from automobiles actually decreased by 31 percent.

And engines and fuel are expected to become even cleaner under recent EPA-issued emissions standards and cleaner fuel requirements. These new standards require all passenger vehicles sold after the 2004–2007 period to be 77 to 95 percent cleaner than those on the road today. Standards that will begin to take effect in model year 2007 will require each new truck and bus to be more than 90 percent cleaner than current models.<sup>8</sup>

The steep decline in NOx and VOC emissions suggests that the impact of vehicle travel on emissions is substantially less than it was in the 1970s through the 1990s.<sup>9</sup>

### **Billions in Funding Targeted to Transportation Projects That Reduce Emissions**

Transportation programs are funneling billions of dollars into efforts to clean up the nation's most polluted areas.

From 1998 through 2003, over \$8.1 billion was targeted for transportation-related projects that will reduce pollutant emissions in areas not meeting air quality standards for ozone, carbon monoxide and particulate matter. These funds—provided through the Congestion Mitigation and Air Quality Improvement (CMAQ) Program—allow state transportation agencies and local governments to fund innovative strategies to clean up the air.<sup>10</sup>

Communities in so-called “non-attainment areas” have been able to increase public awareness concerning the links between transportation choices and air pollution, provide technological applications to improve transportation system efficiency, increase transit services, or implement ozone action programs.

Clean-air benefits from CMAQ transportation funding include transit and traffic flow improvements, shared-ride programs, demand management, automobile inspection and maintenance programs, and bicycle and pedestrian improvements.

These transportation funds also are being used for programs to retrofit heavy-duty diesel engines to reduce emissions from trucks or buses as well as for a variety of freight projects—such as truck stop electrification equipment to reduce idling.

### **Alternatives to Driving**

Many transportation agencies are supporting alternatives to driving—including telecommuting, parking buy-out, and commuter choice programs—as a way to demonstrate emissions reductions. To ensure that transportation activities do not worsen air quality, federal law requires that all transportation plans and programs in areas that are out of compliance

Right – The New York Department of Transportation (NYSDOT) has been promoting an Ozone Action Day Program for several years, working with the state’s air quality agency, which provides air-quality forecasts. In larger the urban areas of New York City, Buffalo, Rochester, and Syracuse, NYSDOT has partnered with local and regional transportation agencies to get the message out to the public. The program utilizes outreach to employers, use of variable message signs and other ITS technology, and public visibility.



with air quality standards conform to the state’s air quality plan. Programs that encourage alternatives to driving are helping agencies achieve “transportation conformity.”

Highway programs also are important supporters of transit, providing the needed infrastructure for expansion of commuter bus service and other public transportation options that reduce auto emissions.

The American Public Transportation Association reports that through 2001, over \$1.2 billion of flexible highway funding has been transferred to public transportation.<sup>11</sup>

Highway investments that benefit air quality can be seen around the country in construction of park-and-ride facilities for buses and carpools; funding of carpool programs; building high-occupancy vehicle lanes; providing rail transit in the highway median in areas including Virginia, Baltimore, and Chicago; and highway/transit interchanges that provide freeway access to transit stations.

### **Ozone Action Days: Transportation Doing Its Share**

An effective and visible way for transportation to do its share to clean up the air is to participate and lead Ozone Action Day Programs.

These programs alert the public when ozone levels are expected to be unhealthy and seek their cooperation to change their travel and other behaviors to reduce emissions on those days. Messages are broadcast by media, through employer organizations, and by roadside variable message signs.

Actions the public can take to reduce emissions include:

- ▶ Carpooling, biking, walking, or taking transit to work;
- ▶ Trip chaining (combining trips and errands into one trip so the catalytic converter does not cool off);
- ▶ Avoiding drive-through lanes, and excessive idling;
- ▶ Re-fueling after 6:00 p.m., and not topping off when fueling;
- ▶ Mowing the lawn in the evening; and
- ▶ Allowing employees to telecommute or use flex time.



A clean air hybrid-electric bus operating in New York City is part of a larger effort to improve air quality within the state of New York. Many transportation agencies are supporting alternative fueled vehicles (AFVs) and the infrastructure associated with them.

Photos courtesy of New York State DOT

## Alternative Fueled Vehicles: Independence and Clean Air

The transportation sector is finding innovative ways to advance new vehicle technologies to benefit air quality. Many transportation agencies are supporting alternative-fueled vehicles (AFVs) and the technology and infrastructure associated with them.

Applicable not only to light-duty vehicles—such as fleet vehicles—but also to transit buses, school buses, delivery vehicles, and station/commuter cars, AFVs are leading to improved energy efficiency and air quality and less reliance on imported energy.

New York has been a leader in adopting AFV vehicles and technologies in a wide variety of applications:

- ▶ The state has committed to alternative-fueled vehicles and technology in its own fleet of vehicles. As of July 1, 2001, New York has acquired over 1,400 AFVs. Since 1998, New York has exceeded its vehicle acquisition requirements under the federal Energy Policy Act.
- ▶ New York is installing compressed natural gas (CNG) fueling stations across the state at locations owned and operated by various state agencies including DOT. Low-volume sites are available to state vehicles only; fast-fill sites are commercially operated and are open to the public. A number of electric vehicle charging stations also have been installed.
- ▶ In the New York City metropolitan area, a Clean Commute commuter station car program has been launched. The public is offered an opportunity to lease a small electric vehicle for the commute between their homes and the rail station. Charging stations are provided at the rail stations. To date, over 100 vehicles have been leased with plans to expand the program to 400 vehicles.
- ▶ The New York City Transit Authority has made a significant commitment to using hybrid-electric buses. It has steadily increased alternative-fueled buses into its fleet, with over 2,300 programmed by 2004. All of its standard size bus purchases after 2004 will be of buses as clean as AFVs. In addition, bus depots are being converted to facilities that can store and refuel these buses.

New York is committed to investigating and testing the economic, energy, and environmental factors for all emerging alternative-fueled technologies, and to advance the most appropriate technologies—or combination of technologies—that address and support the state's needs.

## **Public Education: *It All Adds Up to Cleaner Air***

A key to continued progress in cleaning the nation's air is public education. Transportation and environmental officials are partners in an ongoing program dubbed, *It All Adds Up to Cleaner Air*. Officials are working to educate the public on causes of transportation related air pollution and simple steps the average citizen can take to improve air quality.<sup>12</sup>

Through these public education efforts, transportation officials are urging commuters to use mass transit, carpool, ride a bike, or telecommute—and are encouraging common-sense strategies, like regular auto maintenance and filling up the gas tank on cool days. The program provides a range of advertising spots, check lists, marketing kits, television and radio spots, and other tools to help communities get out the word on cleaner air.

At the beginning of the 1999 ozone season, *It All Adds Up to Cleaner Air* was introduced in 14 demonstration communities across the country. Those areas are sharing their lessons with communities that face similar air quality and congestion issues and demographics.

The Georgia Department of Transportation conducted a statewide kickoff of the media campaign to increase awareness of HOV lanes under construction in Gwinnett County, and to increase use of the existing HOV lanes and metro rail. The event attracted significant media coverage, including three Atlanta television stations. They also ran radio ads on several stations throughout the year. To draw attention to the campaign, GDOT is using the HOV BUG, a 1999 Volkswagen Beetle that was donated. The BUG travels the Atlanta metro area highlighting the need for and benefits of carpooling.

## **Intelligent Transportation Systems: A Smart Way to Keep Traffic Moving**

Development of new transportation technologies holds significant promise for future improvements in air quality. Intelligent Transportation Systems (ITS) is a national program aimed at using modern computers and communications to make travel smarter, faster, safer, and more convenient.

According to federal highway officials, over the past 11 years, the federal government has invested over \$2 billion on ITS research, development, testing, and demonstrations, as well as other activities designed to accelerate the adoption and commercialization of ITS applications.

Promising technologies offer many benefits:

- ▶ Intelligent traffic control systems reduce the time spent stopped at red lights or waiting on freeways when an accident occurs.
- ▶ Automatic toll collection moves vehicles more quickly through tollbooths, reducing congestion, and pollution.
- ▶ Traveler information systems provide current, multi-modal information on travel conditions allowing citizens to make smarter choices about how, when, and where to travel.
- ▶ In-vehicle systems will provide in-vehicle maps and improve safety by automatically notifying emergency services when a serious accident occurs and exactly where the accident is located.
- ▶ Advanced transit systems help transit agencies operate more efficiently and provide travelers with real-time information that makes using transit easier and more attractive.
- ▶ Intelligent commercial vehicle systems will help commercial vehicle operators process the paperwork associated with moving goods. These systems also will help public agencies improve safety by inspecting the vehicles that need it the most.<sup>13</sup>





Opposite – Residents of Radnor Township, Pennsylvania were concerned that an Interstate highway and interchange planned to go through the center of their town, would adversely affect the character of the community, and depress housing values. Rather than accept this premise, they formed a partnership with PennDot, township officials, and private sponsors to enhance and beautify the interchange area.

“Artwork reflecting elements of the Radnor town seal on overpasses, combined with stone sculptures, as well as a passive park and landscaped median areas, calms traffic and imparts a “sense of place” when entering our community. The common thread of this collaborative effort was to evoke emotion. To our great satisfaction, residential values have risen, and Radnor Township is all the better for having access to Interstate 476.”

— Wm. H. (Mac) McCoy II,  
Director, Radnor Community  
Enhancement Trust.

Above – Art finds a home in a rebuilt intersection in Mount Rainier, Maryland.

# Transportation: Enhancing Our Communities and the Environment

## Did you know?

Transportation projects are breathing new life into communities and offering new ways to protect and enhance the environment using principles of context-sensitive design.

The practice of highway design and construction provides an opportunity not only for mobility and safety improvements, but also for community and environmental enhancements. By using context-sensitive design principles, road projects are providing opportunities to address community concerns, and enabling environmental and community preservation benefits that otherwise would have been unattainable.

Considered one of the most important concepts to emerge in highway project planning, design, and construction in recent years, the new practice of context-sensitive design recognizes that a highway or road itself—by the way it is integrated within the community—can have far-reaching impacts beyond its transportation function.<sup>14</sup>

Context-sensitive design gathers input from technical professionals, the local community, interest groups, landowners, road users, and the general public—essentially anyone who will use the road—and incorporates those values into a transportation solution.

Using this approach, transportation officials are finding new ways to help communities address the issues that concern them—ranging from roadway safety, mobility, and historic and natural resource preservation, to aesthetics and environmental enhancements.

The concept is spreading across the nation, as the five pilot states that helped pioneer the practice—Connecticut, Kentucky, Maryland, Minnesota, and Utah—are working with other states and federal officials to spread the word by sharing their success stories and practices and through hands-on training.

The landmark publication, *Flexibility in Highway Design*, illustrates how project teams can develop roadway designs that consider aesthetic, historic, and scenic values, along with safety and mobility. Published in 1997 by the Federal Highway Administration in cooperation with the American Association of State Highway and Transportation Officials and a variety of public interest groups, this guide helped to launch context-sensitive design into the mainstream of transportation.<sup>15</sup>



Photos courtesy of Gannett Fleming, and McCormick Taylor and Associates

Above – The Danville-Riverside Bridge project in Pennsylvania was a model for context-sensitive design, addressing community concerns about the impacts of a modern-looking bridge on Danville’s historic district.

### **The Award-Winning Danville-Riverside Bridge**

A winner of the American Road and Transportation Builders’ Globe Awards for Environmental Excellence, the Danville-Riverside Bridge project in Pennsylvania illustrates how principles of context-sensitive design linked two towns while preserving and enhancing the area’s historic character.

The \$12-million, 1,440-foot Danville-Riverside Bridge, and an associated 325-foot underpass carry State Route 54 over the north branch of the Susquehanna River, connecting the communities of Danville and Riverside, Pennsylvania. While the need to replace the 96-year-old bridge was clear for many years, the key to a successful project was the creation of a plan that addressed community concerns about the impacts of a modern-looking bridge on Danville’s historic district.

The old seven-span steel truss over the river was replaced with a seven-span continuous steel girder bridge. Aesthetic treatments included cut stone architectural surface treatments placed at all six new bridge piers and abutments, decorative masonry lighting on the structure, and gateway pylons of brick and mortar at the touchdown points for the new bridge—all of which helped replicate the design of the nearby historic buildings.<sup>16</sup> The result—a revitalized community with its historic character maintained and enhanced—and an enhanced sense of local pride.

### **Thinking Beyond the Pavement in Maryland: The Roundabout Way**

Maryland was considered the pioneer in context-sensitive design and helped to launch the effort with a 1998 workshop dubbed “Thinking Beyond the Pavement.”

The Towson Roundabout project, in a suburb of Baltimore, Maryland, is considered a model effort in context-sensitive design.

The Maryland State Highway Administration invested \$4.25 million to build the roundabout at a complex interchange where five roads meet at center of the



historic county seat. In addition to a considerable reduction in accident numbers and severity, the project has been an economic lifesaver for the community, breathing new life into the area.

While some were skeptical of this untested solution, with community involvement and incorporation of major streetscape and landscaping improvements into the design, the roundabout project evolved into a major enhancement effort for the downtown area.<sup>17</sup>

The Towson project has been a great success. Mobility and safety improvements coupled with improving the appearance of the downtown area have provided an economic boost to local businesses. For example, a large retail building that was vacant prior to construction has since been acquired and opened by a major retailer.

A key to this success was an effective public involvement program tailored to reach the community in ways that fit their needs. As a result, the roundabout itself and the improvements to the streets are a source of local pride.

### **Community Helps Pave the Way to Improvement in Mount Rainier, Maryland**

Community involvement proved to be the key to improving Mount Rainier, Maryland, a transit-oriented community near Washington, D.C. When residents felt the state road divided their community, intensive community involvement helped devise a solution that produced a fundamental change in the way pedestrians, cars, and transit were to be handled and led to a striking change in the appearance of the roadway and its surroundings.

Above – The Maryland State Highway Administration built the Towson roundabout at a complex interchange where five roads meet at the center of the historic county seat. In addition to a significant reduction in accidents, the project has been an economic lifesaver for the community.

“The Mount Rainier project showed that communities are often less afraid of change than the designers.”

— *Maryland State Highway Administration, When Main Street Is a State Highway*



### Paris Pike: Preserving the Beauty of Kentucky's Bluegrass Region

Running through the heart of Kentucky's Bluegrass Region, the Paris-Lexington Road (US 68), commonly called Paris Pike, is nationally-renowned for its scenic beauty and historic farms. The road is wholly contained within a 10,000-acre historic district eligible for listing on the National Register of Historic Places. Lined with historic rock fences, spring-houses, large trees, and picturesque horse farms, the route is a popular part of any tour of the Bluegrass landscape. But increased traffic volume and safety concerns drove the need to rebuild the existing two-lane roadway.

In response to public concerns, a different approach to highway design was initiated that sought to determine how best to make the road fit the landscape. This approach was based upon the premise that the natural landscape patterns of the area could serve as a framework for addressing cultural, historic, scenic, natural, archaeological, and recreational resources.

The design team worked with residents in designing the road, communicating directly with individual property owners, displaying three-dimensional computer models of roadway designs, and using electronic polling to gauge public opinion.

The result: a road that is attractive and safe to drive. Paris Pike now moves with and around the hilly terrain, while avoiding sensitive areas and resources. Large trees and rock fences are preserved relatively close to the roads, and grass shoulders, timber guardrails, and stone veneer on headwalls and bridges further blend the highway into the surrounding landscape.

### Nevada's Plan for Aesthetics and Landscaping

A master plan recently adopted in Nevada illustrates how transportation is benefiting citizens and the environment through landscaping and aesthetics. *Pattern and Palette of Place: A Landscape and Aesthetics Master Plan for the Nevada State Highway System*, ensures that the state's roads link citizens with their natural and cultural environment through artwork,

Above – Paris Pike, in Kentucky's Bluegrass Region, was rebuilt using the natural landscape patterns of the area as a framework for addressing historic, scenic, and natural resources of the area. Transportation officials hired stone-masons from Scotland to teach local artisans how to build and replace dry-laid stone walls along the scenic roadway, which is contained within a 10,000-acre historic district.

“Highways are among the most visible artifacts of our civilization. Our highways give form to our communities and impact us every day of our lives. They connect us to each other and to the place we have chosen to call home. They welcome our guests upon arrival and send them on their way when they leave.”

— Kenny Guinn,  
Governor of Nevada<sup>18</sup>

“We all have significant places in our lives that we feel connected to, and for the Salish, Kootenai, and Pend d’Oreille people, that place is the reservation. We had to find out what was important to them and then design a highway around that.”

— James Sipes,  
*Jones & Jones Architects  
and Landscape  
Architects*

landscaping, street design, signage, and other treatments along the roadsides—simultaneously improving quality of life for its citizens and the public image of the state.

### **US 93 from Evaro to Polson: A Hallmark of Context-Sensitive Design in Montana**

Highway 93 extends north of Missoula, Montana, connecting the state’s two fastest growing areas, and crossing the Flathead Indian Reservation of the Confederated Salish and Kootenai Tribes. The need for safety improvements on the highway resulted in an historic and unique solution in which federal, state, and tribal governments reached a shared vision of the road’s interaction with the environment and tribal culture—an agreement heralded as one of the nation’s showcases in context-sensitive design.

In a collaborative process, the Montana Department of Transportation, Federal Highway Administration, and the tribes agreed that the new highway would be designed with the idea that the road is a visitor and should respond to and be respectful of the land and Spirit of Place.<sup>19</sup>

Rather than following the initial plan to rebuild the Evaro-to-Polson leg into to a four-lane undivided highway, the highway’s new design incorporates the spiritual and cultural values of the local tribes by blending the highway design into the features of the land, limiting access to the roadway, incorporating landscaping and interpretive signage, and designing innovative “critter crossings” to allow safe movement of fish and wildlife. All of this was accomplished while significantly improving the route’s safety and capacity.

The tribes say their history is not written in books, but is etched into the landscape. Among the ancient rock outcrops, mountain formations, crevices, forests, and other natural features lay landmarks and sacred sites that have been embedded into the minds of tribal members through generations of personal experience and coyote stories. The coyote represents the link between tribal members and the natural and spiritual worlds through which the highway will be constructed. All of this is contained in what the tribes call the Spirit of Place, a continuum of everything on the reservation that is seen and unseen, touched, felt, and traveled through.

After an extensive study of the land and tribal history, the architecture firm analyzed the landscape and came up with ideas for how the road should respond to the land. For example, in one area, the road design favors keeping the pines and rolling character of the sandy hills close to the highway to create the perception that the road is integrated with the land rather than slicing through it.

In another landscape area, the design calls for maintaining the integrity of lakes and ponds, and restoring those that were divided by the existing highway. It also calls for healing the scars from road cuts by treating with a substance that gives the rock a natural weathered look.

To enhance and preserve tribal culture, place-name, and interpretive signs conveying important cultural and natural landscape information will



be provided in three languages: Kootenai, Salish, and English. The borders of the signs will illustrate traditional beadwork patterns.

A logo depicting the coyote, legendary hero of the Salish, Kootenai, and Pend d'Oreille people, will be featured on interpretive signs. Native materials, such as quarried stone and rough-sawn lumber, will be used whenever possible. Only indigenous plants and soils will be used to re-vegetate disturbed areas.

### *Protecting Wildlife*

US 93's new highway design features 42 fish and wildlife-crossing structures that facilitate the movement of fish and wildlife through the corridor. Among the 42 structures are eight open-span bridges, 33 corrugated metal-pipe or concrete-box culverts of various sizes, and one 200-foot-wide wildlife overcrossing—a structure that will allow bears and other large animals to cross over the highway without coming into contact with traffic. This structure will help link grizzly bear populations of the Mission Range and Bob Marshall Wilderness Area to the east, with the Bitterroot Grizzly Bear Recovery Zone to the west. Wildlife fences and cattle guards will funnel wildlife toward and through the crossing structures.<sup>20</sup>

Extensive wildlife crossing structures incorporated into context-sensitive designs, will enable animals like this grizzly bear to move more freely over or beneath US 93 in Montana.

“When planned, designed, and built properly, highways can be the enabler of environmental, conservation, and community preservation benefits that otherwise would have been unattainable.”

— Hal Kassoff,  
Parsons Brinckerhoff

## Principles of Context-Sensitive Design

### Thinking Beyond the Pavement Qualities and Characteristics

The following principles were presented at the 1998 workshop, “Thinking Beyond the Pavement: A National Workshop on Integrating Highway Development with Communities and the Environment,” held in Maryland.

#### Qualities of Excellence in Transportation Design

The project satisfies the purpose and needs as agreed to by a full range of stakeholders. This agreement is forged in the earliest phase of the project and amended as warranted as the project develops.

- ▶ The project is a safe facility for both the user and the community.
- ▶ The project is in harmony with the community, and it preserves environmental, scenic, aesthetic, historic, and natural resource values of the area, i.e., exhibits context-sensitive design.
- ▶ The project exceeds the expectations of both designers and stakeholders, and achieves a level of excellence in people’s minds.
- ▶ The project involves efficient and effective use of the resources (time, budget, community) of all involved parties.
- ▶ The project is designed and built with minimal disruption to the community.
- ▶ The project is seen as having added lasting value to the community.

#### Characteristics of the Process Contributing to Excellence

- ▶ Communication with all stakeholders is open, honest, early, and continuous.
- ▶ A multidisciplinary team is established early, with disciplines based on the needs of the specific project, and with the inclusion of the public.
- ▶ A full range of stakeholders is involved with transportation officials in the scoping phase. The purposes of the project are clearly defined, and consensus on the scope is forged before proceeding.
- ▶ The highway development process is tailored to meet the circumstances. This process should examine multiple alternatives that will result in a consensus of approach methods.
- ▶ A commitment to the process from top agency officials and local leaders is secured.
- ▶ The public involvement process, which includes informal meetings, is tailored to the project.
- ▶ The landscape, the community, and valued resources are understood before engineering design is started.
- ▶ A full range of tools for communication about project alternatives is used (e.g., visualization).

Source: U.S. Department of Transportation, Federal Highway Administration’s Context-Sensitive Design/Thinking Beyond the Pavement web site, [www.fhwa.dot.gov/csd/qualities.htm](http://www.fhwa.dot.gov/csd/qualities.htm)

# Transportation: Revitalizing Brownfields

## Did you know?

Abandoned commercial or industrial sites known as brownfields are being cleaned up and redeveloped with transportation dollars, and transportation projects are the key to successful urban revitalization efforts across the country.

In 1998, the federal government gave the green light for transportation agencies to support the cleanup and redevelopment of former industrial or commercial sites known as brownfields. Since that time, transportation has served a vital role in bringing life back to these valuable, but idled properties.<sup>21</sup>

By supporting brownfields redevelopment, transportation is supporting smart land use and urban renewal. Successful revitalization projects across the country illustrate a whole list of benefits from transportation-related brownfields redevelopment, including environmental cleanup, infrastructure renewal, job creation, tax-base development, economic development, historic preservation, and provision of housing.<sup>22</sup>

Redevelopment of these urban areas brings new services and amenities to neglected neighborhoods; reduces time spent in traffic; and increases the use of transit, walking, and biking—all while helping to preserve undeveloped areas known as greenfields. And the central location of many urban brownfields allows for upgrades to existing transportation infrastructure, rather than building new roads.

In addition to redevelopment efforts, transportation has brought needed funds to clean up contaminated sites as a result of intersection improvements and roadway widenings. This includes the remediation of many hundreds or thousands of corroding and leaking underground tanks that store oil and gasoline.

In recent years, highway projects have been the key to successful revitalization efforts—providing needed funding and technical resources to revitalize brownfields, and turning what was once a liability into an asset.

Transportation funds are contributing to brownfields redevelopment in a number of ways:

- By paying for cleanup of environmental contamination that lies in the path of a transportation project or on the site of a former transportation project. For example, transportation funds may be used to assess and clean up a brownfield site where a road, walkway, bikeway, or transit facility will be built by a transportation agency.



Opposite and above – A model of the future Atlantic Station in Atlanta, Georgia. Billed as the largest urban brownfield development in the United States, Atlantic Station is a \$2 billion smart-growth project on a 138-acre brownfield site in the heart of midtown on the former site of an Atlantic Steel facility. Redevelopment of the site hinged on transportation elements—including a highway bridge to connect it both transit and the highway.



► By stimulating the re-use of brownfields, and enhancing those properties for private or public users by improving access to the sites. For example, state departments of transportation may use federal highway dollars to pay for ramps, roads, bikeways, and walkways that connect a brownfield to an existing road. In addition, transit agencies may enhance their services near residential and employment centers located on former brownfields by building bus or rail stops, and erecting signs and streetlights.<sup>23</sup>



Photo courtesy of Atlantic Station LLC, Atlanta, Georgia

## Atlantic Station, Atlanta, Georgia

Billed as the largest urban brownfield development in the United States, Atlantic Station is a \$2 billion smart-growth project on a 138-acre brownfield site in the heart of midtown Atlanta, on the former site of an Atlantic Steel facility.

The impressive urban redevelopment initiative hinged on its transportation elements. For adequate access, the plan required construction of a highway bridge to connect the site to both transit and the highway. But because Atlanta had not met Clean Air Act standards, the bridge would have been prohibited under a standard interpretation of Environmental Protection Agency regulations. This obstacle was removed after an analysis showed that the smart-growth aspects of the redevelopment would help reduce air pollution through shorter and fewer auto trips with fewer emissions. The analysis, coupled with EPA's use of regulatory flexibility under an innovative program called Project XL, allowed the development to proceed.<sup>24</sup>

A long list of environmental and economic benefits of the project includes: cleanup of an old industrial property; separation of sanitary and

Economic benefits of the the Atlantic Station project includes creation of jobs and economic development where infrastructure already exists.

## Supporting Smart Land Use

Reusing brownfields is particularly smart land use because of brownfields' central location and connection to existing transportation systems. Their reuse has two benefits:

- **Value:** Redevelopment cleans up and reuses underused and potentially dangerous land right where it's most valuable—central to the most people, to the most businesses, and to existing, paid-off infrastructure. In sum, redevelopment turns a liability into an asset.
- **Growth with less traffic:** Redevelopment that's central to people and businesses reduces the traffic from new jobs and housing in two ways: first, more of these trips can be by foot and by transit, placing less demand on roads. Second, for trips on roads, central location means that the trips are on average shorter, reducing demand for road space. And often these trips are on roads that have been underused since the decline of the industry that used to occupy the brownfield. Putting trips on those roads can be far less costly.

Source: G.Alexander Taft, Association of Metropolitan Planning Organizations<sup>25</sup>

## Atlantic Station Redevelopment: Exemplary Transportation and Environmental Improvements<sup>26</sup>

The Atlantic Station project incorporates many transportation and environmental improvements that will serve as a model in brownfield redevelopment and smart growth.

### Transportation Improvements:

- ▶ **Multimodal bridge:** A new bridge is currently being built to assist with transportation flow. The 130-foot-wide bridge will include transit, pedestrian, and bicycle elements along with automobile lanes. The bridge will contain two general-purpose travel lanes and one dedicated transit/bike lane in each direction with sidewalks on both sides. Sidewalks will be 22 feet wide on the south side of the bridge and 30 feet wide on the north side.
- ▶ **Sidewalks:** Pedestrian-friendly sidewalks will be provided on all surface streets in the development and as part of most off-site roadway improvements.
- ▶ **Electric car charging stations:** Priority parking as well as charging stations will be available for electric vehicles.
- ▶ **Shuttle service:** The project will include operation of a clean-fueled, rubber-tired transit shuttle system that will circulate between the nearby MARTA (mass transit) station and the development. The shuttle will operate on a frequency matching the existing mass transit station schedule.
- ▶ **Proximity of businesses:** The close intermingling of the businesses (on average less than 1,500 feet apart) and retail locations with the development's residential properties (and with existing neighborhoods) will promote pedestrian traffic.
- ▶ **Parking:** The property will feature shared parking for retail and office, including metered, street-side parking throughout the shopping district.
- ▶ **Regional bike network:** Atlantic Station will provide cyclists with a connection to a bi-state multi-use trail system.
- ▶ **Transportation facilities design:** Non-standard lane widths, turning radii, and block size will be utilized to reduce roadway cross-sections and promote pedestrian activity.
- ▶ **Alternative transportation incentives/programs:** Atlantic Station will incorporate a car-share program using electric vehicles, electric charging stations, VIP parking for car pools, guaranteed ride home, etc.

### Environmental Improvements

- ▶ **Contaminated soil:** 11,800 dump truck loads (approximately 165,000 tons) of contaminated material were removed from the site.
- ▶ **Trees:** The developer is planting 2,800 new trees on the property and in surrounding neighborhoods.
- ▶ **Groundwater:** The remediation plan involved a groundwater interception system to collect groundwater on-site. The development will monitor and treat (if necessary) intercepted groundwater prior to discharge to the city sewer system.
- ▶ **Stormwater:** The development will provide detention facilities to reduce the peak runoff from the post-development condition to less than or equal to the pre-development conditions. The design of these detention facilities includes an aesthetically pleasing one-acre pond in the center of residential development.
- ▶ **Air quality:** Redevelopment of the site includes a monitoring program (in conjunction with the EPA) consisting of site design criteria and transportation performance targets. These measures are in place to ensure that the redevelopment is designed and built with elements that encourage alternatives to single occupancy vehicle trips.
- ▶ **Energy:** An environmentally friendly central cooling system will save building owners more than \$35 million in construction costs, while operating more than 25 percent more efficiently than traditional building HVAC systems resulting in lower energy bills for tenants. A two-mile-long network of 36-inch pipes will deliver chilled water from a 50,000-square-foot central cooling plant to office, residential and retail buildings as they are built at the 140-acre development.
- ▶ **Recycled materials:** During the property's reclamation, concrete building foundations were uncovered. Atlantic Station broke this concrete into smaller pieces and reused the crushed material as backfill. This recycled concrete accounted for 132,000 cubic yards of material. Additionally, the 164,000 cubic yards of granite that was removed in order to create a level building site was crushed and reused as backfill. By using these large amounts of existing material, Atlantic Station reduced the amount of material that had to be taken to construction and debris landfills and lessened the material that had to be brought in from outside sources.

storm sewer systems; reduction of auto emissions; and creation of jobs and economic development where infrastructure already exists.

The multi-use development will give residents and workers a variety of transportation benefits including short trips and the option of walking, biking, or taking transit. And EPA now is allowing other cities to take air quality credit for similar smart-growth development projects.

### **Riverfront Heritage Trail, Kansas City**

Riverfront Heritage Trail, in Kansas City, Kansas and Missouri, is an excellent example of transportation's support for brownfields redevelopment. The project is a nine-mile-long, bi-state system of bicycle and pedestrian paths coordinated with bus transit service connecting Kansas and Missouri along the urban riverfront.

This brownfields urban redevelopment initiative will revitalize an idled riverfront area—covering over 18 linear miles and linking the downtown business districts of both Kansas Cities. Benefits include visitor access to the Kansas and Missouri Rivers, creation of an urban archaeological park in the original Town of Kansas river settlement, and connection of retail and residential centers through a flourishing Rivermarket area. A restored natural area will provide opportunities for visitors to learn about wetlands and river ecology. The trail also will function as a transportation alternative, serving an employee base of over 150,000 and a residential population of over 60,000.

Substantial transportation funding was contributed to the \$22 million dollar project—including \$3 million from Transportation Enhancements Program funds as well as \$1.2 million from the Congestion Mitigation and Air Quality Improvement program.

The project illustrates many of the benefits of transportation-related brownfields redevelopment. It creates an alternative transportation system that cleans up and recycles contaminated land, addresses air quality issues, and facilitates redevelopment of other brownfields in the area.

### **Stamford Urban Transitway and Intermodal Center**

Another good example of transportation improvements tied to brownfield redevelopment can be found in Stamford, Connecticut. Stamford's Urban Transitway and Intermodal Transportation Center Improvements project illustrates transportation improvements underway in an area undergoing brownfields redevelopment. The area's brownfields project includes redevelopment of three large brownfields in two low-income neighborhoods by the city's harbor, including:

- ▶ a 40-acre abandoned manufactured gas plant;
- ▶ a 17-acre fuel oil depot; and
- ▶ a 22-acre manufacturing complex.

The transportation improvements will provide better access to major activity centers in the area, reducing travel time and cutting down on motor vehicle emissions.

The Stamford Urban Transitway and Intermodal project will provide a one-mile transitway, including a bus lane shared with high-occupancy vehicles, providing a direct link from Interstate 95 to the new Intermodal Transportation Center. The transportation improvements are being funded by a variety of sources, including the New Starts Program under the Transportation Equity Act for the 21st Century (TEA-21).

**Brownfields: Transportation Development Across the Country**

| Description/Site   | Location                                   | Brief Description of Project   |
|--|--|--|
| American Axle Plant  | Northeast Buffalo, New York                | Development of an access road along an old rail corridor to attract businesses to vacant, underutilized parcels along the corridor.  |
| Euclid Corridor  | Cleveland, Ohio                            | Improvement of a transportation corridor occurring in the vicinity of systematic brownfields improvements.   |
| Freight-Related Development of Abandoned Industrial Sites    | North Jersey, New Jersey                   | Freight-related redevelopment of brownfields, including port expansion and roadway/guideway development  |
| Gateway District   | Salt Lake City, Utah                       | Rejuvenation of a 650-acre, blighted industrial district that currently divides the west and east sides of Salt Lake City.   |
| Lawrence Gateway and Merrimack Riverwalk                     | Lawrence, Massachusetts                    | Extension of a walkway providing pedestrian and bicycle access to downtown and to the city's National Heritage Park.   |
| North Marine Drive   | Portland, Oregon                           | Relocation and improvement of an outdated road through contaminated land that provides access from an Interstate freeway through an industrial district dotted with brownfields. |
| Phalen Corridor Initiative                                   | St. Paul, Minnesota                        | Comprehensive community initiative, including transportation improvements, to restore the economic, physical, and social prosperity of St. Paul's East Side.                     |
| Riverfront Heritage Trail                                    | Kansas City, Kansas, Kansas City, Missouri | Development of a nine mile-long, bi-state system of bicycle and pedestrian paths, coordinated with bus transit service connecting the two cities.                                |
| Stamford Urban Transitway and Intermodal Center Improvements | Stamford, Connecticut                      | Transitway and Intermodal Center improvements being undertaken in the vicinity of brownfields redevelopments.  |
| Wellston Technology Park                                     | Wellston, Missouri                         | Development of brownfields being driven by a transportation improvement project: opening of a Metrolink station.   |

Source: *Transportation and Brownfields Redevelopment: Review and Analysis of Current Practice*, Adjo Amekudzi and Ignatius Bomunung, presented at the Transportation Research Board Annual Meeting, January 2003



Photo courtesy of Dan Burden,  
www.pedbikeimages.org

# Transportation: Paving the Way for Walking and Biking

## Did you know?

Annual federal transportation funding for bicycle and pedestrian projects has risen eighty-fold—from almost \$5 million in 1988 to almost \$416 million in 2002.

Opposite and above – For many Americans walking or bicycling is the only viable option of getting around. Others choose to walk or bike for fitness, economic, or environmental reasons, or simply for recreation and the enjoyment of being outdoors.

Every state DOT now has a bicycle and pedestrian coordinator to help implement bicycle and pedestrian solutions as a routine part of transportation planning.

For many individuals—those too young or too old to drive, those who cannot afford to own a car, or those who simply choose not to own a car—walking or bicycling is the only viable option of getting around. Many people choose to walk or bike for fitness, economic, or environmental reasons, or simply for recreation and the enjoyment of being outdoors.

Bicycling and walking provide major benefits—including improved health, recreation, and mobility for individuals, and neighborhood cohesion and increased tourism for communities. Increased biking and walking can help reduce roadway congestion, cut air pollution, and contribute to livable communities. Transportation is a major supporter in helping Americans realize these benefits—providing an astonishing 80-fold increase in funding for bicycle and pedestrian projects—from \$4.9 million in 1988 to almost \$416 million in 2002.<sup>27</sup> This infusion of funds has been a major boost for new bicycle and trail projects with the support of new federal, state, and local policies to advance walking and biking as a mode of transportation as well as recreation.

In the past decade, transportation has provided unprecedented support for bicycling and walking—basic forms of transportation that are accessible to virtually all Americans. In support of this, federal and state governments have taken unprecedented steps. Consider the following facts:

- ▶ The federal government calls for establishing bicycle and pedestrian ways in all transportation projects, unless exceptional circumstances exist.<sup>28</sup>
- ▶ Every state DOT now has a bicycle and pedestrian coordinator to help implement bicycle and pedestrian solutions, and transportation agencies have placed a new emphasis on bicycling as a routine part of transportation planning, design, construction, operations, and maintenance activities.
- ▶ Walking and biking are safer, with about a 13 percent reduction in the number of pedestrian and bicyclists killed in traffic crashes from 1993 to 2001.<sup>29</sup>



Transportation is working to increase biking and walking and the associated health benefits, including reduced risk of coronary heart disease, stroke, and other chronic diseases; lower health care costs; and improved quality of life for people of all ages.

- ▶ More than 2,000 local trails (shared-use paths) were designated in the year 2000 as Millennium Trails as part of the White House Millennium Initiative. These community trails, together with 50 Millennium Legacy Trails and 16 National Millennium Trails designated in 1999, highlight the transportation benefits of bicycling and walking.
- ▶ According to U.S. census data, some 563,476 people reported riding bicycles to work and 3,412,899 workers 16 years and over reported walking to work in 2000.<sup>30</sup>
- ▶ In 2001 alone, over one thousand new bicycle and pedestrian projects were funded with federal transportation dollars.<sup>31</sup>
- ▶ Health professionals are raising concerns regarding increased incidence of obesity in the United States. Transportation is working to increase biking and walking and the associated health benefits, including reduced risk of coronary heart disease, stroke, and other chronic diseases; lower health care costs; and improved quality of life for people of all ages.
- ▶ In 2002, 65 percent (\$270 million) of bike/ped funds came from transportation enhancement activities, while 35 percent (\$145 million) came from the Congestion Mitigation and Air Quality Improvement Program, and various other surface transportation programs. On top of that, some highway projects include incidental bicycle and pedestrian components that are not reflected in the various program funding levels.

About three quarters of the federal funding for bicycle and pedestrian improvements comes from the Transportation Enhancements Program. Far from providing just paths and trails, bicycle and pedestrian projects funded by the program include:

- ▶ sidewalks;
- ▶ bicycle parking;
- ▶ bicycles on buses;
- ▶ pedestrian and bicycle transportation facilities including shared-use paths;
- ▶ pedestrian and bicycle safety and education activities; and
- ▶ preservation of abandoned railway corridors (also known as rail-trails or rails-to-trails).<sup>32</sup>

Since 1992, more than half of the \$5 billion in federal transportation enhancement funds have been used for pedestrian and/or bicycle facilities and related projects. About one-third to one half of these projects are shared-use paths or trail-related, including more than 1,000 rail-trail projects.<sup>33</sup>

Another program—the Recreational Trails Program—has provided over \$136 million in federal transportation funding since 1993, for a variety of recreational trails and related facilities, with another \$135 million coming from additional sources—including other federal agencies, states and localities, and trail clubs. The law provides states \$50 million per year for 2000 to 2003.

Recreational trails are used mostly for hiking and walking, although they also support other recreational uses, including equestrian, cross-country skiing, snowmobiles, and in-line skating.

As of 2002, 4,870 trails projects were reported by states.<sup>34</sup> These include building new trails and adding trail connections, building restrooms, water fountains, establishing educational programs, maintaining trails, resurfacing trail treads, providing accessibility for mobility-impaired persons, and more.

### **The Great Allegheny Passage from Pennsylvania to Maryland**

The Great Allegheny Passage is the longest multi-purpose rail-trail in the East, with 100 continuous miles of trail open in Pennsylvania from McKeesport to Meyersdale, and an additional 20 miles scattered throughout the Pittsburgh area. When the project is completed in 2005, the rail-trail will offer a total of 150 miles of non-motorized, nearly level trail between Pittsburgh, Pennsylvania, and Cumberland, Maryland, with a 52-mile spur to Pittsburgh International Airport. At Cumberland, the Great Allegheny Passage will link with the Chesapeake and Ohio Canal towpath, creating a 300-mile, off-road route between Pittsburgh and Washington, D.C. The trail allows hikers, bicyclists, cross-country skiers, and people with disabilities the opportunity to discover the region's spectacular river gorges, mountain vistas, and sweeping cityscapes. The trail leads travelers through the Allegheny Mountains making use of refurbished railroad bridges and tunnels on their journey along waterways, unique rock formations, and wildlife areas.

A public/private partnership between the Pennsylvania Department of Transportation and the Allegheny Trail Alliance—a coalition of seven trail



Photo courtesy of Dan Burden, [www.pedbikeimages.org](http://www.pedbikeimages.org)

Far from providing just paths and trails, bicycle and pedestrian projects funded by the Transportation Enhancements Program also includes bicycles on buses.

organizations—manages this comprehensive project and has contributed to its success.

A 1998 study showed the direct economic impact of the Great Allegheny Passage exceeded \$14 million a year—even though the trail was only half finished at that time. The study—based on surveys of trail users and local businesses—recorded more than 350,000 visitor trips on the trail each year with users spending \$12.01 to \$15.33 per person, per trip. The study also estimated that trail users spent between \$5.4 and \$14.1 million near six trailheads. In addition, annual expenditures on bicycles and related equipment—attributable to the trail over the prior two years—were between \$8.9 and \$12.2 million. The study suggests a total, direct annualized impact of \$14.3 to \$26.5 million.

In 1998, four new trail-oriented businesses opened in the Allegheny County town of Boston—including bike rentals, restaurants, a bed-and-breakfast, and a novelty shop. In Confluence—one of the project's first trailhead towns—the trail has encouraged the development of several new businesses including three new restaurants, two new bed-and-breakfasts and a bicycle rental program at the local video store. In addition, several homes have been purchased and renovated by trail users, some as primary residences and others as vacation homes. As result, real estate values in Confluence are increasing.

Clearly, the Great Allegheny Passage has positively affected the economies of the communities it passes through. The trail network preserves a valuable transportation corridor while providing a wealth of benefits to communities along its way.<sup>35</sup>

### **The Mineral Belt Trail in Leadville, Colorado**

At an elevation of 10,400 feet above sea level, the Mineral Belt Trail (MBT) is one of the highest paved rail-trails in the country. The MBT was a challenge to developers because it is located within a Superfund Site, a national historic district, a mining district with overlapping claims, and an area of high topographic relief—all of this in a small community with limited financial resources.

In July 2000, seven years after the trail's groundbreaking, Leadville officially opened the Mineral Belt Trail, a 12.5-mile rail-trail through the town. The successful completion of the trail was the result of strong partnerships between Union Pacific Railroad Company, Colorado State Parks, Colorado Department of Transportation, U.S. Environmental Protection Agency (EPA), Asarco Mine, the town of Leadville, Lake County, and private landowners.

Interesting features of the trail include the safe and legal access it provides to historic mining areas, panoramic views of Colorado's three highest peaks (including Mount Elbert, the state's highest mountain) and the trail's use, sanctioned by the EPA, as an impervious cap over the old railroad corridor.



When completed in 2005, the Great Allegheny Passage will offer 150 miles of non-motorized, level trail between Pittsburgh, Pennsylvania, and Cumberland, Maryland. At Cumberland, the trail will link with the Chesapeake and Ohio Canal Towpath, creating a 300-mile off-road route between Pittsburgh and Washington, D.C.



Owners of restaurants and lodging facilities along the Mineral Belt Trail in Leadville, Colorado (left), report that they are serving customers who have come into town specifically to ride the trail. The trail has helped Leadville prevent an economic recession by contributing to the town's revitalization efforts and successful development as a recreation and tourism destination.



Photo courtesy of the National Transportation Enhancements Clearinghouse

Until recent years, mining was the economic backbone for Leadville. The 1999 closure of the Asarco Mine was a devastating blow to Leadville's economy and community spirit. Realizing the need to redefine their community, Leadville residents rallied around the idea of the trail, focusing on the town's natural beauty, recreational opportunities and historic mining areas. The MBT draws tourists to the area year-round, boosting the economic viability of this former mining area. In the months following the trail's opening, Leadville reported a 19 percent increase in sales tax revenues. Owners of restaurants and lodging facilities report that they are serving customers who have come into town specifically to ride the trail. The MBT has helped Leadville prevent an economic recession by contributing to the town's revitalization efforts and successful development as a recreation and tourism destination.<sup>36</sup>

### **Planning for Bicycle-Pedestrian Mobility**

Increasingly, states and cities see the importance of integrating bicycling and walking into transportation networks through comprehensive planning efforts. Transportation agencies are serving a vital role in getting Americans on the move—setting targets and goals for increased bicycle and pedestrian mobility and establishing strategies for getting there.

## New Jersey's Commitment to Bicycling and Walking

The New Jersey Department of Transportation (NJDOT) has made a commitment to encourage bicycling and walking within the state, with an ultimate goal of developing an integrated statewide system of bicycle and pedestrian facilities and infrastructure. The state plans to achieve this goal with a comprehensive, statewide pedestrian and bicycle plan. The first phase of the plan establishes goals and targets that the department is working toward. The next step is to complete an inventory of existing bicycle facilities, develop a list of priority locations for bicycle and pedestrian improvements, and to identify opportunities for improving the bicycle or pedestrian compatibility of existing projects. A database of existing, proposed, and potential bicycle and pedestrian facilities throughout the state will be developed that can be displayed on maps, and easily maintained.

### NJDOT Bicycle and Pedestrian Master Plan Goals

- ▶ Create a bicycle-friendly and walkable transportation infrastructure by planning, designing, constructing, and managing transportation and recreation facilities that will accommodate and encourage use by bicyclists and pedestrians, and be responsive to their needs.
- ▶ Ensure community destinations, transit services, and recreation facilities are easily accessible for all levels of bicyclists and pedestrians.
- ▶ Reform land-use planning policies, ordinances, and procedures to maximize opportunities for walking and bicycling.
- ▶ Develop education and enforcement that will result in reductions of accidents, and a greater sense of security and confidence for bicyclists and pedestrians.
- ▶ Increase bicycling and walking by fostering a pro-bicycling and pro-walking ethic in individuals, private-sector organizations, and all levels of government.<sup>37</sup>



*The following list of bike and pedestrian plans across the country—compiled by Pedestrian and Bicycle Information Center<sup>38</sup>—illustrates progress in integrating non-motorized modes as viable transportation alternatives.*

## **Exemplary Bicycle and Pedestrian Plans Across the United States**

### **Combined Pedestrian and Bicycle Plans**

- ▶ **Oregon Bicycle and Pedestrian Plan:** A statewide planning and design guide for both bicycle and pedestrian modes; contains useful graphics and information about many innovative approaches to accommodating bicycling and walking.
- ▶ **Idaho Bicycle and Pedestrian Transportation Plan:** A clear, simple statement of goals and objectives combined with helpful planning and design information for local agencies.
- ▶ **Vermont Bicycle and Pedestrian Plan:** Useful sections on implementation and the roles of different agencies, partners.
- ▶ **Puget Sound Regional Bicycle and Pedestrian Implementation Strategy:** A regional plan (Seattle-area) identifying more than 2,000 miles of needed bike lanes and paths and pedestrian improvements around activity centers.
- ▶ **Boulder Transportation Master Plan:** Bicycle and pedestrian planning are fully integrated into the Boulder, Colorado transportation master plan, with modal split targets of 15 percent of trips by bike, and 24 percent by foot, by 2020.
- ▶ **Brunswick Bicycle and Pedestrian Improvements Plan:** A great example of a plan for a small town of just 15,000; includes specific planned or proposed improvements, design recommendations.
- ▶ **Mesa Regional Transportation Plan:** The City of Mesa's long-range transportation plan has a chapter of bicycling and on walking that provides a good overview of design and planning issues. Contains a vision, objectives, policies, and actions.

### **Pedestrian Plans**

- ▶ **Oakland Pedestrian Master Plan:** This plan is the first in California. The “next steps in pedestrian planning” section highlights pedestrian level of service and pedestrian modeling.
- ▶ **Portland Pedestrian Master Plan:** One of the first comprehensive pedestrian plans for a city; complemented by a detailed design manual for pedestrian facilities.
- ▶ **Cambridge Pedestrian Plan:** Beautifully produced and thorough plan incorporating specific suggestions for sites throughout the city, design guidelines, links to other modes, and more.

- ▶ **Madison Pedestrian Transportation Plan:** Adopted in 1997, Madison's visionary plans for walking incorporates planning, design, maintenance, and long-term goals and objectives.
- ▶ **Wisconsin Pedestrian Policy Plan 2020:** One of the few statewide pedestrian plans focuses on the policies and programs that will help improve conditions for walking.
- ▶ **Florida Pedestrian Facilities Planning and Design Handbook:** A detailed manual on pedestrian facility planning and development. Thorough coverage of planning factors, design detail, and more.
- ▶ **Maricopa Association of Governments: Pedestrian Plan 2000:** A comprehensive application of the Pedestrian Level of Service and Latent Demand models for the Phoenix area. Includes detailed action plans.

#### Bicycle Plans

- ▶ **Florida Bicycle Facilities Planning and Design Handbook:** A detailed manual on bicycle facility planning and development. Thorough coverage of planning factors, design detail, and more.
- ▶ **Maricopa County Bicycle Transportation System Plan:** The policies in this plan institutionalize bicycle accommodation within the agency; a map provides the starting point for improvements in this rapidly growing area surrounding Phoenix, Arizona.
- ▶ **Austin Bicycle Plan:** A two-part plan that provides the policy and programming aspects first, and the design details second. A good example of action plans.
- ▶ **Denver Bicycle Master Plan Update:** A comprehensive bicycle plan adopted in 2002 that updates a 1993 plan. Addresses everything from design standards to route networks cost estimates for missing links, etc.
- ▶ **Portland Bicycle Master Plan:** Significant not just because of the quality of plan itself but also the five-year review of progress that documents how much of the plan has been implemented. Includes good design information.
- ▶ **Los Angeles Bicycle Plan:** A chapter in the transportation element of the city's General Plan; very accessible production with clear assignment of responsibility and lead roles.
- ▶ **Long Beach Bicycle Master Plan:** Clear and concise plan that incorporates user input and provides project ranking and priorities.
- ▶ **MTC Regional Bicycle Plan:** An element in the San Francisco Bay area's regional transportation plan; identifies a 1,600-mile bikeway network and a \$700 million price tag.

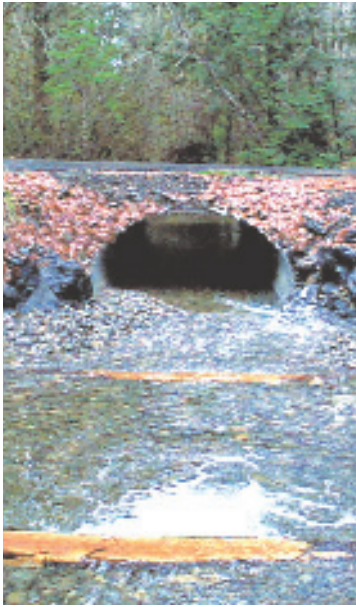
- ▶ **Knoxville Regional Bicycle Plan:** A comprehensive regional plan that incorporates by adoption the U.S. DOT design guidance on accommodating bicycles. Specific roles and responsibilities laid out; extensive resources made available.
- ▶ **New York City Bicycle Master Plan:** The plan identifies a 900-mile bike-way network with critical coverage of bridge access and transit issues; links to the 350-mile greenway network.
- ▶ **Madison/Dane County Bicycle Transportation Plan:** A comprehensive plan for “making the region an even better place to bicycle” that includes an impressive needs assessment and priority list of projects that are scheduled. Covers engineering, education, encouragement, and enforcement in detail.
- ▶ **Davis Bike Plan:** Even the city with the highest level of bike use in the nation still needs a bike plan to keep people riding and improve the scope, operation, and maintenance of the already-extensive bikeway network.

#### Trail/Greenways Plans

- ▶ **Iowa Trails 2000:** A tremendous resource with clear vision and objectives statements, cost estimates, design information, and much more.
- ▶ **Maricopa County:** Includes a policy requiring all county departments to include regional trails in the planning and design of any project near or adjacent to the 221-mile proposed network.
- ▶ **New York City Greenway Plan:** A plan for a 350-mile network of urban greenways crisscrossing New York City.

#### Other Plans

- ▶ **New Jersey Statewide Bicycle and Pedestrian Master Plan:** An update of the ground-breaking 1995 plan is underway.
- ▶ **Soles and Spokes:** The Pedestrian and Bicycle Plan for Chicago Area Transportation: Another work in progress that is worth watching. This regional plan will encompass the six-county Chicago metropolitan area.
- ▶ **Forsyth County Bicycle and Pedestrian Plan:** This suburban/rural county in the Atlanta metro area is in the midst of creating their first non-motorized plan.
- ▶ **University of Connecticut Master Plan:** The campus of the university is being redesigned with pedestrians at the core.
- ▶ **Hopewell Hamlet Pedestrian Plan:** A fascinating insight into potential pedestrian improvements in this small town in New York’s Hudson River Valley. Great use of photos to show the potential improvements for both bicycling and walking.



Opposite and above – Washington State DOT is working to remove fish passage barriers, allowing fish such as this chinook salmon to pass safely beneath the state's roadways. Re-built culverts, pictured above, allow fish unrestricted access to freshwater habitat for spawning and juvenile rearing.

# Transportation: Wetlands and Water Quality Successes

## Did you know?

Transportation is achieving a net gain in wetlands acreage, adding over 20,000 acres of wetlands since 1996.

Few Americans realize that the transportation sector has achieved a 160 percent net gain in wetlands acreage since 1996. Data collected by the federal government over the past seven years show an amazing accomplishment—the highway program averaged 2.6 acres of wetlands gained for every acre lost.<sup>39</sup>

Transportation agencies are boosting efforts to preserve and enhance the natural environment by financing wetlands and habitat mitigation and restoration projects—effectively using the funding flexibility provided in the Intermodal Surface Transportation Efficiency Act of 1991, and subsequently in the Transportation Equity Act for the 21st Century (TEA-21).

The transportation sector's increasing use of wetland banking—setting aside or creating new wetlands to compensate for unavoidable impacts—has shown impressive results:

- ▶ Irreplaceable wetlands that might have been lost to development are being preserved.
- ▶ Wetlands that were altered or degraded are being restored, providing improved water quality and better wildlife habitat.
- ▶ Buffer areas in wetland watersheds are being protected, enhancing existing wetland functions and values for society, including natural areas for recreation.

In addition to wetlands improvements, environmental experts at transportation agencies across the country are devising creative solutions that target taxpayer dollars to preserving and enhancing water quality through storm water management, restoration of streams, and erosion and sediment control. In many cases, transportation dollars and staff are partnering with other agencies and organizations to preserve entire ecosystems and watersheds.

In fact, water quality improvements over the past 25 year—during a time of major economic growth in the United States—represent an achievement that rarely receives much attention. A review of data on the water



Above and opposite left – The South Carolina Department of Transportation, along with the Federal Highway Administration, the Nature Conservancy, and other private- and public-sector organizations, came up with a plan to purchase Sandy Island as a wetlands mitigation bank, preserving it from potential commercial development.

The Sandy Island Mitigation Bank also saved taxpayers over \$50 million—money that would have been required for mitigation of impacts from construction of a major coastal highway and other projects in the area.

quality constituents associated with surface transportation—including nutrients, dissolved oxygen, suspended sediments, dissolved solids, and pesticides—found transportation-related water quality has shown significant improvement.

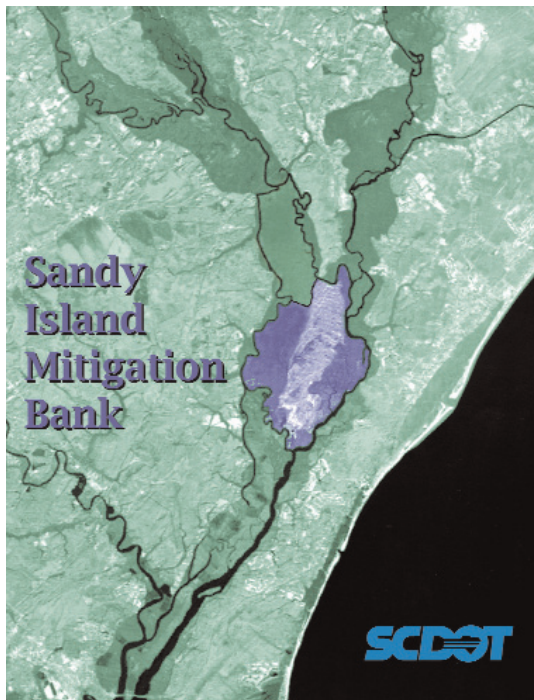
And this improvement came despite a 29 percent population growth, a 61 percent increase in employment, growth of 102 percent for inflation-adjusted gross domestic product, a 61 percent growth in vehicles, and a growth in vehicle miles traveled of 125 percent from 1970–1996.<sup>40</sup>

### **Wetland Mitigation Banking: A Success Story in South Carolina**

The award-winning Sandy Island mitigation project in South Carolina illustrates the benefits of the wetland banking approach in a unique effort in which over 16,000 acres—an entire island of pristine wetland habitat south of Myrtle Beach—was purchased by the state transportation agency as a wetlands mitigation bank. The project was successful in protecting a valuable ecosystem, while at the same time preserving irreplaceable social and archaeological resources.

Wetland mitigation banking operates like a bank account: a designated amount of the restored or created wetlands area can be “withdrawn,” leaving a balance that can be used to offset impacts from future projects.

Working with a unique partnership, the South Carolina Department of Transportation came up with a plan to purchase Sandy Island as a wetlands mitigation bank, preserving it from potential commercial development. The partnership also included the Federal Highway Administration, the Nature Conservancy, and other private- and public-sector organizations.



Right – The Washington State Department of Transportation protects water quality in the state by focusing on entire watersheds.

This unique agreement resulted in preservation of unique wetlands habitat, the remnants of rice plantations, a large colony of endangered red-cockaded woodpeckers, and archaeological sites—providing opportunities for visitors to experience the untouched natural environment and view relics of the past. Preservation of the island also preserved the culture of the island residents, a community descended from African-American plantation labor force, which has been in existence since 1865.

Meanwhile, the Sandy Island Mitigation Bank also saved taxpayers over \$50 million—money that would have been required for mitigation of impacts from construction of a major coastal highway and other projects in the area. Using credits from the mitigation bank, these transportation improvements will proceed, providing important economic benefits to the entire region.

### Washington State’s Watershed Solution

The Washington State Department of Transportation (WSDOT) has taken a comprehensive approach to protecting water quality in the state—focusing not only on individual wetlands or bodies of water, but on entire watersheds.

The primary objective of the agency’s watershed approach is to direct transportation mitigation dollars toward areas that maximize environmental benefit and reduce mitigation cost rather than just meeting minimum mitigation standards. Since 1996, the agency has been developing and refining a watershed approach to meet this objective, while encouraging cooperation among various agencies and promoting long-term solutions that benefit both people and the fish and wildlife resources of Washington State.





Photos courtesy of the Washington State Department of Fish and Wildlife

The potential benefit of investing significant transportation dollars and expertise in watershed restoration is enormous to both taxpayers and the environment.

The agency is developing tools to systematically examine ecosystem function and to identify core problems leading to the degradation of water quality, increased peak flows, declining base flows, and the loss of fish and wildlife habitat. These tools provide new opportunities to mitigate transportation impacts and contribute to local natural resource recovery goals. The result: a more predictable permitting process with measurable transportation and environmental benefits.

Along with developing assessment tools that will help mitigate transportation impacts, a variety of the department's environmental initiatives, such as the Wetlands Strategic Plan, Fish Passage Barrier Removal Program, Advanced Environmental Mitigation Revolving Account (AEMRA), Flood Management Strategy, and Capital Budget Coordination are being managed within watershed scales to help choose the best mitigation options.

Above and inset – Before and after photos of a fish passage project on Washington State's Rasmussen Creek, a tributary to the Strait of Juan de Fuca. A single, precast concrete round culvert, located on SR 112, was replaced with a bridge in 1996, allowing coho salmon, steelhead trout, searun cutthroat trout, and resident trout to pass beneath the roadway.

### *Using Natural Systems*

In the Puget Sound region of Washington State, the department is now developing and testing a new innovative watershed characterization method that continues to build on the watershed approach started in 1996. An interdisciplinary technical team was formed in 2002 to develop methods that view environmental mitigation in a fundamentally different way than conventional approaches.

For example: when a transportation project increases storm water runoff, engineered solutions—such as detention ponds or large concrete vaults under highways—are typically designed and constructed to retain surface water runoff. These options—while considered best management practices—are expensive to construct and will require long-term maintenance and eventual replacement. In contrast, watershed characterization seeks to understand how the project watershed stores water naturally (e.g., wetlands, riparian areas, floodplains), and then identifies where land use has resulted in the loss of natural storage capacity.

By targeting natural systems like wetlands or riparian areas for mitigation, it is possible to mitigate project storm water impacts while simultaneously restoring a self-maintaining natural system that provides many other valuable watershed functions. These include groundwater recharge, water quality treatment, and fish and wildlife habitat, along with aesthetic, recreational, and educational values to residents. Initial method development has been completed on State Route 522 in Snohomish County, Washington, with testing planned in 2003 for the Interstate 405 corridor.

### *Helping Washington's Threatened Salmon*

The watershed approach is helping to address an ongoing challenge in the state—preservation and recovery of threatened species of salmon.

One of the major challenges is assuring that salmon and other fish have unrestricted access to freshwater habitat for spawning and juvenile rearing. Transportation officials are working to help fish navigate the streams beneath the state's roadways by helping to remove culverts that may be barriers due to high water velocity, inadequate water depth, inadequately sized, and/or a large outfall drop.

Washington State DOT has extensive work underway to correct culvert barriers in the course of highway projects, during routine maintenance, and through a special retrofit program as stand-alone projects funded expressly by the legislature.

Many of these salmonid species found in the State of Washington are in danger of becoming extinct and have been listed under the Endangered Species Act.

The fish-passage barrier retrofit program is inventorying highways to locate impassable culverts, rating the potential habitat to be gained from fixing them, and prioritizing the fixes. WSDOT and the state Department of Fish and Wildlife jointly manage a statewide database for this inventory with over 600 identified culvert barriers.

Since 1991, 45 barriers have been corrected in the course of highway projects, and another 54 barriers have been corrected through the stand-alone retrofit program. WSDOT has spent more than \$13.8 million to inventory, conduct habitat studies, prioritize, and correct fish-passage barriers to Washington streams as of April 2003. Under this program, fish access to more than 1,593,467 square meters of salmonid habitat, or, over 357 linear kilometers (222 miles) has been improved.

Once these problem culverts are corrected, the benefits to fish habitat are real and immediate—in many cases fish have been observed upstream of improved culverts within weeks of restoring access.

WSDOT also has developed and funded a research strategy to improve understanding of how road crossings can become barriers to fish and the best approaches to correcting barriers. This research will focus on hydraulic conditions in culverts as well as ecological questions relating to the behavior of juvenile salmonids.

### **Maryland State Highway Administration: Managing Storm Water, Controlling Erosion, and Restoring Streams**

Like other transportation agencies across the country, Maryland's State Highway Administration is going to great lengths to protect and restore aquatic resources through development and implementation of new technologies—and these efforts are making positive contributions that reach beyond the transportation sector.

For example, Maryland has one of the first and most comprehensive storm water management programs in the United States. The goals of the program are to control flooding from highway construction and to clean highway runoff. The ponds and wetlands systems designed to treat storm water have evolved into multi-functional habitat areas for a variety of plant and animal species.

Advanced technologies for sediment control and stream restoration are also being developed and implemented. Sophisticated sediment control technologies initially aimed at protecting the Chesapeake Bay are used on all of the highway agency's projects—and contractors and inspectors must be certified in these sediment control practices.

Efforts to reconstruct streams are helping to advance the state-of-the-art science termed fluvial geomorphology. This process allows engineers and designers to correct past impacts by recreating intricate patterns and details found in nature to re-establish aquatic vegetation, fish, and other species.



Above – A detention pond in Maryland’s District 7 provides habitat for a variety of plant species. Sophisticated sediment control technologies initially aimed at protecting the Chesapeake Bay are used on all of the the state highway agency’s projects. Contractors and inspectors must be certified in these sediment control practices.

Right – The Maryland State Highway Administration is going to great lengths to protect and restore aquatic resources, as shown by the stormwater management facility on US 301 in Kent County, Maryland.



# Transportation: Protecting Species, Enhancing Ecosystems

## Did you know?

Transportation agencies are developing innovative ways to protect animal and plant species—in many cases contributing to the preservation of entire ecosystems.

Transportation agencies across the country are developing ways to make roadways compatible with the plants and animals that share the land. From small efforts—like placing nesting houses on the back of highway signs, to broad-scale initiatives that aim to preserve entire ecosystems—transportation agencies are helping to protect and enhance plant and animal species and their habitats.

A growing field of top-notch environmental professionals at transportation agencies across the country is making a huge contribution to improve the state-of-the-art in protecting endangered species, preserving habitat, and developing tools like geographic information systems that map out vital areas for protection.

The transportation sector's behind-the-scenes contributions to conservation and species recovery are making a difference for plants and animals nationwide—helping provide a voice to our quiet neighbors from the natural world.

While responsible for complying with numerous laws and regulations, these transportation professionals are coming up with creative solutions to ensure that the nation's roadways are constructed and maintained in a way that protects and enhances native plants and animals.

Highway officials are developing new ways to allow animals to cross roads or to keep them safely to one side. Most people would not even



Opposite – A black bear underpass suite beneath Highway 46 in Florida consists of a bottomless rectangular cast-in-place concrete culvert, chain link fence, animal crossing signs, and vegetation management. At least 12 species, including the bears, are using the culvert. This keeps not only the animals, but motorists safer as well.

Above – In an effort to save the endangered Karner Blue Butterfly, the Wisconsin Department of Transportation has seeded an I-94 rest area with Blue Lupine (left) and other native prairie plants. The area is now a solid wall of blue flowers and the butterflies are everywhere.



notice a culvert designed specifically for black bears to cross, fences installed to keep frogs from jumping into the roadway, or a “ladder” constructed in a roadside stream to aid migrating fish.

Few people are aware of landmark government agreements to set aside huge tracts of land in a proactive effort to preserve habitat for numerous threatened or endangered species. And the average citizen is unlikely to recognize that beautiful purple flowers carefully maintained by transportation workers along a roadside are providing vital habitat for a delicate, endangered butterfly.

On a broader scale, identification and encouragement of “exemplary ecosystem” projects are among the priorities of the Federal Highway Administration. The agency is recognizing the increasing number of innovative approaches agencies are using to benefit to the environment—including development of conservation agreements, use of wetland banking, preservation efforts based on identification of wildlife movement corridors, partnering with other agencies and conservation groups, and development of ecological information databases.

### **Preserving the Short-Grass Prairie Ecosystem in Colorado**

Considered an exemplary ecosystem initiative by federal transportation officials, Colorado transportation officials are partners in a broad-scale program of species recovery and ecosystem conservation on Colorado’s shortgrass prairie. This award-winning effort aims to protect habitat of some 36 species—many of which have not yet been given endangered status. Officials are using a range of methods, including plans for conservation of up to 50,000 acres of land, via easements and management agreements in perpetuity.<sup>41</sup>

A recent decision by the U.S. Fish and Wildlife Service not to list as endangered the black-tailed prairie dog in Colorado was based in part on the successful implementation of Colorado DOT’s initiatives to enhance the environment and protect rare species.



It's challenging trying to balance the need to protect the environment while providing a safe transportation system for a growing state. However, CDOT is committed to doing just that. We recognize how important it is to preserve short-grass prairie and protect the wildlife dependent upon it.

— Tom Norton,  
Colorado Secretary of  
Transportation

Working with other agencies and conservation groups, Colorado DOT (CDOT) is working to implement roadside maintenance techniques and is developing Geographic Information System maps and other tools to help preserve the prairie plants and animals. Methods to maintain and enhance ecosystem processes range from protection and care of rare species to control of competitors, promotion of pollinators, protection of riparian areas and wetlands, and maintenance of animal crossings.

Through this proactive approach, the transportation agency has achieved advanced compliance with Endangered Species Act requirements for transportation projects over the next 20 years, while protecting and enhancing the environment. This multi-species recovery effort is expected to promote the recovery of listed species, help prevent listing of additional species, use public funds more efficiently, improve the project development process, and offset permanent habitat loss through large-scale habitat protection.

A recent decision by the U.S. Fish and Wildlife Service not to list the black-tailed prairie dog in Colorado was based in part on the successful implementation of this initiative.

### **Preserving Native Prairie Plants in Wisconsin**

Transportation workers in Wisconsin are using the state's roadsides as preservation corridors for endangered native prairie plant species. The project will involve eradicating most of the woody species that have invaded the prairie, selectively applying herbicides to invasive species (crown vetch, spotted knapweed, etc.), and conducting controlled burns. The burns will take place in early spring of 2003, 2004, and 2005, most likely in April. "We're doing this to be good stewards of a valuable natural resource that is part of our heritage," explained Dick Stark, Landscape Architect from WisDOT's Bureau of Highway Operations in Madison.

"Prairie and its related plant communities once covered millions of acres in the central United States, including about 2.1 million acres in southern and western Wisconsin," Stark added. "It is now one of the most endangered plant communities in the world. By preserving what we can of it, we safeguard the beautiful native grasses and wildflowers that are naturally adapted to the area. We also provide better cover for erosion control than the species that are typically used."<sup>42</sup>

### **Planting a Few Seeds Pays Off for an Endangered Butterfly**

Wisconsin supports the largest and most widespread populations of Karner Blue butterflies in the world, and the species is endangered because its sole host plant—wild blue lupine—has become scarce. The Wisconsin Department of Transportation has joined 22 public and private organizations across the state to preserve existing lupine patches and encourage new lupine growth.

For example, in Jackson County the department seeded an I-94 rest area with lupine and other native prairie plants. Three years later (it takes lupine three years to mature and flower) the area was a solid wall of blue



Photos courtesy of the Vermont Agency of Transportation

flowers and Karner blue butterflies were everywhere. In addition to planting lupine seeds, the department has modified its mowing cycles along 500 miles of state highway rights-of-way where the endangered butterfly lives.<sup>43</sup>

### Vermont Highway Engineers Look After Baby Falcons

Most travelers don't even notice the 19 small wooden boxes attached to the back of signs along Interstate 89 between Bethel and Highgate. But to a hand-full of winged travelers, these boxes are home sweet home—and a place to raise a family for the summer. These seasonal visitors are American Kestrels (*Falco sparverius*), blue-jay-sized falcons arriving in Vermont in the spring from wintering grounds that are as far away as South America. Since 1995, the Vermont Agency of Transportation (VTrans) has been collaborating with the Vermont Institute for Natural Sciences (VINS) in building, installing, and maintaining nesting boxes for kestrels.

Kestrels are the smallest and most colorful raptors in North America. They are graceful, fast, and powerful fliers, known for their remarkable ability to hover.

Kestrels—who like to nest in small cavities—consider nesting boxes on the backs of interstate signs prime real estate. They provide high, predator-proof locations with clear views of their surrounding hunting territory along the clear grassy rights-of-way. VTrans engineers built the first 10 boxes for less than one hundred dollars in materials and one day of their volunteer time. Today, the Kestrel Program continues to be a collaborative effort within VTrans. In the summer, the eggs and the young are counted



The Vermont Agency of Transportation collaborates with the Vermont Institute for Natural Sciences in building, installing and maintaining nesting boxes for American Kestrels—who consider the boxes on the backs of interstate signs prime real estate.





Photo courtesy of U.S. Fish and Wildlife Service



A black bear underpass in Ocala Florida where bears have a known travel corridor from the Ocala National Forest in the north, to the Wekiva River drainage in the south. The crossing structure was working even before construction was complete, with five bears known to use it.

and banded. Hopefully, the banding efforts will shed some light on the mysterious migrating habits of these birds. Since 1995, 76 kestrel fledglings have hatched and four orphaned young were fostered in the VTrans boxes—a significant return on a minimal investment. While this is only a very small portion of what the department’s environmental section does, the Kestrel Program is quickly becoming a symbol of VTrans’ commitment to conducting business in an environmentally sensitive way.<sup>44</sup>

## Wildlife Crossings

### *Black Bears in Florida*

Black bears have few linkages connecting suitable habitat in Florida. In the central section of Florida, bears have a known travel corridor from the Ocala National Forest in the north, to the Wekiva River drainage in the south. This underpass suite beneath Highway 46 consists of a bottomless rectangular cast in place concrete culvert, chain link fence, animal crossing signs, and vegetation management. At least 12 species, including the design species, were recorded using the culvert. The crossing structure worked for bears even before construction was complete, with five bears known to use it. Up to 55 bears used it in the two years following installation. The structure is very well used in fall.<sup>45</sup>



Photo courtesy of U.S. Fish and Wildlife Service

### ***Mojave Desert Tortoise-Retrofitted Culverts and Barrier Fence***

Barrier fences were installed on Route 58 in California's Mojave Desert to test their effectiveness in reducing highway mortalities for the state and federally protected desert tortoise. These specially designed fences directed the tortoises towards storm-drain culverts that spanned the highway and functioned as wildlife crossing structures for a variety of animals.<sup>46</sup>

### ***Amphibian-Reptile Lipped Wall and Culverts***

Prairie State Preserve contains an incredible array of animals—particularly reptiles and amphibians—in the diverse wetland on either side of the four-lane US 441 south of Gainesville, Florida. A suite of structures including long-lipped concrete walls, concrete square box culverts, pre-cast concrete bottomless culverts, round concrete pipes, open median drains, and reverse mount guardrail barriers combine to reduce mortality and allow these animals to cross the highway.<sup>47</sup>

### ***Goat Underpasses in Glacier National Park, Montana***

At one time, mountain goats had to cross US 2 to get to a salt lick on the other side of the canyon. Now they can get there on rocky passageways underneath these bridges, shielded from view by tree cover and the steep hillside.<sup>48</sup>



Specially designed barrier fences in California direct Desert Tortoises to storm-drain culverts that span the highway, and function as wildlife crossing structures for a variety of animals.



Photo courtesy of U.S. Fish and Wildlife Service

Transportation planners in Florida use a GIS computer model to identify habitat corridors where wildlife/vehicle collisions are likely to occur. They can then adapt existing crossing structures, or build new ones like the highly-successful underpasses on I-75 designed for the Florida Panther.

### ***A Computer Model for Exploring Highway/ Wildlife Relationships***

Researchers in the University of Florida's Landscape Ecology Program have developed a Geographic Information System (GIS) computer model that captures, manipulates, displays, and combines spatial information such as hydrology, land use, species distribution, and existing roads and greenways.

The GIS model will help the Florida Department of Transportation integrate the need to improve transportation with the need to counteract habitat fragmentation by roads. Transportation planners can use it to identify habitat corridors where wildlife/vehicle collisions are likely to occur. They can then adapt existing crossing structures or build new ones like the highly successful underpasses on I-75—Alligator Alley—designed for the endangered Florida panther.<sup>49</sup>

The Federal Highway Administration has compiled a long list of simple steps transportation agencies are taking to help protect wildlife along America's roadways. The list on the following page provides some of the highlights.

## Keeping It Simple: Easy Ways to Help Wildlife Along Roads<sup>50</sup>



- ▶ Auguring guardrail posts to protect listed birds from percussive noise
- ▶ Adding ledges to box culverts for Eastern Phoebe nesting
- ▶ Adding shelves in front of and inside frequently-flooded box culverts for easier amphibian entry and crossing
- ▶ Avoiding in-stream construction during the breeding seasons of protected fish
- ▶ Bark mulch berm along narrow causeway to protect lake fish from highway runoff
- ▶ Bat “dome” in culvert
- ▶ Birdboxes and platforms (bluebirds, falcons, kestrels, wood ducks, raptors, ospreys)
- ▶ Burying the inside bottom of oversized culverts below the stream bottom to create a more natural stream bed within the culvert
- ▶ Constructing an elevated boardwalk over the habitat of the Perdido Beach Mouse
- ▶ Constructing concrete fish barriers to keep out unwanted fish
- ▶ Constructing innovative sediment basins to protect listed fish species
- ▶ Creating small-animal habitats out of brush piles
- ▶ Creating bat roosts by retrofitting box culverts with rough-textured concrete forms
- ▶ Cutting trees at the roots at a bridge site to help keep sediment out of the water and away from endangered fish
- ▶ Designing longer-span bridges for wildlife passage along a stream or riparian corridor
- ▶ Designing a channel in the bottom of a stream box culvert to provide low-water fish passage
- ▶ Donating steel posts to FWS for “let’s help save sea turtles” signs
- ▶ Fencing to prevent turtle and tortoise roadkill
- ▶ Fish ladder “lip” to protect trout from the parasitic sea lamprey
- ▶ Including contract provision “protect existing vegetation” when that vegetation is wildlife habitat and is not protected by laws or regulations
- ▶ Installing metal poles on a high bridge to keep marine birds from flying into traffic
- ▶ Installing removable filter devices in bridge deck drains
- ▶ Installing translucent “shrouds” over the entrances to wildlife underpasses in high snowfall-areas
- ▶ Limiting blasting to protect caves used by endangered bats
- ▶ Limiting canopy removal near streams to preserve foraging habitat for endangered bats
- ▶ Limiting tree removal along trout streams
- ▶ “Living snow fence”
- ▶ Leaving old trees in the right-of-way for woodpecker habitat
- ▶ Leaving dead palm fronds untrimmed to protect the habitat of baby yellow bats
- ▶ Leaving standing dead trees on wetlands for egrets, hawks, and other birds to use as perches
- ▶ Leaving in place part of a bridge-project work platform to create rocky habitat for a variety of mussel species
- ▶ Ledges for Eastern phoebes
- ▶ Limiting planting along a topsoil-covered stream bank to encourage growth of natural plant communities and to reduce disturbance to fish and wildlife
- ▶ “Lip” on one barrel of two-barrel culvert for low-flow fish passage

- Locating wetland mitigation sites next to Department of Natural Resources-managed lands
- Low-sodium lights along road to protect endangered birds that fly into bright light
- Low- sodium lights on bridge to protect migrating sea turtles
- Modifying mowing cycles to protect the roadside habitats of ground-nesting birds, the Karner Blue butterfly, and other animals
- “Mound and pool” topography in wetlands for more natural habitats
- Mound-planting bottomland oak seedlings to jump-start their growth and production of acorns
- Netting or Bird-X gel to prevent swallows from nesting on bridges during construction
- Not planting wildlife-friendly vegetation along rights-of-way or in the medians of high-speed roadways
- Not power-spraying bridges to protect birds and fish
- Placing large woody debris and boulders in lakes and streams to enhance fish habitat
- Planting mass-producing hardwood trees to benefit hogs, squirrels, and other animals
- Planting native grasses to bring Bob White quail back to open rural areas beyond the ROW
- Plugging bridge deck drains with removable spray foam
- Preserving a sandy-soil section of wetland for turtle habitat
- Protective platform barriers to catch falling debris from bridge construction
- Purchasing and retaining non-economic remnants for wetland or upland wildlife habitat
- Reconnecting hydrology on large wetlands by putting in more culverts
- Relocating freshwater mussels
- Relocating osprey nests to artificial nesting platforms
- Replacing lost forest cover along highways
- Replanting coastal mangroves to stabilize the shoreline and preserve the food chain in estuaries
- Rock spurs to help stabilize stream banks
- Rock vortex fish weirs
- Saving topsoil and forest duff during construction to use later in habitat restoration
- Scarifying causeway ROWs for shorebird nesting
- Shading lights on walkway under bridge to protect migrating salmon fry from predators
- Start-holes for red-cockaded woodpeckers
- “Startling” fish away from blasting using sonar fish-startle devices
- Stockpiling construction-site boulders and placing them in strategic spots on streams to create pools and riffle areas for fish
- Streambank cattle fencing
- Streambank fish-cover devices that allow fish to rest and hide
- Taller lights at intersections near the home of endangered bats
- Topping low bridge rails with fences barriers to keep purple martins from flying into traffic
- Training highway maintenance and work crews on how to protect desert tortoises and kit foxes
- Using catch basins when cleaning road equipment so diesel-based emulsions and solvents do not drip onto the ground and endanger wildlife
- Using explosives in stream projects only in dewatered coffer dams
- Using fabric-wrapped foam for ditch checks instead of hay bales (an attraction to grazing animals)
- Using visual barriers to protect bald eagles from the sight of construction work
- Willow staking on stream banks for shading and soil stabilization
- Wood-top rail—not barbed wire—on fences in migration area

# Transportation: Sound Solutions to Keep Down the Noise

## Did you know?

State transportation agencies are working to lessen noise impacts along America's highways with more than 2,630 linear miles of sound barriers constructed at a cost of over \$1.4 billion.

Transportation agencies across the country are working to lessen the impacts of highway noise—spending millions of dollars to help roadways fit more quietly into their surrounding communities while at the same time insulating and beautifying neighborhoods. Communities are benefiting from sound solutions along the nation's roadways—including buffer zones, construction of barriers, planting vegetation, installing noise insulation in buildings, and managing traffic.

Transportation officials are encouraging careful land-use planning—locating new roads away from noise-sensitive areas, such as schools or hospitals, and closer to businesses or industrial plants that can benefit from proximity to busy roadways. Land-use controls also are encouraged along existing highways, requiring reasonable distances between buildings and roads as well as soundproofing or other measures to lessen noise disturbances.

One of the most common and effective transportation solutions is construction of a sound barrier. These barriers reduce highway noise entering communities—improving the quality of life of nearby residents, while ensuring their mobility. In many cases, these barriers have been creatively designed to preserve or enhance the roadway setting, and often bring a focal point and sense of pride into the surrounding community. Some even serve as a palette for public display of local artwork.

Residents adjacent to barriers say that conversations in their households are easier, sleeping conditions are better, and the environment is more relaxing. Windows are opened more often, and yards are used more in the summer. Residents also perceive increased privacy, cleaner air, improved views, a rural sense, and healthier lawns and shrubs.<sup>51</sup>



Opposite – Transportation agencies spend millions of dollars constructing sound barriers to help highways fit quietly into their surrounding communities.

Above – Sound barriers have been creatively designed to preserve or enhance the roadway setting, and often bring a focal point and sense of pride into the surrounding community. Some even serve as a palette for public display of local artwork.

## Facts About Sound Barriers

- ▶ State transportation agencies are required to determine if there will be traffic noise impacts from a federally funded highway constructed on a new location or where reconstruction of an existing highway significantly changes the alignment or increases traffic lanes. Noise barriers may be required if the state transportation department identifies potential impacts.
- ▶ Noise barriers are not required along existing highways where no other highway improvements are planned: these barriers are at the discretion of the state transportation agency.<sup>52</sup> Twenty-two states have constructed at least one barrier along an existing highway at a total cost of more than \$580 million.<sup>53</sup>
- ▶ Effective noise barriers can reduce noise levels by 10 to 15 decibels, cutting the loudness of traffic noise in half.
- ▶ Barriers can be formed from earth mounds along the road (usually called earth berms) or from high, vertical walls. Earth berms have a natural appearance and are usually attractive. Noise walls can be built of wood, stucco, concrete, masonry, metal, and other materials.
- ▶ Many noise barriers often are visually pleasing and blend in with their surroundings.
- ▶ Most barriers have been made from concrete or masonry block, range from 3–5 meters in height, and average \$175–\$200 per square meter in cost.

Source: Federal Highway Administration

## Examples of Exemplary Noise Controls

### *Lafayette Bypass, Colorado*

Colorado's Lafayette Bypass was a winner of the 1999 Federal Highway Administration Environmental Excellence Award for noise abatement. Noise mitigation was considered early in the planning process of a designated new alignment along US 287, the Lafayette Bypass. Through proactive public involvement and early coordination, Colorado Department of Transportation was able to incorporate features such as effective wall heights and an aesthetic design that preserved the community character while mitigating noise levels. Colorado Department of Transportation engineers and contractors satisfied the local community with a noise-abatement feature whose concept and design reflects the city of Lafayette and the surrounding residential community.<sup>54</sup>

***Santa Ana, California***

Caltrans installed its first plastic sound wall made from recycled plastic materials on I-5 at the Grand Avenue off-ramp in Santa Ana.<sup>55</sup>

***Cumberland County, Pennsylvania***

In a successful example of integrating noise abatement features into a project while enhancing the natural environment, designers were able to incorporate the best features of noise control while retaining architectural enhancements that help promote a sense of community. Engineers interacted with the community and incorporated public concerns and comments into the project.<sup>56</sup>



State transportation agencies have worked to make sure that many noise barriers are visually pleasing, and that they blend in with their surroundings.





Photo courtesy of the National Scenic Byways Program, [www.byways.org](http://www.byways.org). © 2001, New Mexico Department of Tourism

# Transportation: Taking the Scenic Route to America's Treasures

## Did you know?

“America’s Scenic Byways are roads to the heart and soul of America. Byways help create a sense of pride in America. They connect us to this country’s beauty, history, and culture.”

— *Norman Mineta,*  
*U.S. Secretary of Transportation*

Ninety-five nationally designated Scenic Byways are linking Americans to the nation’s natural and cultural treasures and promoting tourism and education across the country.

Across America, highways provide links to the nation’s natural and cultural treasures—and none are more impressive than those designated as America’s Scenic Byways—a collection of distinctive routes that tell the story of America.

Comprised of 95 roads in 39 states, these byways connect visitors to the heart and soul of the country. Some byways feature America’s natural grandeur and scenic beauty, such as the Route 1 Big Sur Pacific Coast Highway, or the Seward Highway through Alaska’s Kenai Peninsula. Others feature treasured places and human achievements, such as the Selma to Montgomery March Byway, the Natchez Trace, Historic Route 66, and the Coal Heritage Trail. Each byway offers a piece of the American experience, both past and present.<sup>57</sup>

Connecting the American people to their environment and cultural heritage, roads like the Blue Ridge Parkway, Bear Tooth Highway, and El Camino Real, offer opportunities for all citizens to experience the beauty, the resources, and the history of the United States,—and to gain a greater appreciation of the need to preserve and protect these often fragile and scarce resources.

These roads—and other exemplary breathtaking roadways across the United States—demonstrate environmentally-sensitive design while providing access to areas of great scenic beauty and educate the public on the importance of environmental protection and enhancement.

America’s Scenic Byways are selected based on their outstanding archaeological, cultural, historic, natural, recreational, and scenic value. Since 1996, the U.S. Secretary of Transportation has designated 20 All-American Roads and 75 National Scenic Byways in 39 states.

Opposite – The Red Canyon Tunnel along Utah’s highway 12-A is literally a scenic journey through time.

Above – Although much of the original Route 66 has been replaced by a new Interstate, careful travelers can still journey on portions of the highway that inspired the words, “Get your kicks on Route 66.”

There are two levels of designation:

- ▶ **All-American Roads**, which have one-of-a-kind features so exceptional that they qualify as a destination “unto themselves.”
- ▶ **National Scenic Byways**, which have one or more intrinsically valuable qualities and are more regionally significant.

To be designated as a National Scenic Byway, a road must possess at least one of the following six intrinsic qualities that are considered representative, unique, irreplaceable, or distinctly characteristic of an area.

- ▶ **Archaeological quality** involves those characteristics of the scenic byway corridor that are physical evidence of historic or prehistoric life that are visible and capable of being inventoried and interpreted.
- ▶ **Cultural quality** is evidence and expressions of the customs or traditions of a distinct group of people. Cultural features include—but are not limited to—crafts, music, dance, rituals, festivals, speech, food, special events, and vernacular architecture, that are currently practiced.
- ▶ **Historic quality** encompasses legacies of the past that are distinctly associated with physical elements of the landscape, whether natural or man-made, that are of such historic significance that they educate the viewer and stir an appreciation of the past.
- ▶ **Natural quality** applies to those features in the visual environment that are in a relatively undisturbed state. These features predate the arrival of human populations, and may include geological formations, fossils, landforms, water bodies, vegetation, and wildlife.
- ▶ **Recreational quality** involves outdoor recreational activities directly associated with—and dependent upon—the natural and cultural elements of the corridor’s landscape.
- ▶ **Scenic quality** is the heightened visual experience derived from the view of natural and manmade elements of the visual environment.

### Byways by Numbers

- ▶ **The longest byway:** The 1,707-mile Great River Road, along the Mississippi River through Illinois, Iowa, Wisconsin, and Minnesota
- ▶ **The shortest byway:** The 4.5-mile Las Vegas Strip in Nevada
- ▶ **The southernmost byway:** Tamiami Trail National Scenic Byway in Florida
- ▶ **The northernmost byway:** Seward Highway All-American Road in Alaska
- ▶ **The highest elevation:** Trail Ridge Road in Colorado
- ▶ **The lowest elevation:** Death Valley Scenic Byway in California



Photos courtesy of the National Scenic Byways Program, [www.byways.org](http://www.byways.org)

Above, clockwise from left - The Great River Road provides thousands of miles of scenic, historic, and recreational opportunities highlighting the glory of the Mississippi River. The Helena River Reach Park, which includes a boardwalk extending from the levee, provides a close-up view of the Mighty Mississippi along The Great River Road in Arkansas. One of the actions in the Corridor Management Plan is to develop an education brochure about the many types of agriculture found along the route in Indiana. An aerial shot of downtown Minneapolis showcases the Stone Arch Bridge.

## A Few Impressive Examples of America's Scenic Byways

### *The Great River Road*

The Great River Road is a 3,000-mile network of federal, state, and local roads on both sides of the Mississippi River, from Canada to the Gulf of Mexico. The route has National Scenic Byway designation in Minnesota, Wisconsin, Iowa, Arkansas, and Illinois, providing thousands of miles of scenic, historic, and recreational opportunities highlighting the glory of the Mississippi River.

### *Route 1, Big Sur Coast Highway*

From Carmel, California, south to the San Luis Obispo County line, The Route 1, Big Sur Coast Highway follows some of the most spectacular and highly scenic shoreline found along California's coast. Views include rugged canyons and steep sea cliffs, granite shorelines, sea lions and other marine life, windswept cypress trees, and majestic redwood forests. The byway also provides travelers with a lesson in California's rich Mission Era and natural history. The primary goal of the byway is to preserve California's delicate and pristine coastal ecosystem for its natives, visitors, and future generations, while still providing opportunities to experience its wonder.



Photo courtesy of the National Scenic Byways Program, [www.byways.org](http://www.byways.org)

Views from the Route 1, Big Sur Coast Highway in California include rugged canyons and steep sea cliffs, granite shorelines, sea lions, and other marine life, windswept cypress trees, and majestic redwood forests.

### ***Historic Route 66***

Route 66's history is the story of an emerging nation. It is a tale of economic opportunity and the hardship of the dust bowl, of World War II, and the family vacation. Route 66 was designated in 1926 as a federal highway linking Chicago, Illinois, to Los Angeles, California. After almost 60 years as America's favorite route to the west coast, Route 66 was decommissioned in favor of the new interstate highways. Arizona's historic Route 66 travels through some of the most picturesque regions in the Southwest—with petrified forests, painted deserts, meteor craters, and the longest unbroken stretch of original Route 66. There are Homolovi Indian ruins to explore as well as the Grand Canyon Caverns. Byway travelers also enjoy driving from the desert regions of Arizona into the green forests surrounding Flagstaff. Natural beauty is not all you'll see on this byway. The region also is rich in cultural history, harkening back to the era when Americans took to the open road to see the United States. Although much of the original byway has been replaced by the new Interstate, careful travelers can still journey on portions of the highway that inspired the words, "Get your kicks on Route 66."

### ***Beartooth Highway***

Beartooth Highway in Montana and Wyoming is one of the most spectacular National Forest routes on this continent. To many, it is known as the most beautiful highway in America. From its beginning at the border of the Custer National Forest, to its terminus near the northeast entrance to Yellowstone National Park, the Beartooth Highway (US 212) offers travelers the ultimate high country experience as it travels through the Custer, Shoshone, and Gallatin National Forests.

Since its completion in 1936, the highway has provided millions of visitors a rare opportunity to see the transition from a lush forest ecosystem to alpine tundra in the space of a few miles. The Beartooths are one of the highest elevation and most rugged areas in the lower 48 states, with 20 peaks over 12,000 feet in elevation. Glaciers are found on the north flank of nearly every mountain peak over 11,500 feet in these mountains. The first recorded travel across the Beartooth Pass area occurred in 1882, when General Sheridan pioneered and marked a route across the mountains from Cooke City to Billings.

### America's Byways Fun Facts

- ▶ There are over 25,000 miles of America's Byways, which is equivalent to driving from Los Angeles to New York almost nine times.
- ▶ On the Historic National Road, which runs from Maryland to Illinois, condiment cravers will be awestruck when they see the world's largest bottle of catsup. It stands 170 feet tall and has its own fan club ([www.catsupbottle.com](http://www.catsupbottle.com)).
- ▶ Along the Ohio River Scenic Byway, travelers can visit the self-proclaimed home of Superman in the town of Metropolis, which features a seven-foot tall fiberglass statue of the superhero.
- ▶ The Washington Heritage Trail in West Virginia proudly displays George Washington's bathtub—the only monument to presidential bathing.
- ▶ The Great River Road, which runs from Minnesota to Arkansas, features a statue of Robert Wadlow, the world's tallest man. Standing at 8'11", he is called the Alton Giant.
- ▶ The Dinosaur Diamond Prehistoric Highway in Utah and Colorado is not only popular with Jurassic Park fans, but chicken lovers as well. The Mike-the-Headless-Chicken Days Festival along the byway celebrates the life of an ill-fated chicken that had its head lopped off, but still lived for several more years. [www.miketheheadlesschicken.org](http://www.miketheheadlesschicken.org)
- ▶ Travelers can retrace the life of the famed outlaw along the Billy the Kid National Scenic Byway in New Mexico.
- ▶ McKenzie Pass – Santiam Pass National Scenic Byway in Oregon contains an underwater forest. More than 3,000 years ago, a volcanic eruption created a clear lake, which swallowed trees that are still rooted to the ground today. Visitors can go for a boat ride and paddle directly over the submerged trees.

## National Scenic Byways and All-Americans Roads

### All-American Roads

- ▶ Selma to Montgomery March Byway (Alabama)
- ▶ Natchez Trace Parkway (Alabama, Mississippi, and Tennessee)
- ▶ The Seward Highway (Alaska)
- ▶ Route One, Big Sur Coast Highway (California)
- ▶ San Juan Skyway (Colorado)
- ▶ Trail Ridge Road/Beaver Meadow Road (Colorado)
- ▶ Historic National Road (Illinois, Indiana, Maryland, Ohio, Pennsylvania, and West Virginia)
- ▶ Creole Nature Trail (Louisiana)
- ▶ Acadia Byway (Maine)
- ▶ North Shore Scenic Drive (Minnesota)
- ▶ Las Vegas Strip (Nevada)
- ▶ Lakes to Locks Passage, The Great Northeast Journey (New York)
- ▶ Blue Ridge Parkway (North Carolina)
- ▶ Hells Canyon Scenic Byway (Oregon)
- ▶ Historic Columbia River Highway (Oregon)
- ▶ Pacific Coast Scenic Byway (Oregon)
- ▶ Volcanic Legacy Scenic Byway (California and Oregon)
- ▶ Utah's Scenic Byway 12—A Journey Through Time (Utah)
- ▶ Chinook Scenic Byway (Washington)
- ▶ Beartooth Scenic Byway (Montana and Wyoming)

### National Scenic Byways

- ▶ Talladega Scenic Drive (Alabama)
- ▶ Alaska's Marine Highway (Alaska)
- ▶ Glenn Highway (Alaska)
- ▶ Kaibab Plateau—North Rim Parkway (Arizona)
- ▶ Crowley's Ridge Parkway (Arkansas and Missouri)
- ▶ Great River Road (Arkansas, Illinois, Iowa, Minnesota, and Wisconsin)
- ▶ Arroyo Seco Parkway Scenic Byway (California)

- ▶ Death Valley Scenic Byway (California)
- ▶ Tioga Road/Big Oak Flat Road (California)
- ▶ Dinosaur Diamond Prehistoric Highway (Colorado and Utah)
- ▶ Frontier Pathways Scenic and Historic Byway (Colorado)
- ▶ Gold Belt Tour Scenic and Historic Byway (Colorado)
- ▶ Grand Mesa Scenic and Historic Byway (Colorado)
- ▶ Santa Fe Trail Scenic and Historic Byway (Colorado and New Mexico)
- ▶ Top of the Rockies (Colorado)
- ▶ Connecticut State Route 169 (Connecticut)
- ▶ Merritt Parkway (Connecticut)
- ▶ A1A Scenic and Historic Coastal Highway (Florida)
- ▶ Indian River Lagoon Scenic Highway (Florida)
- ▶ Tamiami Trail Scenic Highway (Florida)
- ▶ Russell-Brasstown Scenic Byway (Georgia)
- ▶ Northwest Passage Scenic Byway (Idaho)
- ▶ Payette River Scenic Byway (Idaho)
- ▶ Pend Oreille Scenic Byway (Idaho)
- ▶ Country Music Highway (Kentucky)
- ▶ Wilderness Road Heritage Highway (Kentucky)
- ▶ Red River Gorge Scenic Byway (Kentucky)
- ▶ Lincoln Highway (Illinois)
- ▶ Meeting of the Great Rivers Scenic Route (Illinois)
- ▶ Ohio River Scenic Route (Illinois, Indiana, and Ohio)
- ▶ Loess Hills Scenic Byway (Iowa)
- ▶ Old Canada Road Scenic Byway (Maine)
- ▶ Rangeley Lakes Scenic Byway (Maine)
- ▶ Schoodic Scenic Byway (Maine)
- ▶ Chesapeake Country Scenic Byway (Maryland)
- ▶ Woodward Avenue (Michigan)

Top to bottom –  
Scenes from Historic  
Route 66; the Great  
River Road in Iowa; and  
the Death Valley Scenic  
Byway in California.



Photos courtesy of the National Scenic Byways Program,  
[www.byways.org](http://www.byways.org)

- Edge of the Wilderness (Minnesota)
- Historic Bluff Country Scenic Byway (Minnesota)
- Minnesota River Valley Scenic Byway (Minnesota)
- The Grand Rounds Scenic Byway (Minnesota)
- Little Dixie Highway of the Great River Road (Missouri)
- Lake Tahoe—Eastshore Drive (Nevada)
- Pyramid Lake Scenic Byway (Nevada)
- Kancamagus Scenic Byway (New Hampshire)
- White Mountain Trail (New Hampshire)
- Billy the Kid Trail (New Mexico)
- El Camino Real (New Mexico)
- Jemez Mountain Trail (New Mexico)
- Historic Route 66 (New Mexico)
- Turquoise Trail (New Mexico)
- Seaway Trail (New York)
- Sheyenne River Valley Scenic Byway (North Dakota)
- Cherochala Skyway (North Carolina and Tennessee)
- Amish Country (Ohio)
- CanalWay Ohio Scenic Byway (Ohio)
- Cascade Lakes Scenic Byway (Oregon)
- McKenzie Pass-Santiam Pass Scenic Byway (Oregon)
- Outback Scenic Byway (Oregon)
- Rogue—Umpqua Scenic Byway (Oregon)
- West Cascades Scenic Byway (Oregon)
- Ashley River Road (South Carolina)
- Cherokee Foothills Scenic Highway (South Carolina)
- Savannah River Scenic Byway (South Carolina)
- The Native American Scenic Byway (South Dakota)
- Peter Norbeck Scenic Byway (South Dakota)





The majestic Seward Highway in Alaska.

Photo courtesy of the National Scenic Byways Program, [www.byways.org](http://www.byways.org)  
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- ▶ The Energy Loop: Huntington and Eccles Canyons Scenic Byways (Utah)
- ▶ Flaming Gorge—Uintas Scenic Byway (Utah)
- ▶ Logan Canyon Scenic Byway (Utah)
- ▶ Nebo Loop Scenic Byway (Utah)
- ▶ Mountains to Sound Greenway—I-90 (Washington)
- ▶ Strait of Juan de Fuca Highway—SR 112 (Washington)
- ▶ The Coal Heritage Trail (West Virginia)
- ▶ Highland Scenic Highway (West Virginia)
- ▶ Midland Trail (West Virginia)
- ▶ Washington Heritage Trail (West Virginia)



Opposite and above – State transportation agencies across the country are stewards of the nation’s front yard. Here, workers assure that new plantings of native grasses and wildflowers along a sound barrier get a good start.

# Transportation: Cultivating Wildflowers and Native Vegetation on America’s Roadsides

## Did you know?

Transportation agencies are helping to nurture and restore America’s roadsides, working to cultivate natural wildflowers, control noxious invasive weeds, prevent erosion, and provide wildlife habitat on over 10 million acres of roadside rights-of-way.

Our nation’s highways provide access to the wonders of nature, and offer opportunities for travelers to enjoy natural beauty within their rights-of-way. As stewards of America’s roadsides—the nation’s front yard—transportation experts are providing significant resources to maintain some 10 million acres of land, creating and maintaining attractive landscaping and scenic vistas while protecting and restoring the natural environment.

Caring for the nation’s roadside rights-of-way requires a balanced approach that:

- ▶ assures water quality;
- ▶ improves erosion control;
- ▶ increases wildlife habitat,
- ▶ reduces mowing and spraying;
- ▶ enhances natural beauty;
- ▶ controls noxious weeds; and
- ▶ protects natural heritage.

Transportation agencies across the country are achieving these goals as they work to implement vegetation management programs. The results: beautiful wildflowers along many roadways, preservation of natural plant



species that cut down on the use of chemicals and irrigation, control of harmful invasive species, and nurturing of native plants and animals.<sup>58</sup>

### What's Growing on America's Roadsides?

Under the program provisions of Operation Wildflower and the Surface Transportation and Uniform Relocation Assistance Act of 1987 (STURAA), native wildflowers are being planted in America's rights-of-way to add natural character to the highway environment. These programs are the framework of all state department of transportation wildflower programs.

The law requires that native wildflower seeds or seedlings be planted as part of landscaping projects undertaken on the federal-aid highway system. At least one-quarter of one percent of the funds spent on a landscaping project must be used to plant native wildflowers and grasses on that project.

Wildflowers also are being grown and protected on highway roadsides under other program initiatives instituted by states. The reduced mowing policies of Michigan, Wisconsin, and Minnesota allow the natural establishment of wildflowers and protection of natural remnants. Native wildflowers and grasses are being included in plantings undertaken as part of erosion control and vegetation management methods. They are also being planted under states' continuing efforts like Adopt-a-Highway, Roadsides-for-Wildlife, and Transportation Enhancement projects.<sup>59</sup>

Above – A close-up of a surprising Missouri native—a Prickly Pear Cactus on Highway 54.

The Surface Transportation and Uniform Relocation Assistance Act of 1987 requires that native wildflower seeds or seedlings be planted as part of landscaping projects undertaken on the federal-aid highway system.

## History of Vegetation Management

**1965:** The Highway Beautification Act—under Ladybird Johnson's influence—encouraged the removal of billboards, screening of junkyards, and landscaping of roadsides.

**1969:** The National Environmental Policy Act (NEPA) established the notion of avoidance and minimization of disturbance. This law encouraged environmentally sensitive solutions.

**1987:** The Surface Transportation and Uniform Relocation Assistance Act (STURAA) is the act that includes the requirement to plant native wildflowers with of one percent of a highway project's landscape budget when federal funds are used. By 1987, some states were already planting more than that minimum. By 1994, only 38 states had program level support for native wildflowers.

**1991:** The Intermodal Surface Transportation Efficiency Act (ISTEA) provided funding for enhancements. One of the ten categories of enhancements was landscaping. All ISTEA projects were subject to the STURAA requirement of native wildflower use.

**1994:** The Executive Memorandum on environmentally and economically beneficial landscaping was signed by President Clinton. The memo recommended the use of regional native plants, less fertilizers, less pesticides, less irrigation on federal grounds, lands, and federally funded landscape projects ...as in highway construction projects.

**1999:** An Executive Order on invasive plants was signed by President Clinton. It ordered increased communication and cooperation of all agencies through a National Invasive Species Council. All agencies focused on prevention and control of invasive plant species, and followed up with restoration of native plants as directed.<sup>60</sup>

### California Wildflowers in Landscape Design: Nurturing Nature

The California Department of Transportation's wildflower program has evolved into a holistic approach to native vegetation in the state. Dubbed California Wildflowers in Landscape Design (CaliforniaWILD), the program recognizes the complex interaction of all plant forms that occur together in nature and the stages of natural landscapes that change over time. Caltrans has found that protection, preservation, and enhancement of naturally occurring and self-sustaining native roadside vegetation is cost effective, environmentally sound, functional, and aesthetically pleasing.<sup>61</sup>



Photo courtesy of Caltrans

A significant aspect is the Botanical Management Area program, which identifies, studies, and manages state highway right-of-way locations that are environmentally significant, natural remnants of California's botanical diversity. Sites are chosen for their biological integrity, species diversity, need for resource protection, and suitability for scientific evaluation, among other criteria. To date, management plans have been developed for 20 sites statewide.

Through its comprehensive vegetation management program, Caltrans is helping to grow community pride with low-maintenance, cost-efficient, drought-tolerant, environmentally beneficial landscapes. Wildlife habitat is improved and California's diminishing natural resources are preserved and protected.

### *Reaping the Benefits*

The many benefits of nurturing vegetation in California are easily overlooked, but are important nonetheless:

- ▶ Worker and traveler safety is improved because established native plants require less maintenance than non-native species. Roadside vegetation maintenance is subsequently reduced.

Above – A controlled burn to battle invasive plant species is conducted by the California Department of Fire and Forestry Protection, in cooperation with Caltrans, at the Bear Creek Botanical Management Area, on Route 20 in Colusa County.

- ▶ Roadside fire hazards are lowered since some California native plants—particularly many low-growing, cool-season native grasses—produce less fire fuel than comparable non-native species that were introduced to the state primarily as cattle forage.
- ▶ The use of herbicides can be reduced when native plants are established successfully. Native plant communities are composites of complementary vegetation types that grow together in natural order and resist weed infestation.
- ▶ Many native drought-tolerant plants provide effective erosion control—some grow deep, sturdy roots to tap water resources deep underground and thereby help anchor soil. California native plants thrive on seasonal rainfall and available ground water. They have evolved to succeed in their natural environment and do not require supplemental irrigation that is both costly and a drain on California’s limited water resources.
- ▶ The use of native vegetation in highway landscape plantings, erosion control, storm water runoff control, and other projects enhances scenic values as well. Native plantings look natural in the context of California’s diverse roadside environs.

In addition, the California program educates local travelers and tourists using signs to identify areas where the state’s native vegetation can be viewed.

### **South Carolina’s Wildflower Program**

Traveling along South Carolina’s interstates and major highways has been a colorful experience for the past 10 years, thanks to the wildflower planting efforts of the SCDOT maintenance forces. This program is a major component of the Department’s Integrated Roadside Vegetation Program.

The Wildflower Program not only brings color to the state’s interstates and primary highways, it also assists in roadside maintenance and promotes the natural establishment of wildflowers. Generally, planting takes place twice a year—in the fall for spring/summer color and in the late spring/early summer for summer/fall color. Wildflowers planted include annuals, perennials, and natives. In addition to the cultivated wildflower beds, the Maintenance Division emphasizes the management of naturally occurring wildflowers. By teaming up with Clemson University, the SCDOT has been able to incorporate research and educational opportunities into the program as well.<sup>62</sup>

### **Prairie Passage: A National Wildflower Route**

In 1993, the Federal Highway Administration responded to a proposal for a national prairie landscape effort by supporting the departments of transportation in Minnesota, Iowa, Missouri, Kansas, Oklahoma, and Texas to identify and plan a national wildflower route through these states. The DOT’s selected the name Prairie Passage, and various highways and



Interstates have been proposed as Prairie Passage routes. Through multi-agency and local community cooperation, the DOTs are seeking to integrate the natural, historical, and cultural rediscovery of prairie and wildflowers through education, protection, planting of wildflowers and grasses, and economic development. Prairie heritage sites and routes will be signed with uniform signage/logo. Maps, guidebooks, and interpretive materials are being produced to weave together the ecological, cultural, and historical stories of our North American prairie.<sup>63</sup>

Prairie Coneflower (*Ratibida pinnata*), is featured on the proposed logo and signage art. This species is common to the tallgrass prairies across North America. Prairie Coneflower is also a species that is easy to restore in gardens, natural areas, and along roadsides.

### **Missouri DOT's Adopt-a-Highway Program**

As part of its Adopt-A-Highway program, Missouri Department of Transportation encourages citizens to landscape and beautify highway roadsides, and suggests planting shrubs, trees, and flowers to complement the roadsides' neighboring land.<sup>64</sup>

The Prairie Coneflower (*Ratibida pinnata*), is featured on the proposed logo and signage art along proposed Prairie Passage routes.

The Minnesota, Iowa, Missouri, Kansas, Oklahoma, and Texas DOTs are seeking to integrate the natural, historical, and cultural rediscovery of prairie and wildflowers through education, protection, planting of wildflowers and grasses, and economic development, by establishing this national wildflower route.



Above – Wildflowers are part of the landscape at this rest area along Highway 30 in Blair, Nebraska.

Below – Travelers along Route 301 are greeted by Blackeyed Susans when stopping by the Bay Area Welcome Center on Maryland's eastern shore.



# Endnotes

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18. *Pattern and Palette of Place: A Landscape and Aesthetics Master Plan for the Nevada State Highway System*, July 3, 2002, [http://www.nwww.nevadadot.com/pub\\_involvement/landscape/unlv/MasterPlan-July3.pdf](http://www.nwww.nevadadot.com/pub_involvement/landscape/unlv/MasterPlan-July3.pdf)

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