



FHWA'S "GREEN" INITIATIVES

by M. Myint Lwin

SUSTAINABILITY IS...

In the Winter 2008 Edition of *ASPIRE*,™ we read many exciting articles about projects and the application of sustainability concepts in the planning, design, construction, operation, and preservation of highway bridges. The FHWA realizes the importance of developing and implementing sustainable solutions through working together at the federal, state, and local levels. Communities, industry, academia, and many others are in the chain of sustainable solutions for a sustainable future.

In this issue of *ASPIRE*, we continue to read about sustainability and learn about ideas and practices in applying the concepts of "Green Highways/Bridges" to enhance the natural and built environment.



Protecting and Preserving the Environment

In 2006, the FHWA published an environmental guide titled *"Eco-Logical: An Ecosystem Approach to Developing Infrastructure*

Projects" to help improve the understanding of how infrastructure impacts habitat and ecosystems. This multi-agency initiative describes a vision for integrating infrastructure development and ecosystem conservation processes with economic, environmental, and social needs and objectives. An ecosystem approach is a method for sustaining or restoring ecological systems and their functions and values. It is goal driven and is based on a collaboratively developed vision of desired future conditions that integrate ecological, economic, and social factors.

The FHWA is committed to protecting and preserving the environment through stewardship and timely reviews. In recent years, the FHWA and its partners have made substantial contributions to the environment and to the communities, through planning and programs that support wetland banking, habitat restoration, historic preservation, air quality improvements, bicycle and pedestrian facilities, context-sensitive solutions, wildlife crossings, public and tribal government involvement, and others.

The FHWA is working closely with partners to take proactive measures in moving from simply mitigating environmental impacts to actively contributing to environmental enhancements.

Technology Deployment Programs

The FHWA's technology deployment programs promote initiatives with social, economical, and ecological benefits, including:

- Use of high performance materials in pavement and bridge construction to increase durability, minimize maintenance, and reduce cost;
- Use of prefabricated systems in pavement and bridge construction to accelerate construction, improve work-zone safety, and reduce disruption to the public. Fabrication of the systems is done in controlled environments on or off the jobsite, resulting in improved quality and less impact on the environment;
- Use of self-propelled modular transporters (SPMT) in accelerated bridge construction for removal and replacement of heavy bridge components in record time; and
- Use of span-by-span, balanced cantilever, and incremental launching techniques in bridge construction to protect the environment by minimizing the needs for construction equipment or work on the ground or wetlands below the bridges.



Recycled Materials in Highway Construction

The FHWA promotes and supports the use of recycled materials in highway construction. Through the Recycled Materials Resource Center at the University of New Hampshire, the FHWA is making changes in the extent of use of several industrial by-product materials in highway construction. The FHWA also has an active Recycling Team that works with the states, the Environmental Protection Agency, and industry to implement recycling technology.

SAFETEA-LU directs the reuse of debris from bridge demolitions in shore erosion control or stabilization, ecosystem restoration, and marine habitat creation.

FHWA Exemplary Ecosystem Initiatives

In 2002, the FHWA identified ecosystem conservation as one of three performance objectives under the Agency's "Vital Few" goal of Environmental Streamlining and Stewardship. To demonstrate its commitment to this goal, the FHWA agreed to identify a minimum of 30 exemplary ecosystem initiatives in at least 20 states or Federal Lands Highway Divisions by September 2007.

FHWA developed the following specific criteria for selecting the exemplary ecosystem initiatives:

1. An exemplary ecosystem initiative helps sustain or restore natural systems and their functions and values.
2. An exemplary ecosystem initiative is developed within a landscape context.
3. An exemplary ecosystem initiative uses partnering and collaborative approaches to advance common goals.
4. An exemplary ecosystem initiative uses the best available science in ecosystem and habitat conservation.

5. An exemplary ecosystem initiative provides clear examples of innovative environmental solutions by transportation agencies and achieves high standards in the environmental process.

6. An exemplary ecosystem initiative achieves high-quality results.

7. An exemplary ecosystem initiative is recognized by environmental interests as being particularly valuable or noteworthy.

As of 2006, the FHWA had identified more than 40 exemplary ecosystem initiatives in over 30 states. More exemplary ecosystem initiatives are expected to be designated in 2007 and beyond. Examples of these initiatives are described below. See Concrete Connections on page 52 for the website with the locations and details of these initiatives.

California—South Bay Expressway Mitigation Program

The South Bay Expressway, State Route 125 South in San Diego County, is a 10.8-mile-long alignment that crosses through sensitive habitat for threatened and endangered species, known historic and cultural sites, community park areas, and established residential communities. The \$20-million mitigation program includes everything from restoring habitat, mitigating noise and air pollution, protecting water quality, and recovering cultural resource data.

Illinois—Route 29 Improvements to Protect Ecosystems

This is a 35-mile-long corridor that runs from State Route 6 near Mossville in Peoria County to I-180 in Bureau County. The highway lies between bluffs and blufftop farmlands to the west and the Illinois River to the east. Two-lane Route 29 is being studied for expansion to four lanes. The Illinois Department of Transportation (IDOT) partnered with the Illinois Department



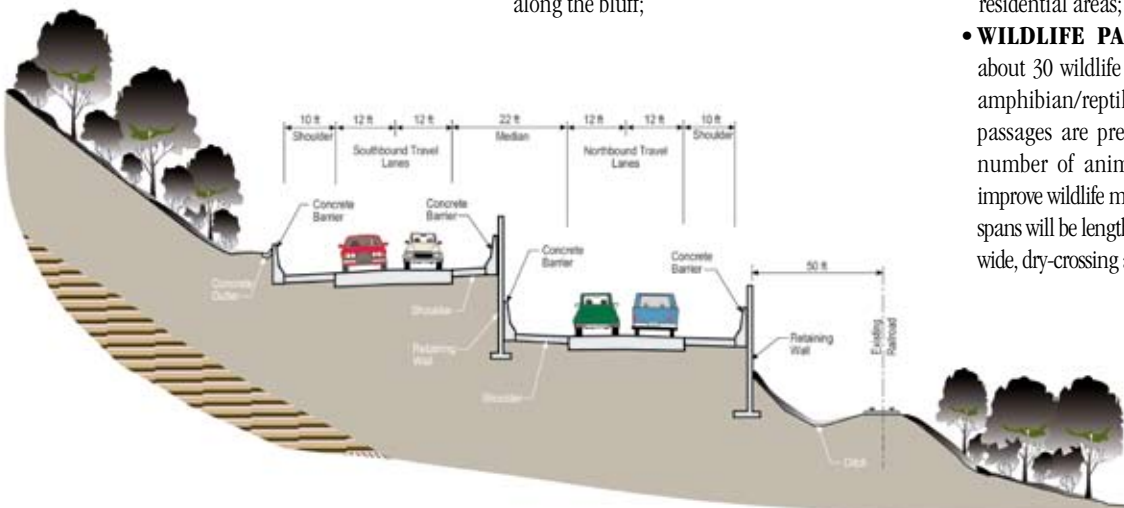
Il 29 – Oak and hickory woodland on right. Floodplain forest wetland on left. Photo: IDOT.

of National Resources (IDNR), U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Department of the Interior, and the FHWA to develop minimization and mitigation strategies, such as:

- **SPLIT PROFILE ROADWAY.** Three miles of Route 29 have been designed as a “split profile” roadway, meaning that the southbound lanes will be 3 to 17 ft higher than the northbound lanes, avoiding impacts to upland forests and natural areas along the bluff;

- **SPLIT INTERCHANGE DESIGN.** IDOT uses a “split interchange” design for a new Route 27-Route 29 interchange within the village of Sparland. A “split interchange” design divides an interchange in half. Half of the interchange will be located at the southern end of Sparland, and the other half at the northern end. Separating the ramps by nearly a mile is expected to reduce impacts to Sparland, nearby wetlands, an IDNR property, flood-buyout properties, and residential areas; and

- **WILDLIFE PASSAGES.** IDOT proposes about 30 wildlife passages for mammal and amphibian/reptiles roadkill hot spots. The passages are predicted to reduce the high number of animal-vehicle collisions and improve wildlife movement. Additionally, bridge spans will be lengthened to provide a sufficiently wide, dry-crossing area for large animals.



Rendering depicts a “split Profile” roadway. Rendering: CH2M Hill.



The New Hampshire Department of Transportation created a 320-acre Pine Road Wetlands Mitigation Site. Photos: Normandeau Associates Inc.

New Hampshire—Route 101 Ecological Protection and Enhancement Feature

This initiative showcases a multi-faceted mitigation plan to improve 17.6 miles of Route 101 from Epping to Hampton. The governor of New Hampshire appointed a Task Force to address the concerns of local residents on the potential impact on their homes, businesses, and historic properties, and the desire of the environmentalists to avoid impacts on local wetlands and other wildlife habitat. The Task Force guided the project development to a mitigation strategy that focused on a broad “landscape approach” to fit the local ecosystem and resource management needs. Some of the ecosystem solutions are:

- **OUTDOOR LABORATORY.** The New Hampshire Department of Transportation created a 320-acre Pine Road Wetlands Mitigation Site. Students from high schools and colleges use this wetland site to study water quality and other wetland functions;
- **REPLACING CULVERTS WITH BRIDGES.** Existing culverts on the Piscassic River were replaced by a twin-span bridge to provide improved hydraulic performance and a better corridor for wildlife movements across the highway; and
- **LENGTHENING A BRIDGE.** A bridge over the Squamscott River was lengthened by 560 ft to restore 4 acres of salt marsh.

Washington—I-90 Snoqualmie Pass East Project

Interstate 90 is the main east-west route across the Cascades into Seattle. The Snoqualmie Pass—a 15-mile-long section of the highway—is infamous for its avalanche hazards, its dangerous curves, its deteriorating pavement, and increasing traffic. The project crosses a critical north-south corridor for elk, lynx, gray wolf, grizzly bear, and wolverine. The project also cuts through areas of habitat connecting much larger habitat areas along the mountain range. The Washington State Department of Transportation (WSDOT) partnered with the U.S. Forest Service, state, and federal resource agencies

in working together with the Cascades Conservation Partnership, the Alpine Lakes Protection Society, the Mountains-to-Sound Greenway, and the Kongsberger Ski Club to provide ecological solutions to the I-90 improvements. Some of the solutions are

- **WILDLIFE DISTRIBUTION.** U.S. Forest Service researchers used geographic information systems technology, snow-tracking, and other techniques to learn the movements of animals to understand wildlife distribution along and near the highway;
- **CONNECTIVITY BRIDGES.** A working group of biologists and hydrologists identified where and how connectivity bridges should be built along I-90. The connectivity bridges should provide wide and open space for large mammals to cross; and
- **STREAM CROSSINGS.** The working group recommended that bridges be built primarily at stream crossings, since they represent locations where multiple project and ecosystem needs converge and therefore offer an opportunity for synergistic solutions. The stream-crossing bridges should be designed to accommodate aquatic, riparian, and terrestrial habitat features. The crossings should be expansive enough for large mammals to utilize and built at key linkages of major creeks and wetlands.



Washington—I-90 Snoqualmie Pass East Project, stream crossing. Photo: WSDOT.

The common threads in the exemplary ecosystem initiatives are reducing habitat fragmentation, removing barriers to animal movement, encouraging the development of more sustainable mitigation sites, stimulating early ecosystem planning, and

fostering ecosystem-based studies and solutions in working closely with partners, stakeholders, and the communities.

Closing Remarks

SAFETEA-LU, Section 6002 Efficient Environmental Reviews for Project Decisionmaking, has integrated environmental planning factors into statewide and metropolitan planning processes by requiring that transportation agencies coordinate with resource agencies and public stakeholders as early as possible in the environmental review process. These efforts are expected to lead to more informed decision-making in transportation planning; proactive integration of natural resource considerations with transportation needs; and identification and prioritization of opportunities with the greatest potential to mitigate the possibly harmful environmental impacts of proposed transportation projects.

The FHWA has been and continues to be a leading partner in the Green Highways Partnership (GHP), which is a voluntary, public/private initiative dedicated to the innovative concepts and approaches to “Green Transportation Infrastructure” through community partnering, environmental stewardship, and transportation network improvements in safety and functionality. The FHWA has contributed significant resources towards the partnership, including staff time, monetary commitments, and technological expertise. The environment is everybody’s concern, and at FHWA, it assumes a particular importance—one that touches virtually every aspect of highway planning, design, construction, and preservation.

In the next two issues of *ASPIRE*, we will continue to explore the social, economic, and ecological benefits of sustainability in planning, design, construction, preservation, and renewal of the highway infrastructure. I invite readers to share ideas and suggestions, facts and figures, case studies, and photographs on these topics by writing to me at myint.lwin@dot.gov.



U.S. Department of Transportation
Federal Highway Administration



Silica Fume Association


The Silica Fume Association (SFA), a not-for-profit corporation based in Delaware, with offices in Virginia and Ohio, was formed in 1998 to assist the producers of silica fume in promoting its usage in concrete. Silica fume, a by-product of silicon and ferro-silicon metal production, is a highly-reactive pozzolan and a key ingredient in high performance concrete, dramatically increasing the service-life of structures.

The SFA advances the use of silica fume in the nation’s concrete infrastructure and works to increase the awareness and understanding of silica fume concrete in the private civil engineering sector, among state transportation officials and in the academic community. The SFA’s goals are two-fold: to provide a legacy of durable concrete structures and to decrease silica fume volume in the national waste stream.

Some of the recent projects completed by the SFA, under a cooperative agreement with the Federal Highway Administration (FHWA), include:

- The publication of a *Silica Fume User’s Manual*—the manual is a comprehensive guide for specifiers, ready mixed and precast concrete producers, and contractors that describes the best practice for the successful use of silica fume in the production of high performance concrete (HPC).
- The introduction of a Standard Reference Material (SRM)[®] 2696 Silica Fume for checking the accuracy of existing laboratory practices and to provide a tool for instrument calibration. This SRM is available from the National Institute of Standards and Technology (NIST).


A much anticipated research program nearing completion by the SFA is the testing of in-place silica fume concrete under service conditions. At the conclusion of this research the results will demonstrate the benefit of silica fume concrete’s unparalleled long-term performance. For more information about SFA, visit www.silicafume.org.




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