ENLIGHTENED STEWARDSHIP

Major highway projects need not conflict with the environment

By James T. Ruddell, P.E., Vice President, Parsons Brinckerhoff Construction Services, Inc., and Michael S. Baker, Environmental Manager, URS Corporation

The conventional wisdom is that large construction projects give short shrift to environmental sensitivity. The $2.4 billion Woodrow Wilson Bridge Project is making this perception a thing of the past, while staying on schedule and on budget. From the planning of this 12-lane, Interstate 95 drawbridge with four adjacent major interchanges, through design, and during its first four years of construction, effective environmental management has been key to the project's ongoing success.

Throughout the planning phase, both the public and regulators warned of substantial environmental degradation stemming from construction. After all, the massive project would be built in the Potomac River, its tributaries and fragile wetlands along its corridor.

To address these legitimate concerns, the project's public sponsors, the Federal Highway Administration (FHWA), Virginia Department of Transportation (VDOT), Maryland State Highway Administration (SHA), and District of Columbia Department of Transportation called on the general engineering consultant, a joint venture of Parsons Brinckerhoff, URS Corporation, and Rummel, Klepper & Kahl, to assemble an environmental management group.

The environmental management group comprises three teams: a leadership team, responsible for agency coordination, environmental design, project permitting, and achieving success of the $65 million compensatory mitigation package; a mitigation team, which manages the environmental enhancement contractors responsible for building wetlands, planting trees and underwater grasses and restoring streambeds; and an environmental inspection team to address environment-related issues arising from construction of the drawbridge and interchanges.

As a result of an unprecedented level of integration and coordination among these teams, the environmental management group swiftly and creatively overcame many challenges—some of which threatened the project's viability.

Among its achievements, the group obtained all permits in about 12 months, quickly located and developed a disposal site to accept dredged material from the Potomac River bottom, without which the project could not have started, and developed and deployed an innovative air bubble curtain system that eliminated fish kills during river pile driving.

The Lowest-impact Alternative

Better known for its chronic gridlock, the Wilson Bridge project corri-
dor is also distinctive for its healthy and diverse ecosystems. Over the course of a thorough and inclusive planning effort that exceeded traditional National Environmental Policy Act and other statutory/regulatory requirements, all feasible river crossing options were closely evaluated for their potential environmental impacts.

Assisted by extensive public and resource agency input, the alternative selected by a committee of elected local officials, SHA, VDOT, FHWA and others was notable for its overall lowest environmental impact relative to other finalist options. Twin side-by-side bridges complemented by four rebuilt interchange and Capital Beltway improvements extending 7.5 miles (12 percent of the Capital Beltway) will provide smoother and safer travel for future generations—in a manner that lies lightest on the land and water.

Protected Fish

Foundation construction, which took place from spring 2001 until summer 2003, involved building pyramidal-like foundation footings that will support the bridge's s-shaped piers. A total of 629 steel pipe piles were driven to support the bridge foundations in the Potomac River and 410 concrete piles were driven to support the landside piers, creating tremendous environmental challenges.

The largest challenge was protecting fish during water pile driving activities. After learning that the large piles, which were driven by a 400,000 foot-pound hydraulic hammer, could produce pressure waves in the water that could injure or kill fish, the project devised a unique solution, called a "Contained Air Bubble Curtain System," to protect the fish population.

A temporary large diameter pipe is placed vertically in the river and the permanent steel pipe pile is set inside; a perforated air hose is placed between these two pipes on the river bottom, creating air bubbles, or a "bubble curtain," that surrounds the surface of the piles within the river. The curtain of air bubbles effectively absorbs and reduces the strength of the pressure waves generated by pile driving and allows fish to swim safely nearby.

Other key environmental successes include:

- use of minimization techniques, such as selective use of dredging, to reduce disturbance from 15 acres of river bottom to 4.5 acres;

- containing, treating and reusing hundreds of thousands of gallons of wash water necessary to clean heavy-duty concrete conveyor systems; and

- installing silt containing fabric on a chain link fence along the landside perimeter of the work area and a floating turbidity curtain along the shoreline to manage potentially detrimental construction run-off.

Environmental Mitigation

Perhaps the most dramatic evidence of the project’s environmental sensitivity is the successful hatching and fledging of five generations of bald eagles nesting immediately adjacent to the project. As part of a $65 million environmental mitigation program, the project created a permanent 84-acre bald eagle sanctuary in Prince George’s County, Md. However, over the past several years the nesting pair has built nests progressively closer to project construction—
now just yards from the project and the 200,000 vehicles that travel the Capital Beltway each day. Over the course of five seasons, they have hatched and fledged approximately 15 young.

The environmental mitigation program also includes establishment of more than 11 acres of tidal wetlands in Stafford County, Va., removal or circumvention of 23 man-made stream blockages that prevent migratory fish from spawning upstream in Rock Creek and tributaries of the Anacostia River, planting of river grasses, reforestation, parkland creation and habitat preservation.

Recently, the project received regulatory permission to use the demolished concrete substructure of the old bridge to create fish reefs in designated areas of Chesapeake Bay.

The Woodrow Wilson Bridge project received a 2004 Globe Award from the ARTBA Transportation Development Foundation for overcoming major environmental challenges while completing the $125 million Foundations Contract for the new twin-span bridge.

Traffic congestion and deteriorating infrastructure will demand a myriad of large highway projects in the future. Protecting the natural environment remains a paramount concern of regulators and the public alike. The tangible environmental successes of the Wilson Bridge Project show how enlightened environmental stewardship can and should be used in the construction of infrastructure projects.

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Environmental Success in California

By Len Bettes, Quantm

Transportation Corridor Agencies (TCA) has utilized a new planning methodology to deliver improved environmental outcomes and reduced planning time on the Southern California Foothill Transportation Corridor-South (FTC-S) project.

In 2002, TCA was facing the prospect of increasing conflict and significant delays to the planning, design and construction of the Southern California FTC-S project.

After spending two years developing alternative route scenarios for the proposed 16-mile toll road using conventional geographic information systems and CAD systems, TCA and their appointed consultant, the Corridor Design Management Group, were unable to satisfy the multiple interests of different project stakeholders. The FTC-S project is located in a part of the state dense in population and natural habitat, and is subject to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) regulations.

The scenario has become a common phenomenon across the country. The need to demonstrate compliance with NEPA and Section (4f) of the Department of Transportation Act has introduced a level of complexity into the route selection process that can—and often does—stop projects dead in their tracks. In these conflict situations, it is easy to get caught in a silo mentality, particularly if the demands appear unreasonable. Unfortunately, the inability to show consideration of “all feasible alternatives” provides ample leverage for environmentalists, communities and action groups, and any alignments presented are vulnerable to dispute.

A Different Approach

TCA took a different approach. Having read a study report on the California High Speed Rail project that described the successful application of