

I-75 Widening Requires Substantial Environmental, Stormwater Work

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Triple 48-inch pipes (foreground) provide inflow to the pond. A control structure can be seen in the far corner.

The Interstate 75 Roadway Expansion (iROX) design-build-finance project involves widening I-75 from four to six lanes for 30.5 miles in Collier and Lee counties in Florida. The \$430.5 million Florida Department of Transportation (FDOT) project is divided into four segments, all of which will be constructed in a little more than three years. This article focuses on acquiring permits and designing for drainage and stormwater management—some of the biggest challenges for this project.

A NEW ANGLE

Originally, the plan was to add the two new lanes in the median and match the cross-slope of the four existing lanes. This would drain the runoff from the new inside lanes across the outside lanes to roadside ditches. Stormwater detention ponds were sized and designed to provide stormwater management for the widening to six lanes, as well as potential future widening to eight and 10 lanes.

In the final configuration, the new lanes were still added in the median; however, instead of sloping to the outside, they slope inward toward the median. For the most part, this keeps the area of new pavement separate from the existing pavement, offering several advantages:

- Reduced area is needed for stormwater detention ponds due to smaller contributing drainage area.
- Stormwater management (treatment and attenuation) is required only for the median area and new lanes rather than the entire right-of-way.
- Because the project traverses a significant amount of wetlands, confining the roadway and drainage improvements to the median significantly reduced wetland impacts by minimizing outside ditch work.
- The smaller drainage area requires smaller conveyance ditch widths and storm drain pipe sizes.

FDOT committed to having most of the identified pond sites available when the project started and continued acquiring pond sites throughout the proposal, selection and early design phases. This required flexibility during the drainage design as some of the easements and takings were modified during the acquisition process. It should be noted that FDOT's right-of-way acquisition for stormwater ponds occurred during the peak housing boom in one of the most rapidly developing areas of the country. Very few parcels were available, and land was extremely expensive. As a result, some ponds were located in wetland areas, others in wetland conservation areas and some were joint-use facilities with other public roadway projects or private developments.

MAKING THE MOST OF AVAILABLE TIME

The project faced numerous environmental challenges throughout the design and permitting phases. Critical issues such as a wetland-dominated project corridor, limited mitigation options, threatened and endangered species, and coordination with multiple state and federal regulatory agencies were in turn heightened by the project's aggressive construction schedule. In a design-build project, challenges such as these translate directly to risk. With increased risk there is the potential for substantially increased costs. To manage this risk, HDR formulated a unique approach to permitting.

The aggressive project schedule meant environmental resource permits (ERPs) for the first three segments of the project had to be obtained in eight months as opposed to a normal permitting schedule of nine to 12 months. Doing so

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required an equally aggressive design and plans production effort, particularly with the project drainage design. The project involves 24 stormwater detention ponds, new and widened bridges, cross drains, storm drains and conveyance ditches.

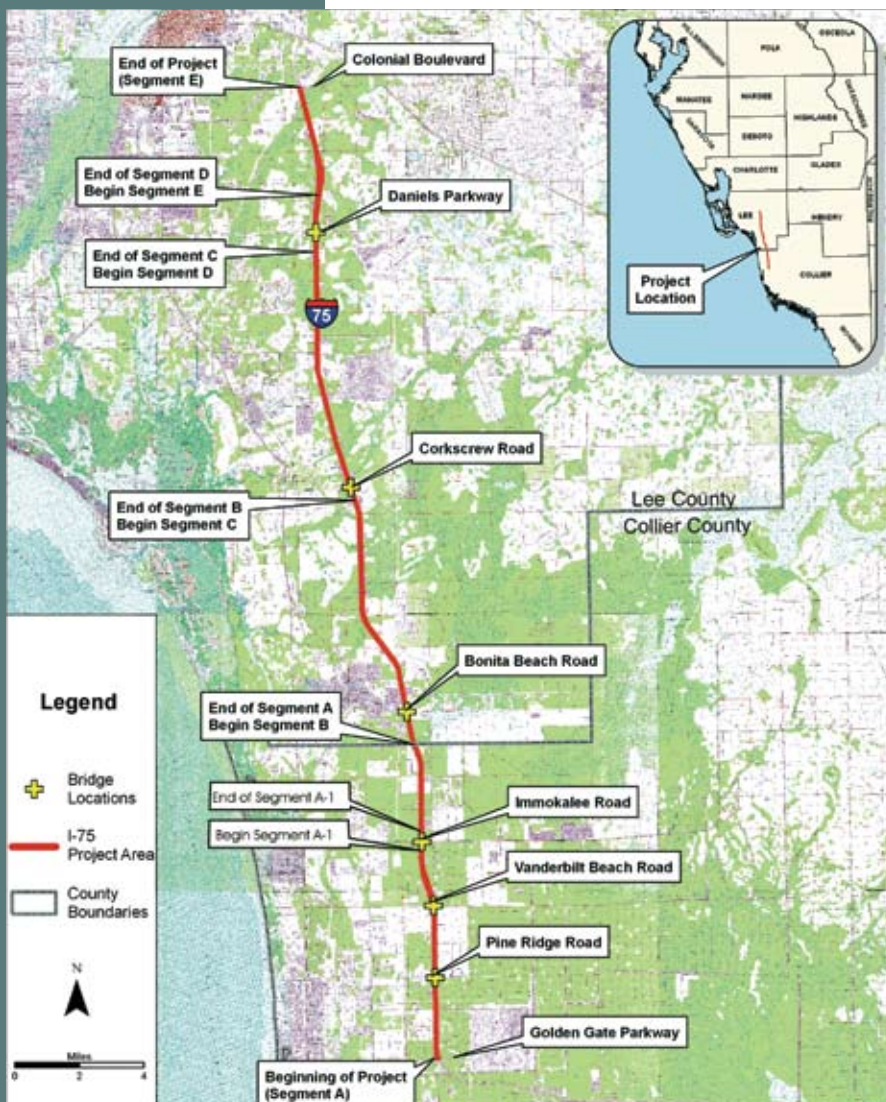
Starting October 28, 2007, the contractor has 1,150 days to complete the project with incentives for early completion and penalties for running late. Intensive negotiations with regulatory agency staff were initiated before the project was awarded to identify permitting strategies that would allow the contractor to begin work as early as possible.

Environmental and drainage task-leaders met with agency staff to identify work elements that could be conducted without state and federal permits and those that would require a minimal permitting effort. The product of these negotiations was the ability to begin major work elements such as milling and resurfacing without state or federal permits. Fast-tracked permitting efforts allowed demolition and pile installation at key bridge sites shortly after the contractor received notice-to-proceed from FDOT. These efforts enabled the contractor to mobilize early and get started on construction.

Further helping things along, FDOT committed to obtaining permits for the southernmost segment of the project (Segment A) in time for the project to begin construction. The contractor had the option of building that segment as originally designed and permitted, with the new lanes sloping to the outside, or modifying the permit to build something different. This allowed the contractor to begin work on part of the project while waiting for permits for subsequent segments. FDOT submitted the ERP application for Segment A in August 2006 and received the permit in August 2007. During this process, HDR received copies of the South Florida Water Management District (SFWMD) requests for information and attended (but did not participate in) meetings between FDOT, the original design consultant and SFWMD.

These early steps paved the way for developing a comprehensive approach to designing the drainage and obtaining permits. The following strategies contributed to this effort:

- Permitting the project in four segments minimized the risk that the entire project could be held up due to issues in one particular area, allowing the contractor to begin the actual widening construction work as soon as possible



Map of the I-75 project corridor.

- Utilizing multiple design teams, including teams from other offices, to work on the project segments simultaneously
- Using a uniform format for calculations, drainage design and environmental documentation, including summary tables with information that SFWMD staff specifically looks for when reviewing permit applications
- Continuous coordination with staff of the permitting agencies throughout the design and permitting process
- Keeping FDOT and the contractor advised of permitting issues with the potential to delay receipt of permits and impact the project schedule
- Understanding and using SFWMD’s permitting structure to get the contractor started on activities for which no permits are required (e.g., milling, resurfacing and building up the outside shoulder in anticipation of traffic shifts during lane construction)
- Obtaining general permits (with less stringent documentation requirements and review times) for additional early construction activities such as partial bridge demolition and pile driving in upland (non-wetland) areas, and construction of accident investigation sites at interchange exit ramps
- Committing to a 14-day turnaround to address SFWMD requests for information on permit applications
- Coordinating with the contractor and drainage sub-contractor throughout the proposal and plans production phases on construction methods and materials to minimize the number of questions that come up during construction

GOING WITH THE FLOW

Design of the drainage and stormwater management for I-75 posed several challenges. Physically, the project area is characterized by flat terrain, high water table elevations and shallow rock layers. Also, though the new lanes slope toward the median, the majority of the stormwater ponds are located outside the limited-access right-of-way, requiring stormwater to be piped under existing travel lanes. Since four lanes of traffic must be maintained, jacking and boring is the preferred method for getting pipes under the roadway. Roadway runoff also has to be conveyed considerable distances by ditches and storm drains to reach the ponds.

The most significant challenge dealt with differences in design parameter assumptions made during FDOT’s identification and selection of pond sites, versus design parameters required by SFWMD to get permits. When designing wet detention ponds, the required treatment and attenuation water volumes are “stacked” above the pond control elevation, which is normally taken as the wet season high water table. For some of the ponds, the permitted control elevations were higher than what was originally assumed, resulting in lower storage volume capabilities.



The new inside lane slopes the opposite direction of the outside lanes.

SFWMD also limited the ponds’ discharge from their respective control structures to approximately 1 cubic foot per second per acre based on the size of the contributing pre-developed drainage area. Permitted pond discharges were significantly less than originally assumed, again resulting in lower storage volume capabilities in the ponds.

Fortunately, these differences surfaced during FDOT’s pursuit of the permit for the original design of Segment A, so HDR was able to incorporate the revised design parameters in the design of the ponds for the remaining segments as well as in the modifications to Segment A. By coordinating closely with SFWMD, the design and permitting remained on schedule.

PROTECTING THE ENVIRONMENT

Environmental scientists coordinated with project roadway and drainage engineers throughout the design phase to identify major wetland areas. Where avoidance was not feasible, steps were taken to minimize impacts as much as possible.

As construction began on the early work elements, environmental scientists worked concurrently to complete data collection efforts. Where wetland impacts occurred, a majority were remnant wetland areas that remained after the original construction of I-75 during the 1970s. To satisfy permitting criteria for SFWMD and the U.S. Army Corps of Engineers (USACE), approximately 30 miles of interstate right-of-way—including stormwater pond sites—required wetland jurisdictional determinations and subsequent reviews by both regulatory agencies. This task alone required jurisdictional and seasonal-high-water determinations, functional assessments and plant community descriptions for approximately 200 wetland areas.

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SFWMD and USACE require wetland mitigation to compensate for permanent wetland impacts. In spite of the emphasis to avoid and minimize impacts, the project resulted in permanent impacts to approximately 105 acres of wetlands. Traditional mitigation is accomplished by creating new wetlands, restoring areas that were formerly wetlands, enhancing existing wetlands or wetland preservation. All of these options require land acquisition which, due to the extreme costs involved, was not an option. It was decided to utilize regional wetland mitigation banks to provide the required mitigation.

Both SFWMD and USACE rely on functional assessment methodologies as tools to determine the quality of impacted wetlands and satisfactory mitigation. The two methodologies used for this project included the Wetland Rapid Assessment Procedure (WRAP) and the Uniform



Environmental Technician Voni Moore participates in one of 200 wetland site assessments performed during the permitting process.

Mitigation Assessment Method (UMAM). The WRAP and UMAM assessments enabled determination of the amount of mitigation credits needed to offset adverse impacts to wetlands. HDR acted as a liaison between the regulatory agencies

and the mitigation banks to negotiate the number of mitigation credits required.

The presence of threatened and endangered wildlife within the project limits posed additional challenges. A sampling of observed and potential listed species included the Florida panther, bald eagle, Big Cypress fox squirrel, wood stork, eastern indigo snake, gopher tortoise, Florida sandhill crane and Florida black bear. Working with the Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service to address this issue, the project team analyzed areas of panther and wood stork habitat to quantify future habitat loss. Mitigation for these impacts was provided through the purchase of habitat credits from mitigation banks that specialize in preserving species-specific habitat. For the remaining species, the project team produced a comprehensive wildlife management plan to ensure protection of listed species during construction. The team designed species-specific information pamphlets to be carried by construction personnel and conducted pre-construction information sessions to convey the importance of species protection.

STATUS

The I-75 design-build-finance project is now under construction. At the time of the writing of this article, SFWMD ERPs and USACE permits have been received for three of the four project segments, with the ERP and USACE permits for the fourth segment anticipated in June.

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