

Public Roads

Route 17 - The Four Decade Project by Sande Snead

After almost 40 years of project gridlock and many starts and stops, a road in Virginia's Great Dismal Swamp is nearing completion.

Seemingly, it was the road that could not be built. In fact, it took 36 years and cooperation between 6 State and Federal agencies, and 21 environmental agencies. The U.S. 17 widening project in southeastern Virginia adjoining the world-renowned Great Dismal Swamp National Wildlife Refuge includes a donation of 307 hectares (758 acres) of wetlands, construction of a bear crossing, and installation of culverts that will serve as crossings for smaller wildlife. From the beginning, the project seemed like a "Catch-22" situation. U.S. 17, which runs along the eastern line of the Dismal Swamp Canal, needed to be widened because it could no longer handle the heavy traffic between North Carolina and Virginia. Various alignments were considered, but they all seemed to come down to this: people or wetlands? One alternative would affect only 4.5 hectares (11 acres) of wetlands but would mean displacing 33 families and taking parts of 80 other properties. Another alignment involved fewer families, but 22 hectares (55 acres) of wetlands would be affected.



Paul Aiken, The Virginian-Pilot

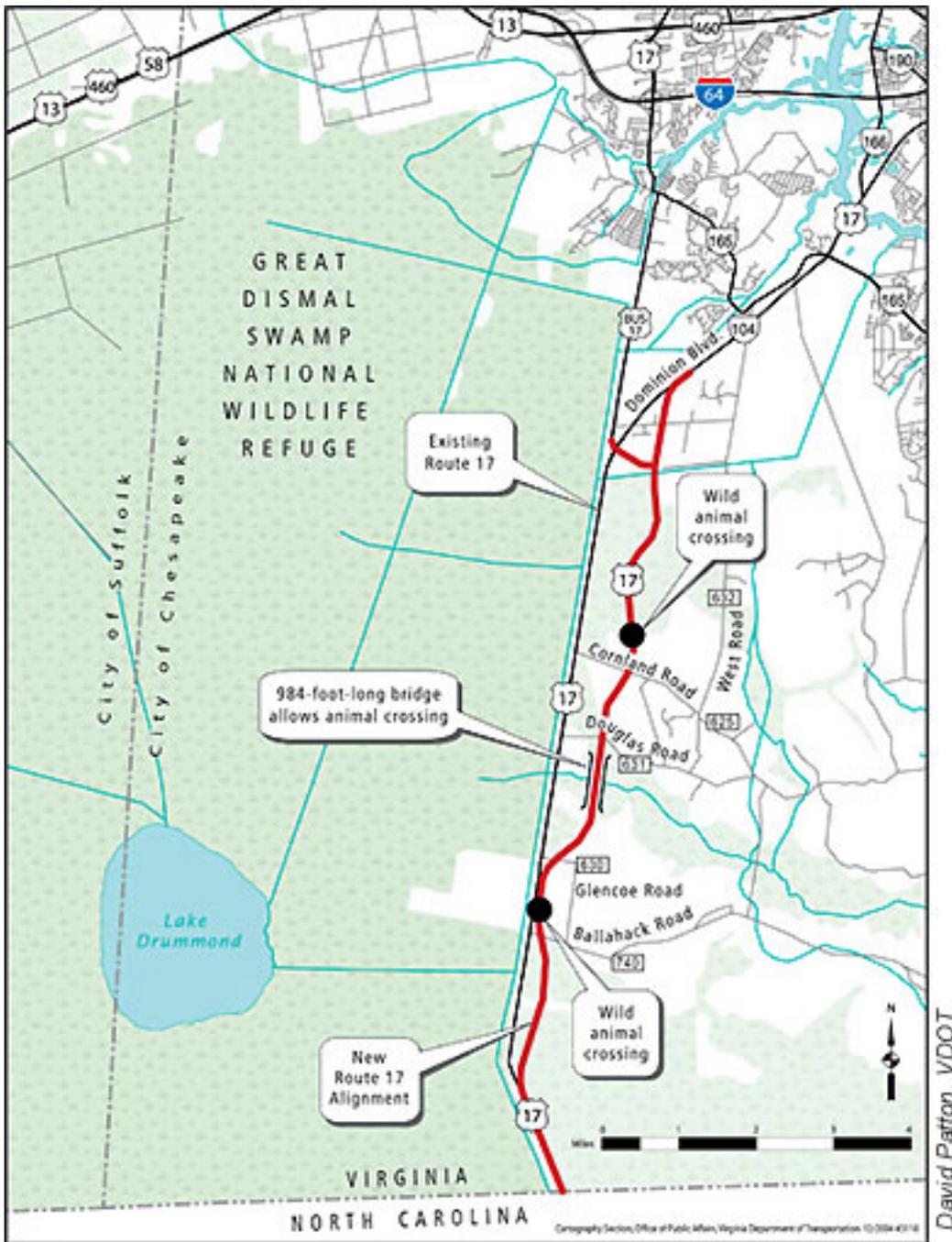
The U.S. 17 widening project in southeastern Virginia will include construction of wildlife crossings that will enable bears, like this

one, and other animals to move safely within the Great Dismal Swamp area.

Before a solution could be found, the Commonwealth faced a State budget shortfall, and money for the project was pulled. Although North Carolina went ahead and built its portion of the road 20 years ago, Virginia's Route 17 widening project languished for years. When it resurfaced, the Virginia Department of Transportation (VDOT) had to reinstate the National Environmental Policy Act process and prepare an Environmental Impact Statement; pursue all of the permits again; interpret and decipher new, tougher regulations; and face increased resistance from environmentalists.

To complicate matters, the U.S. Army Corps of Engineers owned the land beneath Route 17, but not the roadway. And VDOT was unable to produce documentation showing that it owned the right-of-way along the existing road. In the meantime, the U.S. Environmental Protection Agency (EPA) also had designated the aquatic resources in the area as "aquatic resources of national importance" (ARNIs) which, by agreement with the U.S. Army Corps of Engineers (USACE), is normally the first step that is taken in vetoing any permit that the USACE might issue. EPA pledged to veto the project because of impacts to organic soil wetlands and the national importance of the Great Dismal Swamp. Federal regulators said that States just do not build roads through this type of wetland anymore.

But clearly there was a need for widening the road. Over the last decade, this narrow and busy stretch of road saw 256 crashes and 30 fatalities.



David Patton, VDOT

A Citizen to the Rescue

A solution was finally found: a shift in the alignment of the road 305 meters (1,000 feet) to the east and construction of parallel 300-meter (984-foot)-long bridges that ultimately displaced only one family and affected only 10 hectares (25 acres) of wetlands. The idea for the shift came from an unlikely source—a citizen. The U.S. Army Corps of Engineers' Alice Allen-Grimes who worked on the project refers to the problem solver as "Citizen Brown."

"I have been driving that road for 40 years and working on highways for 30," says Robert Brown, a superintendent with a general contractor, Higgerson-Buchanan, Inc. "Common

sense told me we needed a brand new road with a decent subbase. The existing Route 17 was built along the Dismal Swamp Canal, and all kinds of material were buried along that route. There were stumps and trees, and I'm sure the workers who built the canal threw dirt, roots, and topsoil along the canal bank. The existing road could not be improved on."

He adds, "When you travel one area as much as I do, you get to know all of the backroads and shortcuts, so it was not hard for me to see which way the road should go. The plan the highway department [VDOT] came up with in the end has more curves, but it's very similar to the plan I submitted."

Although the new plan was much preferred to others that were considered, the effect on the environment remained a concern.

The deal maker for VDOT was an unusual mitigation package. The agency provided 307 hectares (758 acres) of wetland preservation and agreed to mitigate 0.4 hectare (1 acre) for each of the 10 hectares (25 acres) affected. Of these, 3.8 hectares (9.5 acres) were nutrient-rich organic soil wetlands, and the other 6 hectares (15.5 acres) were mineral soil wetlands.

History of Route 17

One of the unique characteristics of the Dismal Swamp is its association with George Washington, who owned several thousand acres at one time and supported draining the swamp for wood harvest and the possibility of making the land suitable for farming. During the 1700s, slaves pushed loaded barges up and down canals with long poles, creating walking paths. This was probably how Route 17 came to parallel the Dismal Swamp Canal. In 1796, the Dismal Swamp Canal Company halted work on digging the canal and instead began building a road on the eastern bank. The road opened in 1804 and evolved into today's U.S. 17.

The roadway probably was paved sometime in the 1920s. Drawbridges were constructed at Deep Creek and South Mills in 1934, and the road was widened from 6 to 9 meters (20 to 30 feet). In 1963, the city of Chesapeake took over maintenance of Route 17 from VDOT.

Today, U.S. 17 runs from New York to Florida and is also known as the Ocean Highway and The Historic Albemarle Highway.

To further reduce disturbance to Great Dismal Swamp wildlife, VDOT installed two large culverts and several smaller ones for passages under the heavily traveled road. To accommodate larger wildlife such as deer, bears, and bobcats, the agency is installing natural walkways under the two parallel bridges. The walkways will enable the animals to travel from one side of Route 17 to the other without crossing the busy roadway and without sinking into the wetlands. The walkways, also called bear terraces, will be installed once the bridges are finished toward the end of the construction project, which is slated for completion in the fall of 2005.

The bridges carry the road about 2.4 meters (8 feet) above the ground to allow water to flow from the swamp to the Northwest River, providing a natural path for wildlife. VDOT has constructed a 1.6-kilometer (1-mile)-long, 3-meter (10-foot)-high chain-link fence with three strands of barbed wire on either side of the road to direct wildlife to the

underbridge crossings. Pine or oak natural mulch will be used on the walkways to make them more inviting to traverse.

"The mitigation package is unprecedented in Virginia," says Ed Sundra, senior environmental specialist with the Federal Highway Administration (FHWA). "VDOT determined that it could address the hydraulic requirements of the crossing with a [2.4-by 2.4-meter] 8- by 8-foot box culvert, but this wouldn't accommodate wildlife or minimize impacts to wetlands. We brought together a mitigation committee of representatives from EPA, U.S. Fish and Wildlife Service, FHWA, VDOT, and the U.S. Army Corps of Engineers to address the concerns of each agency. As a result, we came up with a plan we could all move forward with, which included parallel bridges and the preservation of more than 750 acres of wetlands that would [have] eventually [been] threatened by development."



This temporary trestle bridge was built between the new parallel bridges. The bridges carry the road about 2.4 meters (8 feet) above ground level to allow water to flow from the Great Dismal Swamp to the Northwest River, providing a natural path for wildlife.

The end result for Route 17 is a 19-kilometer (12-mile), four-lane divided highway that will improve safety for motorists and better serve the increased traffic volume heading to and from North Carolina and the Outer Banks. The project will cost \$42 million. It may have taken nearly four decades, but this is a classic story of a road being built against all odds.

Great Dismal Swamp

Wayne Williams, project manager, has worked in VDOT's Norfolk residency since 1967, and he knows Route 17's history well. He also knows the land and the wildlife that are still abundant there. He and his father both trekked through the area where the road would be located, seeking the elusive quarry known in these parts as "The Ghost of Wild Horse Ridge."

"That deer was legendary," Williams recalls. "He knew how to outwit hunters and lived so long that his antlers were white. They would glow when the moonlight hit them." The Great Dismal Swamp is full of legendary tales. For example, Lake Drummond is an almost perfectly round 1,255-hectare (3,100-acre) body of water that lies in the middle of the swamp. How and why a lake developed there remains a mystery. It is one of only two natural lakes in the Commonwealth. Some say it was formed by a meteor crater. But Mary Keith Garrett, a volunteer with the Great Dismal Swamp National Wildlife Refuge, says carbon dating shows the lake to be considerably younger than the swamp. "Pollen studies show that 10,000 years ago the lake area was an upland forest, and that is when organic soils started forming," Garrett says. "The lake is only 3,500 years old. It's commonly thought to be the result of a deep peat fire." Presumably a depression formed when the peat burned off, filling with swamp water to become the lake.

As a 40-year resident of the nearby town of Suffolk, Garrett has heard about plans to expand Route 17 most of her life. Though she is an avid environmentalist and Great Dismal Swamp protector, she says that she looks forward to the new, safer roadway.



Route 17 Project Manager Wayne Williams shows one of the culverts that may be used by large mammals to go from one side of the road to the other.



Tom Saunders, VDOT

VDOT's Williams stands at the end of one of the parallel bridges. Animals can cross under the bridge where the rocks are shown here. When the bridge is complete, a natural walkway will be installed underneath for wildlife passage.

Wildlife and Wetlands

"Transportation agencies usually widen roads by building new lanes parallel to the existing ones," says the U.S. Army Corps of Engineers' Allen-Grimes. "That was not the best solution in this case. There were extenuating circumstances to consider."

Among them was the history and ecology of the Great Dismal Swamp. "There is such an important combination of historic and natural resources in this area," says Allen-Grimes, "including the Dismal Swamp Canal and the national refuge on one side of the road, and wetlands and woodlands on the other side."



Tom Saunders, VDOT

A yellow-bellied slider turtle rests on a log near the Great Dismal Swamp's Lake Drummond. Yellow-bellied and spotted turtles are commonly seen, and an additional 56 species of turtles, lizards, salamanders, frogs, and toads have been observed in the area.



Tom Saunders, VDOT

This banded water snake is one of 18 nonpoisonous species found in the Great Dismal Swamp area.

The swamp supports a variety of mammals, including otters, bats, raccoons, mink, gray and red foxes, and gray squirrels. White-tailed deer are common, and black bears and bobcats also inhabit the area. Three species of poisonous snakes are found in the swamp—cottonmouth, canebrake rattler, and the more common copperhead—along with 18 nonpoisonous species. Yellow-bellied and spotted turtles are commonly seen, and an additional 56 species of turtles, lizards, salamanders, frogs, and toads have been observed. More than 200 species of birds have been identified in the area. "It's natural for animals to want to move around and go back and forth," says VDOT's Williams.

Virginia Transportation Research Council scientist Bridget Donaldson is studying the issue of animals on the roadway and motorist safety. Each year, about 200 people die in animal-related car crashes out of the nearly 44,000 traffic fatalities in the United States. There were 247,000 crashes involving animals in 2000, the latest data available, according to the Centers for Disease Control and Prevention.

Donaldson is conducting a performance evaluation of seven underpass structures (not including the Route 17 underpasses) throughout Virginia to ensure that VDOT is maximizing its investments in these structures. Determination of a structure's success is based on its use by wildlife and its potential to reduce animal-vehicle collisions. Remote cameras are monitoring the seven sites over 12 months to determine the extent of use by large mammals, such as deer and black bears. (See "[Why Did the Bear Cross the Road?](#)".)

To determine where animals are most likely to cross U.S. 17, researchers from Virginia Polytechnic Institute and State University (Virginia Tech) placed barbed wire 46 centimeters (18 inches) above the ground along the west side of the existing road. They were able to determine the most popular crossing points by noting the location of animal fur caught in the wiring. The research helped VDOT determine where to place the culverts.

In addition to making accommodations for wildlife, VDOT had to build the new Route 17 with minimal disturbance to wetlands, per permits from the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality. Because the new roadway goes through wetlands, VDOT had to find a way to build with the least impact possible. The agency could cut trees but had to leave the stumps and was told not to do any excavating. Parallel bridges were seen as the best way for the road to traverse wetlands without disturbing the ecology and were the most practical way to build without having to use fill.

Why Did the Bear Cross the Road?

Answer: To try out the new animal passageway built by VDOT, of course.

Because VDOT is installing a wildlife walkway under the new Route 17 bridges and oversized culverts for animal passages, the question becomes if you build it, will they come? The answer, according to preliminary results of a study being conducted by the Virginia Transportation Research Council (VTRC), appears to be yes.

Bridget Donaldson, research scientist with the council, is studying the effectiveness of highway underpasses and their use by large mammals in Virginia. Her study involves monitoring seven structures throughout the State—five that were not constructed for wildlife movement and two that were installed specifically for that purpose. The study will make recommendations for improving VDOT's existing crossing structures and will provide suggestions for designing the most effective crossing structures in the future.

Data from monitoring animal movements are being obtained from remote digital cameras that photograph images based on infrared heat and motion sensors. The cameras recorded 1,600 photos in the first 6 months of the study from June to November of 2004.

Preliminary results indicate that there have been 775 deer crossings in three of the sites (deer do not use the other four) and well over 1,000 crossings of smaller mammals (raccoons, opossums, coyotes, groundhogs, cats, and even squirrels). The most popular deer crossings are a large box culvert in Fairfax County, which was designed specifically as a wildlife crossing, and another box culvert just outside Charlottesville beneath I-64.

"The I-64 underpass was constructed as a passage for farm equipment beneath the highway," Donaldson says. "Its openings are 3 by 3.7 meters (10 by 12 feet), which is the smallest crossing I've found (according to other research studies) to be used this extensively by deer. This indicates that proper location and adequate fencing extending from either side of the underpass (which this structure has) are extremely important factors in determining the success of a crossing."

Donaldson notes that no black bears have used the seven structures she is monitoring. "There have been occasional visits to the structure beneath I-64 by black bears, but no complete bear crossings," she says. "Each time the bear approaches the entrance, it turns around—likely due to inadequate structure size."

Results from a Transportation Research Board survey of State DOTs indicate that the majority of States have installed various forms of wildlife crossing structures. Of the 34 State DOTs that responded, 29 use culverts to facilitate wildlife movement across roadways, 24 have bridge extensions, 23 have underpasses, and 6 have overpasses.

"Money spent on wildlife crossings may seem an unnecessary addition to construction costs," Donaldson says. "However, the savings associated with reduced human injury, mortality, and vehicular damage as a result of effective wildlife crossings can offset the cost of crossing installations. While many

successful crossing structures cost less than \$200,000, studies have estimated the cost of a single human traffic fatality at more than \$3 million in lost income, medical costs, and property damage."



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Bridget Donaldson, VTRC



"We haggled a lot about the length of the bridges," says Wendy Kedzierski, then an environmental specialist with the Virginia Department of Environmental Quality. "We wanted a longer bridge, but VDOT provided a cost-benefit analysis that showed that the longer bridge was cost prohibitive. VDOT then proposed a length that minimized impacts to the wetlands, allowed for bear crossing, and also fit the budget."

Some fill was needed, however, and for that VDOT had two borrow pits from which it hauled 1.2 million cubic meters (1.6 million cubic yards) of sand.

"Where the road was going through, we left the stumps and put in large stone as a base filler," VDOT's Williams explains. "A geotextile material is on top of the stone to act as a barrier between the stone and embankment material. The stumps are covered, but they are not going to rot. They will help support the road."

Kedzierski adds, "Widening an existing road usually has the least impact on the environment, but for Route 17, that was not the case. VDOT really worked with all the agencies and stakeholders to find the best possible route for the new road."



This dump truck and others hauled 1.2 million cubic meters (1.6 million cubic yards) of sand to be used as fill for construction of the parallel bridges.

Not only is the new alignment of Route 17 more animal friendly, it is also more people friendly. The original plan would have run the entire 19-kilometer (12-mile) stretch along the existing roadway, and construction probably would have caused significant traffic backups and delays along the already dangerous road. Construction of the new road does not interfere with traffic on the existing highway.

When the existing Route 17 closes to traffic in 2005, plans are for it to be used to enhance tourism and visits to the Great Dismal Swamp. Officials from the nearby city of Chesapeake found out in November 2004 that it will receive \$1.75 million in Federal funds to turn part of the old Route 17 into the Dismal Swamp Canal Trail.

"We've been planning for a contact center forever," volunteer Garrett says. "We'll be able to develop educational programs closer to the population. The refuge is so far off the path that we really don't get much in the way of tourists. Access is nearly impossible because almost all of the roads leading to the center are unimproved logging paths. By closing off the old Route 17, and developing bike and pedestrian paths, we should be able to make it easier for the public to see what a treasure, what a national natural resource, we have in the swamp right here in Virginia."

The Route 17 project received national recognition from FHWA for protecting wildlife and preserving the swamp ecosystem. The project is one of seven in the country that FHWA has designated as a 2004 Exemplary Ecosystem Initiative, a special designation for transportation projects that develop innovative and forward-thinking ways to preserve and enhance ecosystems.

Jack McCambridge, Hampton Roads district environmental manager, has worked on the Route 17 project for 14 of his 19 years with VDOT. He says getting the Route 17 road built has been like a roller coaster ride that is not fun. "In the end, the process worked," he says. "We knew it needed to be built. The Raleigh, NC, to Norfolk, VA, corridor is an important transportation link, and the existing road wasn't safe. Although the process was frustrating and at times contentious, it did enable VDOT and the various agencies to build a better partnership and achieve what we all believed to be important."

Sande Snead is a public affairs officer for VDOT, a position she has held since 2002. Prior to joining VDOT, she was a freelance writer for more than a decade. Snead has won numerous State and national writing awards, including a national award in 2004 for a series called "How Virginians Move" for the VDOT Web site.

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