

Raising the roof on Heartland a major feat for railroading

One of the most amazing things about the Heartland Corridor tunnel clearance project is this: That Norfolk Southern even came up with a way to pull it off.

The business case was compelling. NS, aiming to capitalize on a shift in global shipping trends, wanted to increase rail capacity and accelerate delivery of international intermodal freight moving between East Coast port terminals and consumer-rich markets in the Midwest.

Actually getting the project done, however, has been akin to building an airplane while trying to fly it.

Without delaying or disrupting trains, NS set out to raise the height of 28 tunnels on the corridor, a gritty task of grinding and breaking out rock and concrete roofs or arches through nearly 5.5 miles of tunnels in Virginia, West Virginia, and a sliver of Kentucky. That meant getting track time to do the work while still meeting train schedules, over one of the railroad's busiest lines on the Pocahontas Division.

"That was probably the biggest hurdle out of the chute," said **Bob Billingsley**, NS director structural projects. "We had to find the time to do the work and not interfere with train schedules and the quality of service to our customers."

The tunnels range in length from the 3,302-foot Cowan to the 174-foot Big Four No. 2. In addition to the tunnel work, the project involved removing 25 overhead obstructions, including bridges, signal structures, and slide detector fences.

"When we were planning this people asked me, 'What can we compare it to?' and I said, 'Nothing, this is it,'" said **Jim Carter**, NS chief engineer bridges and structures. "It's a once-in-a-lifetime project for us. It's probably the single biggest engineering project taken on by any railroad in modern times."

Given that, it's remarkable the project has proceeded on schedule, with minimal delays to train traffic.

Just as significant, the Heartland Corridor has demonstrated the effectiveness of public-private partnerships in accelerating construction of critical railroad infrastructure projects, said **Rob Martinez**, NS vice president business development.

Public funds from the federal government, Virginia, and Ohio will cover around half of the estimated \$188 million needed for the overhead clearance project. Martinez, along with **Darrell Wilson**, assistant vice president government relations, helped lead NS' efforts to secure state and federal legislative support for the corridor improvements.

"From a cost perspective, it would have taken NS much longer to do this alone," Martinez said. "With the public participation that helped make this happen, we'll have jobs and economic development benefits that will accrue right away to Hampton Roads, Va., the central Ohio valley and, in the future, to the Roanoke Valley and West Virginia."



■ Contractors use an excavator, in top photo, to remove a boulder and other material while raising the elevation of the Cooper Tunnel. In middle photo, an Alpine roadheader mounted on a rail car grinds exposed rock inside the Hatfield Tunnel Main Two Track. At bottom, two excavators with roadheader attachments grind a notch in the concrete liner of Hemphill No. 1 Tunnel.

The real story: planning and teamwork

Construction on the corridor improvements began in June 2007. Two and a half years later, contractors hired by NS have finished 23 of the 28 tunnels. NS now anticipates wrapping up work by August, with completion of the final tunnel, the 2,627-foot-long Big Sandy 1, near Williamson, W.Va.

The success of the clearance project boils down to planning and teamwork, Carter said.

"To me, the real story of Heartland is the cooperation that's gone into this by everyone involved," he said. "I can't say enough good things about the transportation planning people in Atlanta who have facilitated this and the transportation folks on the Pocahontas and Virginia divisions who have executed it. The designers tailored their plans so the work could be done within a daily window of time, and the construction management team and the contractors have been committed to stay within that time frame. Their ability to do the work and then return the railroad to service every day safely and without unplanned interruptions has been remarkable."

Construction work was scheduled to accommodate two NS trains, 217 and 218, that haul freight for United Parcel Service. Keeping those trains running on time left a 10-hour work window of 2 a.m. to noon on the Pocahontas Division and 10 a.m. to 8 p.m. on the Virginia Division.

"UPS is one of the most service-sensitive intermodal customers that we have, and NS would have lost that freight if we hadn't built around it," said **Mike McClellan**, NS vice president intermodal and automotive marketing. "It's one thing to provide good service, but to provide premium service while we've been doing this project is a real testament to the construction schedules and the way the work has been done."

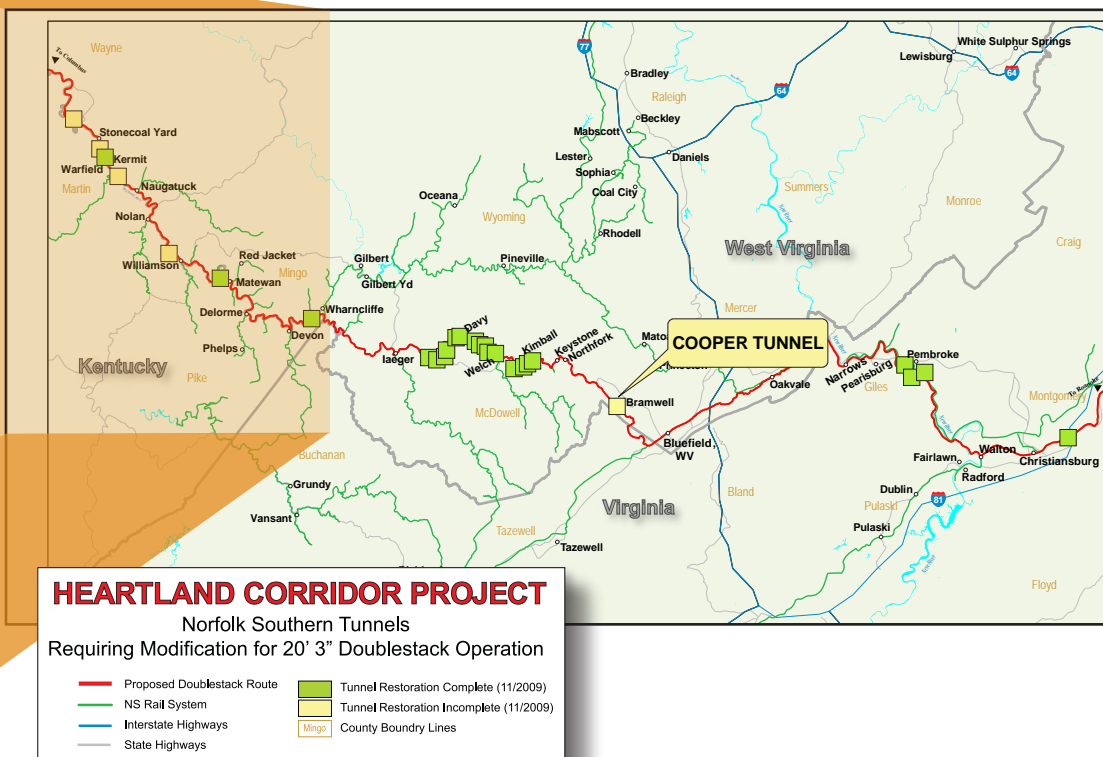


Coordinating with NS coal traffic was another challenge. When the project began, contractors worked a Saturday- to-Wednesday schedule to accommodate coal movement, which tends to get heavier later in the week. When coal demand began slacking off in late 2008 as the global recession settled in, construction shifted to a Monday-to-Friday schedule, which also saved NS weekend overtime pay for flagmen at construction sites.

As of late December, clearance work continued on five tunnels in West Virginia – the Big Sandy 1, 3, and 4, the Williamson, also known as Mingo, and the Cooper.

Most of the concrete-lined tunnels being raised were constructed in the early 1900s, but a few exposed rock tunnels were built prior to that.

The tunnel heights are being elevated an average of 1.5 feet to provide a clearance of 21 feet, giving double-stack trains a 9-inch safety margin. In some cases, contract construction crews have achieved that by grinding out the arched corners of tunnels, but in other instances, they've had to cut, grind, and break away concrete roof liners with diamond-tipped saws and excavators.



■ The Heartland Corridor project is raising the height of 28 tunnels, shown on the map as green or yellow boxes, to allow double-stack trains to run the route. As of late December, work on all but five of the tunnels, shown in yellow, was complete.

Given the limited work window, the daily clearing activity in some of the tunnels has progressed in 15- to 20-foot sections. Before the track could be returned each day to the railroad to run trains through, the work crews had to secure the roof sections with some type of support.

"It's very tedious and time-consuming," Billingsley said.

NS forces follow behind the contract tunnel crews to replace track, ballast, and ties.

Dewey "D" Smith, director NS transportation service design, said careful planning paid off. "We formed one big team and gathered all the data we needed, including all the traffic data, the blocks, and the train schedules, and we modeled those using computer simulations," Smith said. "We looked at the traffic all the way down to each shipment on a train and how a 10-hour curfew would affect it.

"We found that if we had everyone on board and had the right discipline in place, we could perform the work and run all the trains without detouring or delaying them," he added. "So we developed a plan based on the simulations and we talked about them and tweaked them as needed."

Smith said NS' field transportation crews deserve a lot of credit. Among those involved were **Gary Shepard**, Pocahontas Division superintendent, and his field crews; **Haskel Stanback**, Virginia Division superintendent and his field people; **Alan Shaw**, then group vice president coal transportation and resources (now group vp chemicals), and the coal group; and McClellan's group. **Clark Cheng**, senior manager operations research, and **Wayne Mason**, senior director strategic planning, helped lead the computer modeling efforts.

"We had great tools and great people to work with," Smith said. "This was a sound plan, but we needed the people to step up and execute it. Everybody involved put in a lot of effort to make sure they operated and executed according to the plan, and that really is what has made it a success. Everybody played by the rules." ■ BizNS