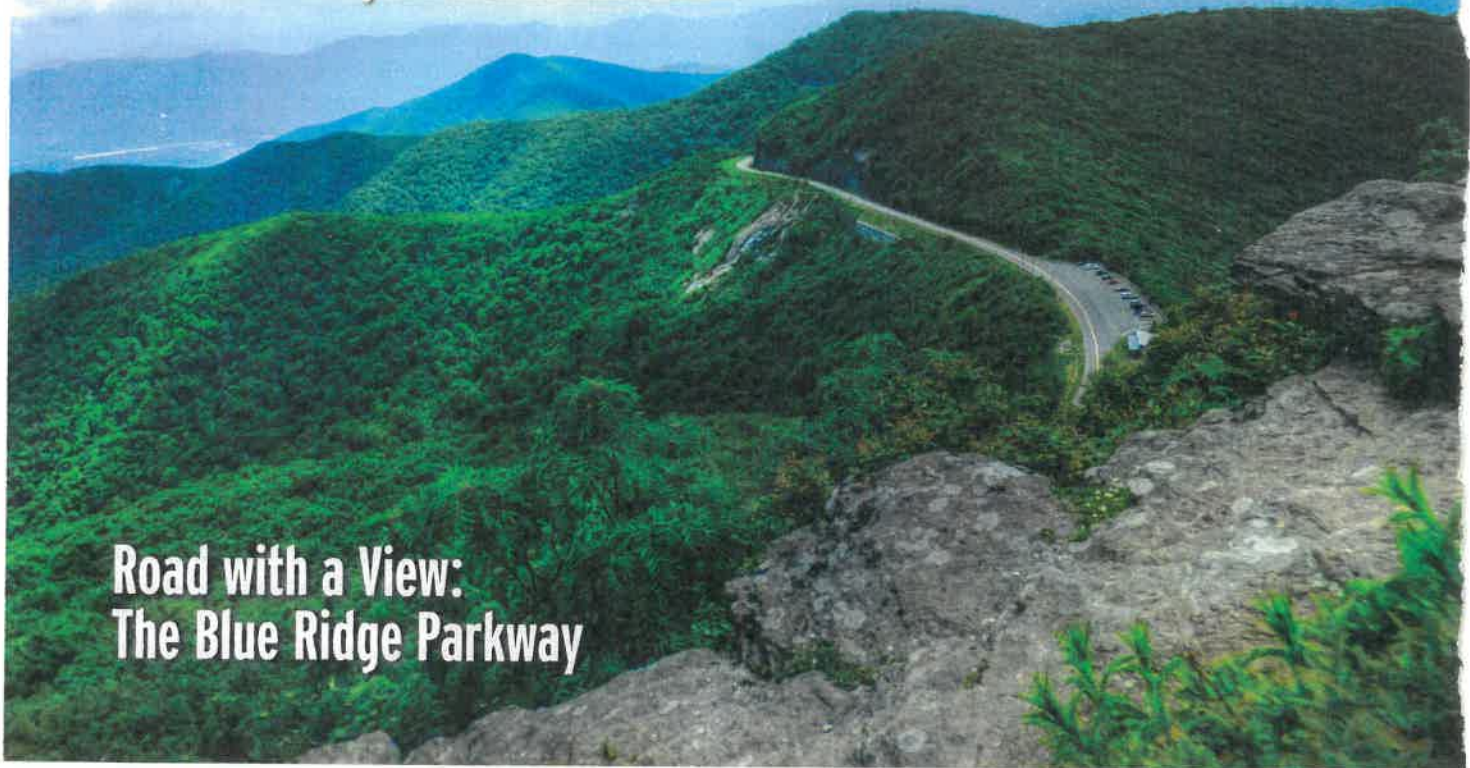


History Lesson



Road with a View: The Blue Ridge Parkway

MORE OFTEN than not, a highway is built simply to facilitate travel from one place to another. The Blue Ridge Parkway, however, was created for a different purpose: to offer motorists pleasant views of the Appalachian Mountains. The realization of that vision involved one of the most successful collaborations between landscape architects and civil engineers in American history.

The project was born on August 11, 1933, when Senator Harry Flood Byrd suggested the idea to President Franklin D. Roosevelt on a visit to Shenandoah National Park. Having received the president's blessing, Byrd convened a meeting of officials from the National Park Service (NPS), the Bureau of Public Roads (BPR), the U.S. Forest Service, the Public Works Administration, and the states of Virginia, Tennes-

The view from Craggy Gardens, above, is one of many vistas that the parkway made accessible to the public. Where rock cuts were necessary, crews typically reduced the gradient of the back slope for a more natural contour, below.

see, and North Carolina to discuss the proposal. The parkway quickly gained approval, and in November of that year Harold L. Ickes, the U.S. secretary of the interior, authorized its construction.

The Public Works Administration's involvement was no accident, for the Roosevelt administration viewed the parkway not only as a worthy project in its own right but also as an opportunity to create jobs and boost the regional economy—key goals of the president's New Deal. In fact, several New Deal agencies funded the project, including the Public Works Administration, the Works Progress Administration, and the Civilian Conservation Corps.

Although the project involved numerous stakeholders, the NPS took the principal role. To bring in some badly needed expertise, Thomas Vint, the chief landscape architect of the NPS, hired Gilmore D. Clarke, of New York's Westchester County Parks Commission, as the consulting landscape architect. He also engaged Clarke's colleague Jay Downer as the consulting engineer. On Downer and Clarke's recommendation, Vint selected Stanley W. Abbott as the resident landscape architect.

Clarke was considered an authority because the system of urban parkways he had built in Westchester County between 1913 and 1930



epitomized early-20th-century parkway design. The broad, four-lane roads were located within a landscaped corridor 200 to 1,700 ft wide to maintain a pleasant view. Grade crossings were eliminated, and access was limited to a few entrances and exits. Planners enhanced the routes by incorporating parks, beaches, and other recreational amenities along the way.

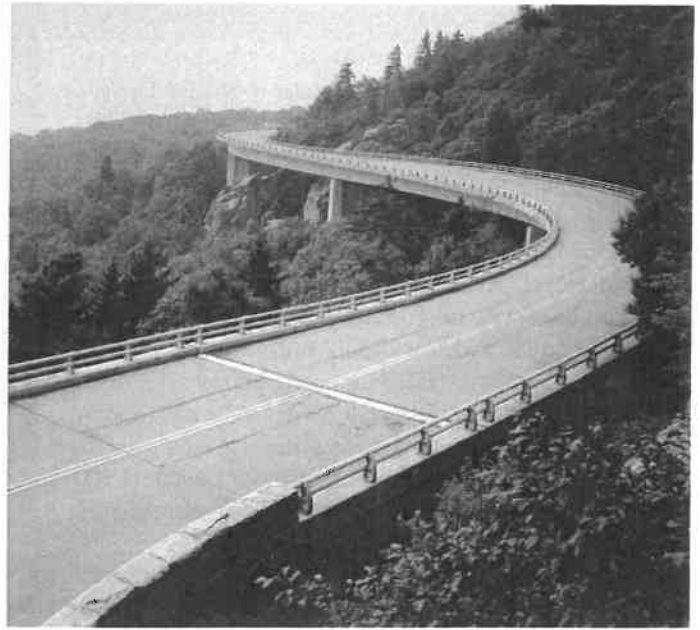
The pleasant urban parkways of Westchester County were an inspiration, but replicating them in the rugged Appalachians must have seemed a distant dream when Abbott began exploring the area in a Dodge truck in January 1934. Vint, Clarke, Downer, and BPR engineers William M. Austin, W.I. Lee, and Harold J. Spelman later joined Abbott in the field. The composition of the group reflected a partnership between the NPS and the BPR (and the latter's successor agencies: the Public Roads Administration and the Federal Highway Administration) that would make the Blue Ridge Parkway a model of roadway design.

Not long after the project began, Clarke and Downer resigned because of a quarrel with Ickes over their pay rate, leaving the 26-year-old Abbott in charge. Abbott assembled his own team, including Edward H. Abbuehl, his chief assistant, and Hendrick van Gelder, an expert on highway location and a veteran of the Westchester County Parks Commission. A visionary landscape architect and capable planner, Abbott would lead the project for a decade.

The parkway was conceived as a connector between Shenandoah National Park and Great Smoky Mountains National Park, but the initial authorization did not specify a route. The northern portion of the road would have to be located in Virginia, but farther south a number of possible routes existed through parts of North Carolina and Tennessee. Both of these states wanted the economic ben-

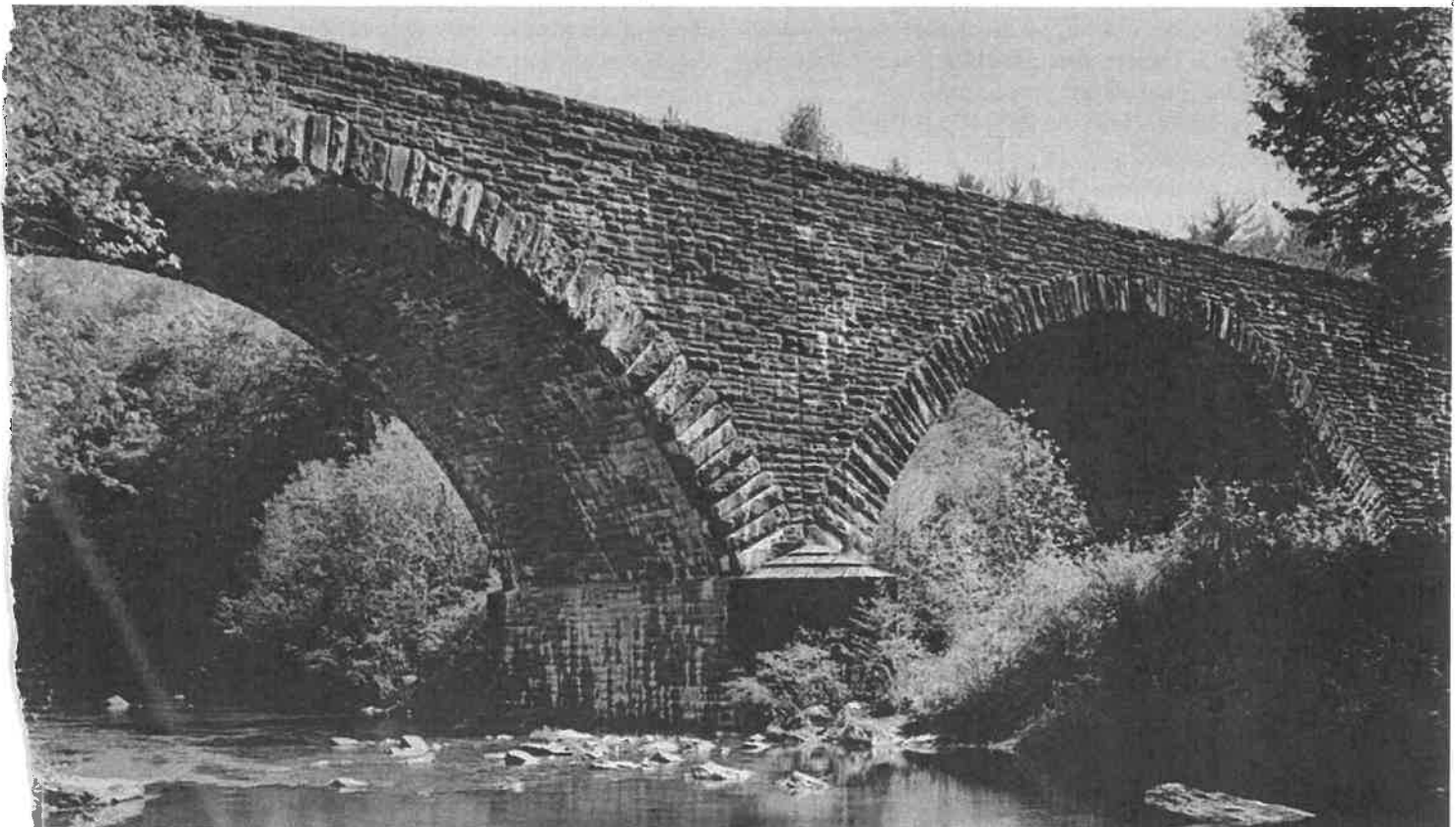
efits the parkway was expected to bring, and a bitter political battle ensued. The North Carolina highway engineer R. Getty Browning led that state's lobbying effort, which eventually prevailed. Ickes approved a Virginia-North Carolina alignment in November 1934.

Route planning was a collaborative endeavor. First, an NPS staff member, usually Abbott, Abbuehl, or van Gelder, staked out a preliminary alignment, proceeding south from Shenandoah National Park. BPR engineers followed, surveying and establishing acceptable grades while keeping an eye on projected construction and maintenance costs. Once the landscape architects and the engineers agreed on an alignment, they prepared right-of-way maps to guide the states' land acquisition efforts. The states purchased the land and donated it to the NPS. Meanwhile, the NPS and the BPR finalized the roadway design.



The Linn Cove Viaduct, above, was the key to filling the final gap in the parkway. The Linville River Bridge, below, is the parkway's largest stone-faced bridge.

LIBRARY OF CONGRESS, BOTH



The Blue Ridge Parkway was similar to Skyline Drive, a scenic roadway then under construction in Shenandoah National Park, but the two roads differed in significant ways. For example, Skyline Drive followed the crest of the mountains, but Abbott sought a route that would pass through a variety of terrain and give motorists a sense of the diversity of the landscape. Moreover, Skyline Drive was restricted to a relatively narrow right-of-way. In contrast, Abbott wanted a corridor that would vary in width, widening at times to include large tracts seen as having special scenic or recreational value. Even areas beyond the actual right-of-way were to be protected by easements in order to keep entire vistas free of development. In 1935 Abbott directed the states to acquire an average of 100 acres of right-of-way for every linear mile of roadway, plus 50 acres of easements.

One innovative feature of the road involved its curvature. Prior to the development of the Blue Ridge and other parkways of the 1920s and 1930s, American highway engineers tended to view the horizontal alignment of a road as a series of straight lines called tangents. When a change in direction was required, they made the transition from one tangent to another using a "circular" curve, that is, a segment of a circle.

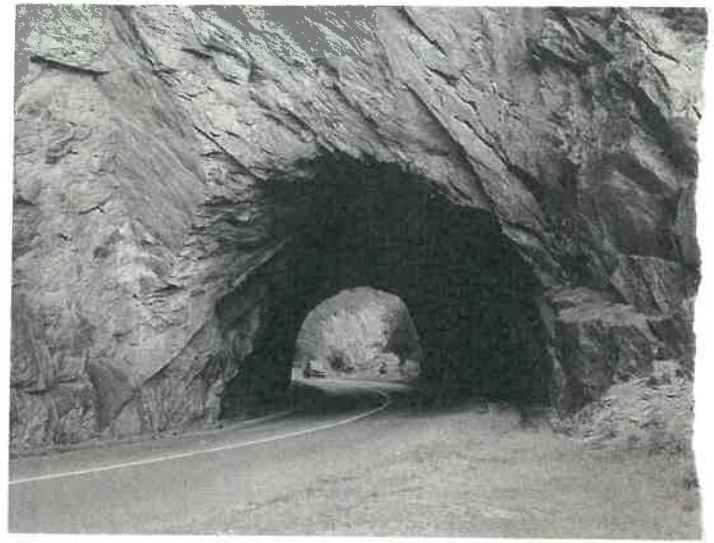
Railroad engineers had once taken a similar approach, but as trains became faster, they realized that curves would have to be more gradual to counteract the centrifugal force and keep trains moving at relatively constant speeds. They adapted by making more frequent use of "spiral," or transition, curves. Here the radius of curvature is not constant but rather decreases at a uniform rate. Because spiral curves are flatter than circular ones, they ease the transition from travel in one direction to travel in another.

Clarke, Downer, and another landscape architect, Wilbur Simonson, were among the first to borrow the spiral curve concept from the railroads and apply it to parkways, most notably Virginia's 15 mi long Mount Vernon Memorial Parkway (later renamed the George Washington Memorial Parkway), which opened in 1932. The designers of the Blue Ridge Parkway adopted the same approach on a grander scale.

Spiral curves benefited the Blue Ridge Parkway in that they enhanced safety by enabling motorists to maintain a constant speed. They also made it possible for the roadway to conform more closely to the terrain, promoting a sense of connection to the natural landscape. Each gentle curve opens a new vista to the motorist, making the drive a pleasant and memorable experience.

The parkway's cross section too was designed with aesthetics in mind. Where hillside cuts were required, plans typically called for excavation crews to reduce the gradient of the back slope (on the inside edge of the roadbed) and extend the fill slope (on the outside edge). Flattening the slope in this way resulted in a streamlined cross section that appeared to follow the natural contour of the land.

The roadway is typically 21 ft wide and has 4.5 ft shoulders of stabilized turf. Its base consists of compacted stone. For most of its length the road has an



asphalt surface, although some sections in Virginia are paved with bituminous concrete. The parkway was designed for travel at 50 mph, but in many places the grades and curves prevent drivers from attaining even the posted 45 mph speed limit.

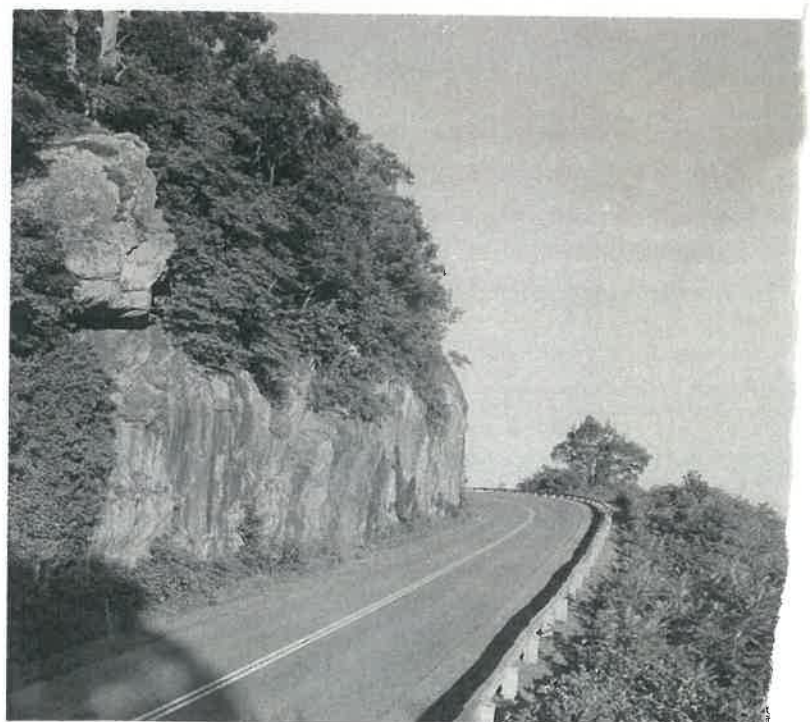
The two-lane, undivided road was designed to be unobtrusive. Its planners generated land use maps to indicate the intended appearance of each segment of the parkway, including such details as plantings, drainage lines, and views to be preserved. They even omitted outer edge stripes to help the parkway blend into its surroundings.

The parkway's early bridges and grade separation structures reflect a similar attention to detail. Many are rigid-frame, reinforced-concrete arches, although they are often mistaken for stone arches because they were faced in native stone in a rustic style. Even the three-span, 309 ft long Linville

River Bridge, the largest of the early crossings, is barely noticed by motorists, although a trail beneath it offers hikers a close look at the impressive stonework.

For construction purposes, the alignment was divided into 45 segments, and separate contracts were awarded for various phases of the work on each segment. For example, an initial contract might include clearing, rough grading, and drainage, while a subsequent contract would entail final grading

Tunnels, above, bridges, opposite, and the curving roadway itself, below, were all designed with a rustic look in mind.



and surfacing. Contractors were expected to preserve the natural landscape through such measures as protecting stream beds from erosion and felling as few trees as possible. Landscape architects and engineers inspected the work regularly.

Construction of the parkway began in September 1935 on a 12.5 mi stretch just south of the Virginia–North Carolina border. The work progressed quickly in the first several years under the supervision of the BPR engineers Austin, Lee, and Spelman. By the end of 1937, some 115 mi had been graded, and in April 1939 the first, 50 mi section was opened to the public.

Private contractors did most of the work, but several Depression-era public works programs also played a role. The Works Progress Administration, for example, paid laborers to perform such tasks as clearing brush and drilling rock. Crews organized by the Federal Emergency Relief Administration did landscaping work at recreational areas along the parkway. The project also employed workers from the

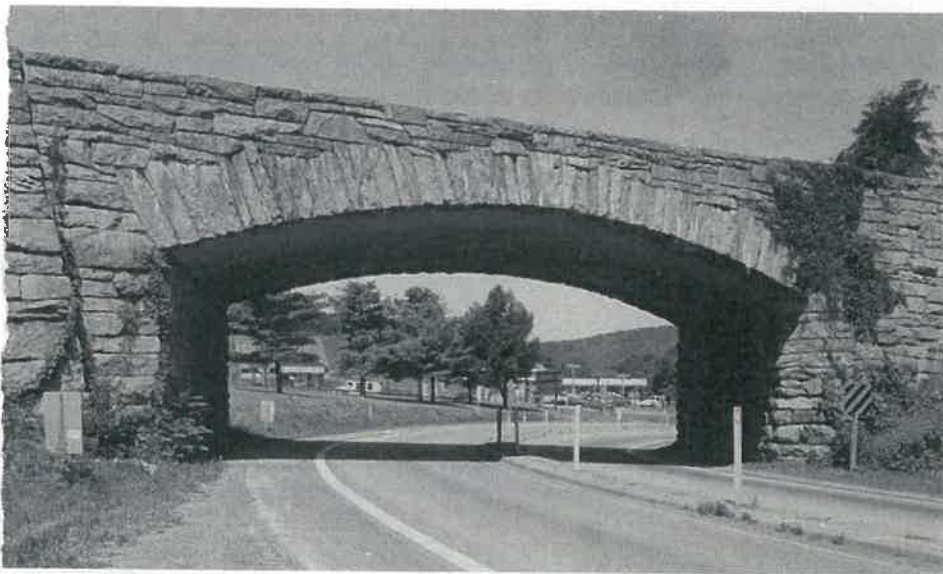
more than two decades, forcing drivers to make a 14 mi detour. The cause of the delay was Grandfather Mountain, a 5,946 ft peak that belonged to a family-owned corporation. For years, the route was the subject of negotiations between the NPS and the Federal Highway Administration, on the one hand, and the private company, on the other. The parties eventually reached a compromise, but completing the route would require the construction of a major viaduct, the funds for which were not available at the time.

Congress finally funded the project in 1979, making it possible to build the most significant structure on the parkway, the 1,243 ft long Linn Cove Viaduct, on the south side of the mountain. Figg and Muller Engineers, Inc., designed the eight-span segmental concrete bridge, which was erected using a unidirectional cantilever construction method to avoid scarring the landscape. The curvature of the precast, posttensioned box girder, which follows the contours of the

mountainside, made it the most complex structure of its kind in the world at the time.

Completed in 1983, the Linn Cove Viaduct won a merit award in 1984 in ASCE's Outstanding Civil Engineering Achievement Award competition. In August 1987 the remainder of the "missing link" was finished, and after 52 years of construction, the Blue Ridge Parkway was finally complete. In 1999 ASCE accorded landmark status to the parkway in its Historic Civil Engineering Landmark Program.

The Blue Ridge Parkway today winds 469 mi from Rockfish Gap on Skyline Drive, near Waynesboro, Virginia, to its southern terminus at the entrance to Great Smoky Mountains



Civilian Conservation Corps, which assigned them to four camps of approximately 200 men each, including a separate camp for African-Americans. Because such programs were intended to create as many jobs as possible, they relied heavily on manual labor.

When World War II began, approximately 170 mi of the parkway were open to visitors, and an additional 160 mi were under construction. But wartime priorities meant fewer dollars for the project, and construction nearly came to a halt. The war also ended the Works Progress Administration, Federal Emergency Relief Administration, and Civilian Conservation Corps programs that had contributed so much to the effort.

By the time the war ended, the project had lost momentum. In fact, major construction did not resume until the mid-1950s, when the NPS's director, Conrad L. Wirth, launched an initiative called Mission 66 to invest in the development of the nation's parks with an emphasis on attracting automobile tourists. Thanks to this new infusion of funds, by the end of 1966 the entire parkway was complete and open to the public, with one notable exception.

The last remaining gap in the parkway was a single, 7.7 mi long segment near Linville, North Carolina. It remained so for

National Park near Cherokee, North Carolina. Along the way, it passes through five major mountain ranges, dipping to 649 ft above sea level near Lynchburg, Virginia, and rising to a height of 6,047 ft on North Carolina's Richland Balsam Mountain. The scenic corridor includes 14 visitor centers, 26 tunnels, approximately 170 bridges, and nearly 300 overlooks. In nearly every year since its completion it has been the most visited place in the National Park Service system, drawing 13.9 million visitors in 2014 alone.

The parkway's historical significance rests on more than statistics, however. It was the National Park Service's first long-distance rural parkway and the longest road in the United States to be planned as a single unit. It was a triumph of large-scale land use planning, unlocking the recreational potential of a region spanning two states. Not least, it demonstrated the value of collaboration between landscape architects and civil engineers.

—JEFF L. BROWN



Jeff Brown is a contributing editor to Civil Engineering.