



# CATHEDRAL OF MOUNTAIN RAILROADING

Austria's Semmering Railway has been an artery of Europe for more than 160 years

Story and photos by Scott Lothes

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As the predawn sky glows above the village of Breitenstein, a northbound freight train rolls onto the Kalte Rinne Viaduct in May 2016. At far left, a green signal beckons the train onward, beneath the lights of the village.



Near the top of a rocky, wooded valley in the Alps of eastern Austria, there stands a hewn stone viaduct befitting the Old World's most renowned castles and cathedrals. Two levels of majestic arches rise 151 feet above the valley floor in a structure that could serve as the entrance to a king's palace or an emperor's fortress. Parapets run along the top of both sides, but there are no towers and no guards. Only the overhead catenary betrays what could otherwise be a scene from the Middle Ages. Within minutes, a train appears, almost silently, two red locomotives leading a long string of open auto racks, emerging from a sheer cliff as if coming from the center of the earth.

The locomotives bear the initials ÖBB for Österreichische Bundesbahnen, Austrian Federal Railways. The viaduct is the Kalte Rinne, signature structure of the Semmering Railway — the first line to cross the Alps and still one of Central Europe's busiest arteries. Connecting Vienna with Italy and the Adriatic Sea, traffic approaches 200 passenger and freight trains on a busy day. They still use the same right-of-way, bridges, and tunnels that some 20,000 laborers built by hand in the middle of the 19th century.

The sheer rock face belongs to the Polleroswand, a 3,000-foot mountain whose crest offers a vertiginous view of the Semmering Railway's most impressive engineering. To the east, the Alps roll off into the distance toward the Great Hungarian Plain, while the tracks appear below from the village of Breitenstein, go through a 46-foot tunnel, and vault across a steep ravine on another two-story viaduct, the Krauselklause. They then immediately pass through Polleroswand Tunnel — nearly a quarter-mile long — before emerging onto Kalte Rinne at the apex of a 10-degree horseshoe curve. The trains pass quietly, frequently, purposefully, like

robed monks through a Benedictine abbey. Seen from the loft of the Polleroswand, the Semmering has all the grandeur of the cathedral of mountain railroading that it truly is.

## ADRIATIC OBSTACLE

The Semmering Railway is just 25.5 miles long, but it is the capstone of Austria's Southern Railway on the 300-mile route from Vienna to the Adriatic. What is now northern Italy for centuries belonged to several empires and monarchies, including the Holy Roman Empire. Footpaths dating from at least the Middle Ages linked Vienna, seat of imperial power, with Trieste, the empire's primary seaport. Those paths crossed the mountains via 3,166-foot Semmering Pass, 50 miles southwest of Vienna and the only major obstacle on the entire route to the sea.

While most commerce in North America moves east and west, in Europe, much of it moves between north and south. As that flow began to swell with the Industrial Revolution, leaders of the Austrian Empire sought better means of transportation and connectivity. While Europe is the cradle of railroad technology, its early lines were straight and flat. Most of the continent's leading rail experts staunchly agreed that an adhesion line through the Alps was impossible, some even calling it "pure madness." One early plan called for a circuitous route to Trieste through present-day Hungary and Croatia that would bypass the rugged mountains altogether.

Yet a railroad through the Alps via Semmering Pass offered a tantalizingly shorter route to the sea. It would require technology that had not yet been invented, from new locomotives to new surveying instruments and methods. Mountain railroads demanded new ways of thinking. To

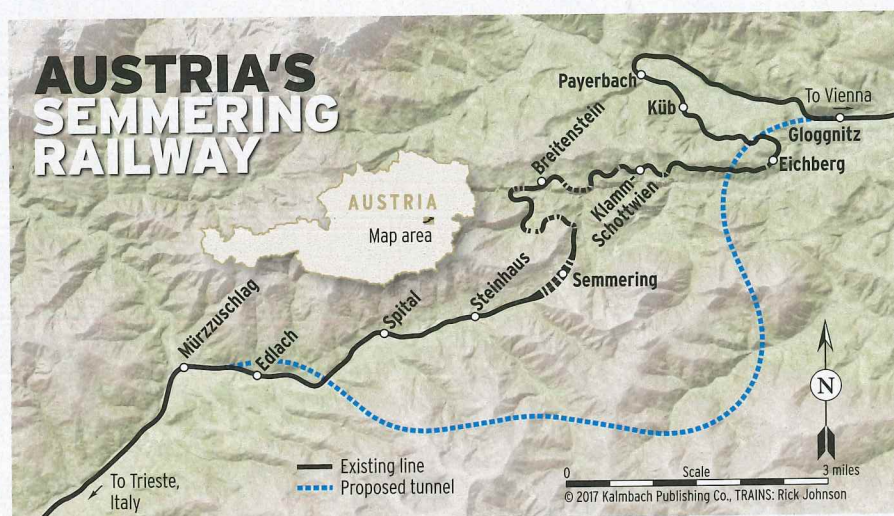


build Europe's first, Austria needed a genius. It found one in Carl von Ghega.

Born Carlo Ghega in Venice in 1802, he had such aptitude for mathematics that he had received a doctorate by age 17. He worked initially on daring roads and bridges in the mountains of what is now northern Italy, before shifting his focus to rail in 1836. Ghega had soon devised a rough plan for a conventional adhesion railroad over Semmering Pass.

Austria's leaders must have had great faith in Ghega — or so desperately wanted a railroad to Trieste by the shortest possible route that they were willing to listen to anyone who said it could be done. Whatever the case, in 1842 they placed him in charge of planning all of the state railroads, with special focus on a line over the Semmering. They even sent him to the U.S. for five months of study, where seeing the Baltimore & Ohio Railroad, fully convinced Ghega of the Semmering's feasibility.

During the next five years, Ghega perfected his plans. He and his technicians plotted 25.5 miles of winding track between the mountain towns of Gloggnitz and Mürzzuschlag — separated by just 13.5 air miles. They used 2.5-percent grades, 10-degree curves, 16 major viaducts, and 14 tunnels, plus a 4,695-foot summit tunnel beneath the pass. Workers began building the Semmering Railway







**A southbound freight crosses Kalte Rinne Viaduct, with a Class 1142 head-end helper leading a Taurus in May 2016. The rock-faced mountain at left is the Polleroswand, through which the railroad passes with a tunnel of the same name.**

in June 1848.

To find a locomotive capable of pulling trains over the steep grades and sharp curves, Ghega convinced the government to sponsor a contest. There were four entrants — all successful.

The Semmering Railway officially opened on July 17, 1854, immediately enabling direct train service over 267 miles from Vienna to Ljubljana, today the capital of Slovenia. The full line to Trieste opened three years later. Ghega had proved his doubters wrong and ushered in a new paradigm in European railroads. Not only did his design prove feasible, many considered it quite beautiful. By necessity, builders used locally quarried limestone for the line's many viaducts, tunnels, and structures, which helped them blend naturally with their surroundings. Trained in both engineering and architecture, Ghega sought an aesthetically pleasing functionality, ensuring everything from dramatic vistas along the right-of-way to ornamental flourishes in structural stonework.

Lauded in its time, the Semmering Railway has aged well. In continuous use



**A Class 1142 electric leads a southbound auto rack train upgrade at Wolfsbergkogel. Behind the station is the Kurhaus Semmering Hotel, which opened in 1909 and was once among the many opulent hotels at Semmering that regularly hosted Vienna's elite.**

for 163 years, most of the major infrastructure is unchanged. The viaducts and roadbed now support axle loadings of 25 tons, a 67-percent increase over their initial specifications. A second, parallel summit tunnel was completed in 1952 to abet the original single-track bore — which re-

mains in service. Overhead catenary was installed from 1957 to 1959 for electrification at 15 kv, 16⅔ hz. Passenger traffic grew so rapidly that many of the stations were soon replaced, but a stone original remains at Klamm-Schottwien. When it opened, the railroad included 57 stone





linemen's houses — one about every half mile — to allow for constant visual monitoring. Several remain, and the one at the uphill end of the Kalte Rinne Viaduct now houses a museum.

### TRAFFIC TODAY

The Semmering Railway is still the primary route between Vienna and Italy, and it is busier than ever. Regular passenger traffic exceeds 60 daily trains. Most are regional runs with Austria's high speed Railjet equipment, which entered service in 2008. The push-pull trainsets are seven cars long and typically powered by Siemens' 8,600-hp, EuroSprinter electric locomotives in matching paint. Railjets feature first- and second-class seating, on-board restaurant service, free Wi-Fi, and a top speed of 143 mph — although they are limited to just 37 mph through the Semmering's tight curves.

Railjets provide 14 daily round trips between Vienna and Graz, Austria's two largest cities, and six between Vienna and Villach. There are three daily pairs of long-distance EuroCity trains with traditional equipment that link Vienna with the cities of Ljubljana; Venice; and Zagreb, Croatia. Two pairs of EuroNight sleeper trains run between Vienna and Italy. Three-car EMUs provide local service every 2-3 hours during the day.

Freight traffic varies greatly but can exceed 100 movements on busy days, with a diverse blend of intermodal, mixed freight, and unit trains — including solid sets of open auto racks taking new cars south. Nearly all freights get a head-end helper locomotive for the mountain grades, and many get a pusher as well. EuroSprinters are typical road power, but older Austrian electrics of the 1142 and 1144 classes still hold the helper assignments. These date from the 1960s and 1970s and, following upgrades in the 1990s, develop 4,700 and 6,700 hp, respectively. With more tonnage going south, helpers frequently return north as light units.

The entire railroad has two main tracks, with bidirectional signaling and frequent crossovers to keep operations fluid. Most of the stations along the line have one or more sidings for additional flexibility. The freights generally have sufficient horsepower to stay out of the way of passenger trains, but trains do occasionally overtake each other — both in stations and along the line.

Spending some time along a busy Euro-

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**A pair of light helpers consisting of a Class 1142 and Class 1144 hustle north over the Kalte Rinne Viaduct on their way back to Gloggnitz to assist more southbounds.**





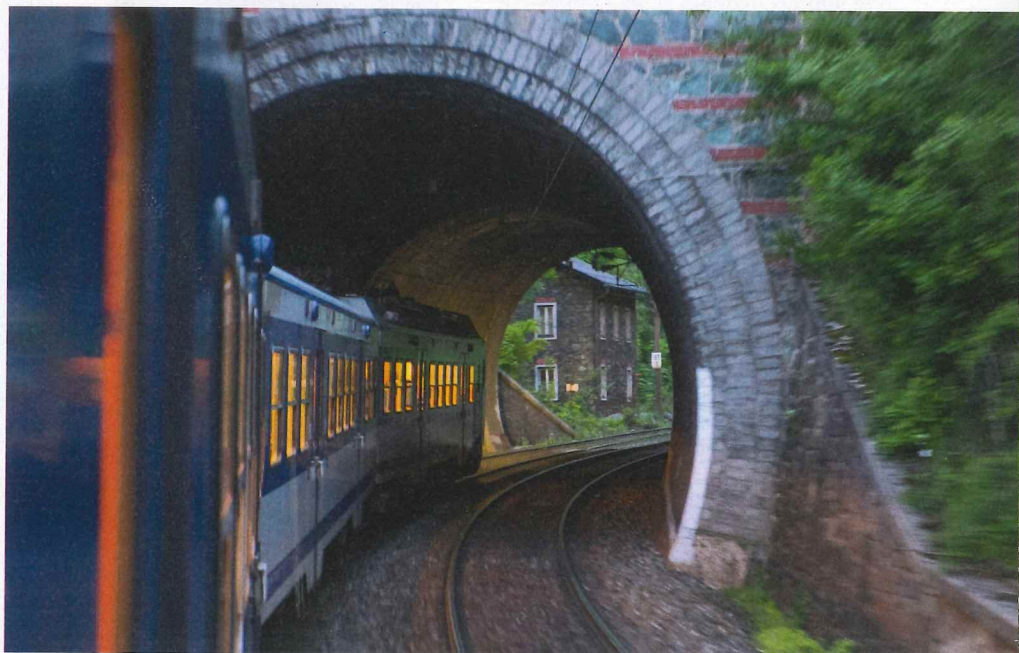
**The 46-foot Krauselklaus Tunnel separates a northbound Railjet on Krauselklaus Viaduct and a short southbound freight led by a single Class 1144 in May 2016.**

pean main line like the Semmering can be a refreshing change of pace from train-watching in much of the U.S. For all the traffic, though, tonnage pales in comparison to the volumes of North America's heaviest corridors. With short freight trains essential to smooth passenger operations, the Semmering handles about 20 million tons per year. By comparison, annual freight traffic on BNSF Railway's Southern Transcon main line from Chicago to Los Angeles exceeds 100 million tons.

Ultimately, though, directly comparing North American and European main lines is fair to neither continent's railroad. Outside of the Northeast Corridor — which frequently has four main tracks and almost no freight traffic — few main lines in the Americas attempt to move the number of intercity passengers that an average route in Europe handles. And Europe's railroads rarely have the need to perform the long-haul, heavy-tonnage services that define so many North American main lines. For what it does, the Semmering is every bit as impressive as the most renowned mountain routes in the U.S. and Canada.

## LEGACY AND FUTURE

In 1998, approaching its sesquicentennial, the Semmering became the first railroad to obtain UNESCO World Heritage Status. The railroad was recognized for its significance, how little it changed, and its



**The opened window of the day's last southbound local passenger train offers this view of a typical stone-faced tunnel portal and stone lineman's house on the Semmering Railway.**

economic, historic, and cultural value.

Trains brought the mountains within easy reach of Viennese, and Semmering grew quickly as a resort community in the second half of the 19th century. Viennese society immediately appreciated the mild summer climate and, later, the abundant snow for skiing and other winter sports. Luxury hotels opened all over the mountainsides, and for decades their guest lists read like a who's who of Vienna's elite.

While much of this opulence has faded, Semmering remains a popular getaway from Vienna, particularly in the winter. Its slopes continue to host World Cup races, and at least a few of the skiers still arrive by train.

In warmer months, a highly developed network of trails offers hikers an intimate way of exploring the railroad. The main, 14-mile-long Bahnwanderweg follows the line all the way from the visitor center at



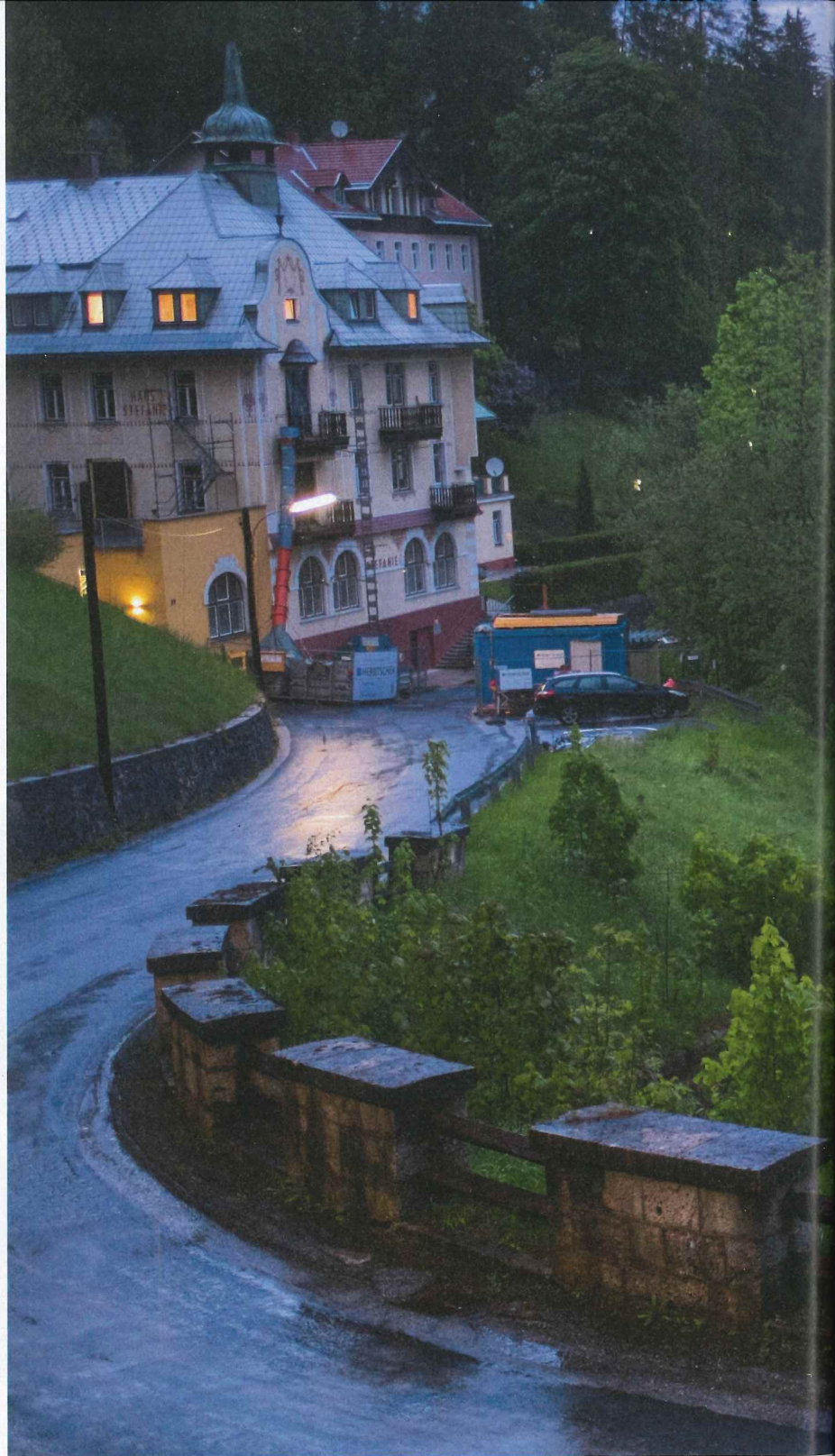
**At twilight of a stormy day, a southbound freight train has nearly finished its climb up from Vienna and is about to enter the 4,695-foot-long Semmering Tunnel at the resort town of Semmering in May 2016.**

Semmering down to Gloggnitz. Signs in multiple languages provide interpretation, while numerous side trails lead to spectacular vistas. Most famous is the "20-Schilling View," named for Austria's 20-schilling banknote introduced in 1967 that featured Ghega's portrait on one side and Kalte Rinne Viaduct on the other. A platform built above the trees less than half a mile from Wolfsbergkogel station preserves the famous vantage for all to enjoy. For his work on Austria's railways, Ghega was knighted in 1851. He is buried in Vienna Central Cemetery, commemorated by a large stone monument there, as well as at Semmering Station. The lineman's house along the hiking trail at the uphill end of Kalte Rinne Viaduct has been converted into the Ghega Museum, which is open in the summer and early fall, honoring his work and the building of the railroad.

The legacies of the Semmering Railway and its mastermind are secure, but what of those 20,000 souls who built the line? While the first laborers came from Vienna, the Semmering's workforce ultimately included Bohemians, Italians, Slovenians, and even Saxons. Most of their names and stories are lost to time, but the fruits of their labors live on with each passing train. They worked 12-hour days, almost entirely by hand, carving out the right-of-way, hewing stone for the viaducts, and digging nearly 2 miles' worth of tunnels without the aid of dynamite. They lived in cramped quarters, through harsh winters, often lacking adequate hygiene and even fresh food. Many of the workers never left. The exact death toll is impossible to determine, but historians estimate that between 1,000 and 1,500 laborers died while building the Semmering Railway.

The ruins of Castle Klamm sit atop a hill just beyond Klamm Tunnel, near the midpoint of the grade up the north side of the pass. At the base of the hill is St. Martin's Parish Church, with a small graveyard on its south and eastern sides. Hemmed in by the hill and the church, the graveyard narrows to a point at the corner nearest the castle. At that point is the largest marker in the cemetery, a light gray obelisk about 10 feet high. There is but one word at its base, *Bahnbauteit*, "railway construction," followed by the years, 1848-1854.

Klamm is a tiny village of just a few dozen buildings, with the railroad hidden in the tunnel. It is a quiet, contemplative

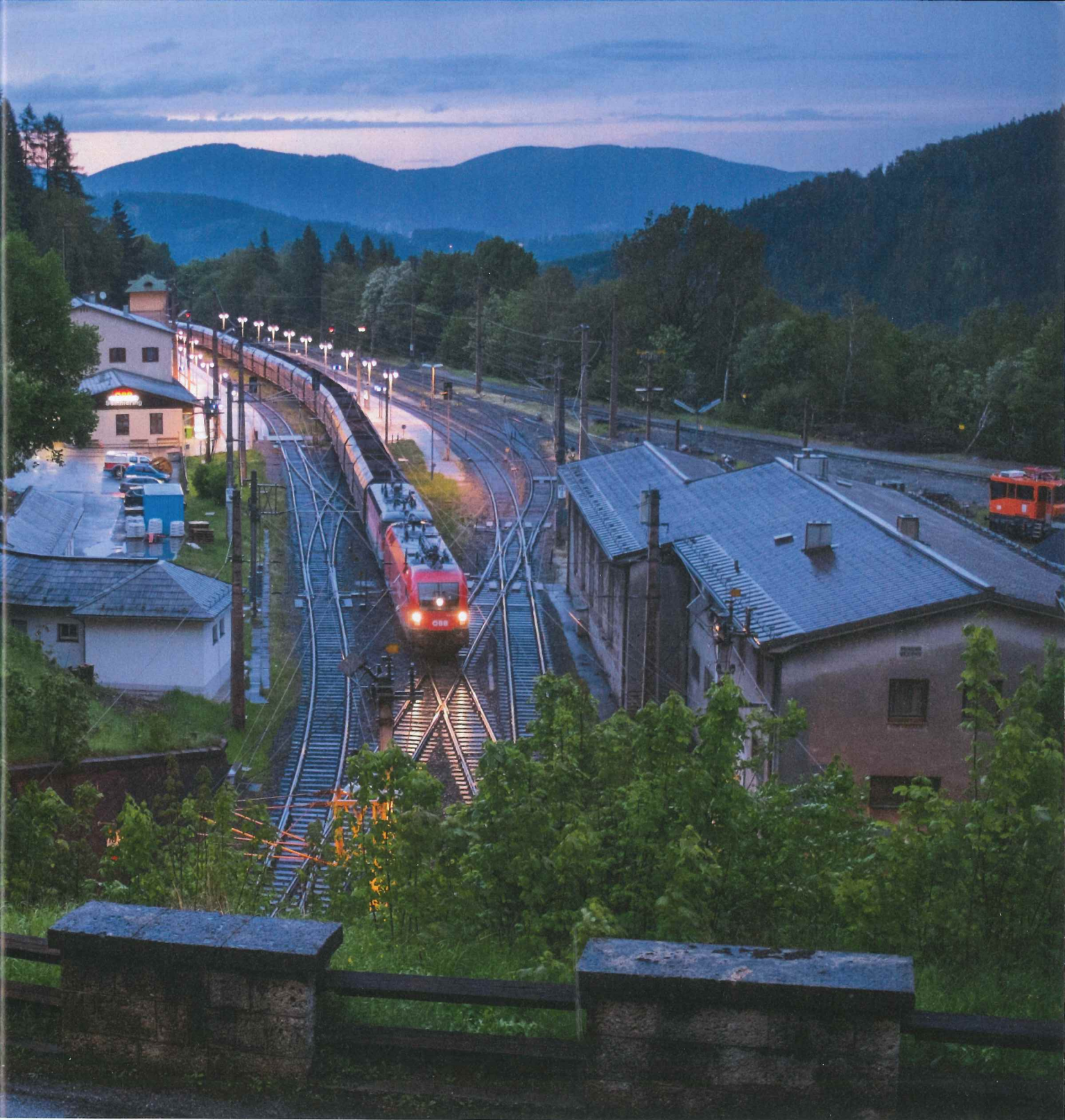


spot, with a commanding view of the valley opening to the east. You cannot see the trains, and the electricians are deceptively quiet, but you can hear the flanges squealing through the tight curves, a distant sound that mixes serenely with chirping birds and the gentle breeze as cumulous clouds build over the Eastern Alps on a late spring afternoon. You cannot help but say a prayer of gratitude to the railroad builders, and hope

they rest in peace.

Far below them, their contemporaries toil deep within the mountains. After more than a century and a half of unabated, arterial use, time is catching up with Semmering Railway. With traffic on this key Baltic-Adriatic corridor expected to grow, the slow mountain crossing is becoming a constrictive bottleneck. Construction commenced in 2014 on a 17-mile base tunnel





that will bypass the entire Semmering Railway. Expected to open in the mid-2020s, the new tunnel will reduce the ruling grade to 0.85 percent while increasing the speed limit to 155 mph, shaving 30 minutes off transit times while significantly increasing the route's capacity.

The original Semmering Railway will likely remain in use for local passenger and tourist service. Given its historic and cultur-

al significance, it should continue to draw visitors from Austria, across Europe, and around the globe. For a few more years, it will continue to provide exactly what Ghega and the Austrian Empire intended, fully achieving its billing in the UNESCO World Heritage application as an "epoch-making achievement of the human spirit."

In one sense, the epoch that the Semmering Railway ushered in will come to a

close with the base tunnel's opening. Yet in a broader sense, the era continues, as ever-improving technology makes transportation increasingly easier through even the harshest terrain. The Semmering was a great milestone on the long arc of travel through the Alps. Even when most of its crowds have gone underground, the cathedral will remain, its corridors quieter, but no less profound. **I**