SPECIAL REPORT: LOCOMOTIVE TECH p. 8

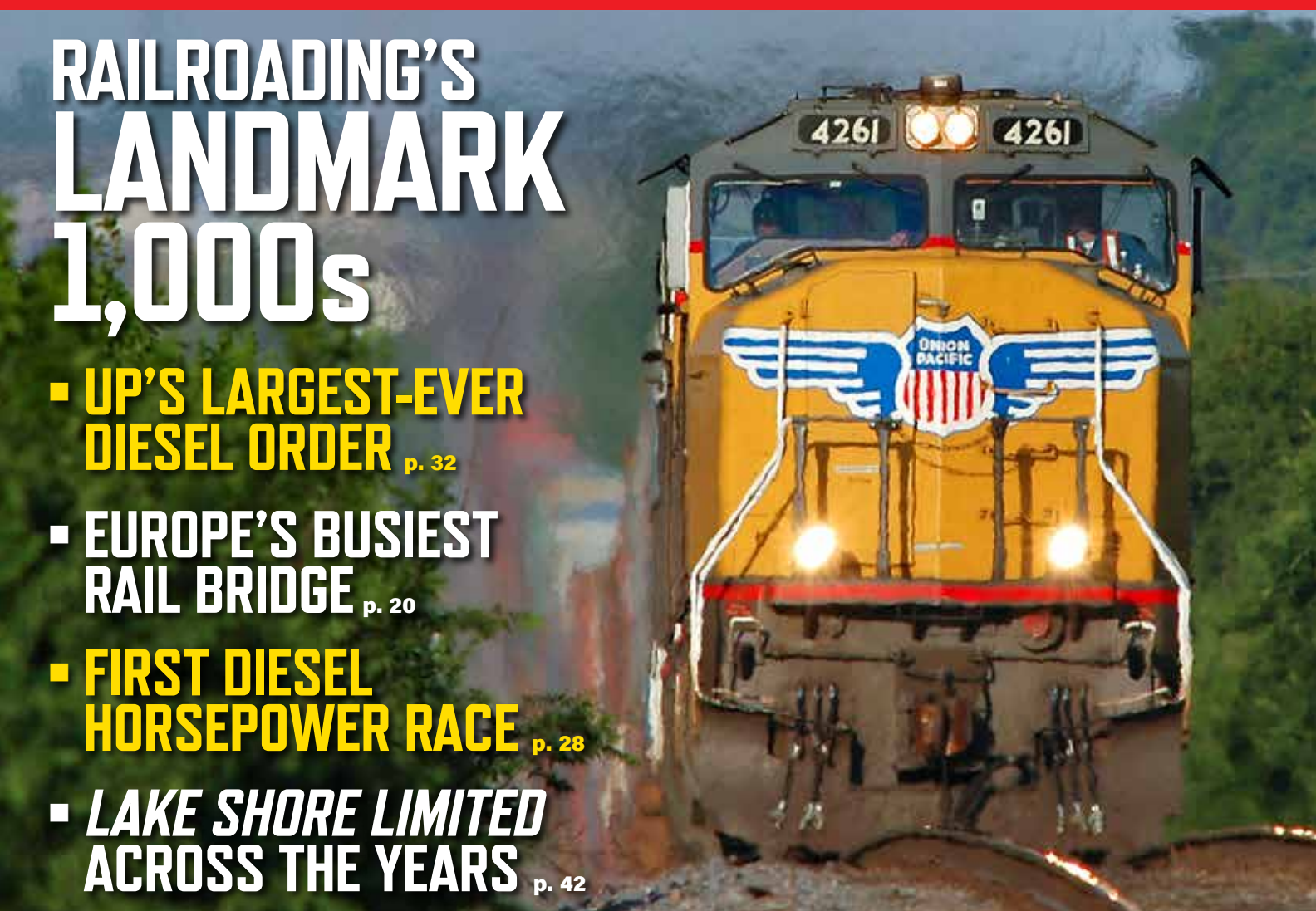
1,000 ISSUES

Trains®

www.Trains.com • February 2024

RAILROADING'S LANDMARK 1,000s

- UP'S LARGEST-EVER DIESEL ORDER p. 32
- EUROPE'S BUSIEST RAIL BRIDGE p. 20
- FIRST DIESEL HORSEPOWER RACE p. 28
- *LAKE SHORE LIMITED* ACROSS THE YEARS p. 42



PLUS

RAIL EXECS NAME INDUSTRY'S WORST INVESTMENTS p. 50

ST. LOUIS' HISTORIC EADS BRIDGE MARKS 150 YEARS p. 72

SALISH SEA: A BEN BACHMAN PHOTO ESSAY p. 60

$7.99

0 74666 01213 4 02

Vol. 84 • Issue 2

trains.com

ALL-NEW SPECIAL ISSUE ARCHIVES

ACCESS TO 100+ SPECIAL ISSUES

Trains.com Unlimited members now get access to more than 100 special issues in the archives! The all-new Special Issue Archives features curated titles like Locomotive 2018, Model Railroad Scenery, Electric Trains From A to Z, Great Trains West, and more!

CHECK OUT THE 30-DAY FREE TRIAL OF TRAINS.COM UNLIMITED TO START READING POPULAR ISSUES TODAY!

SCAN TO LEARN MORE

VISIT US ONLINE:

TRAINS.COM/MEMBERSHIP

THE BEST IN MODELING & RAILROADS • ALL IN ONE STOP!

Trains · Model Railroader · Classic Toy Trains · Classic Trains Magazine · Garden Railways · trains.com VIDEO

In this issue

1000 ISSUES

February 2024
Vol. 84, No. 2

Features

ON THE COVER:
Union Pacific SD70M No. 4261 leads an intermodal stack train westbound near Terrell, Texas, in January 2005. Steve Schmollinger

In every issue

Trains.com

facebook.com/TrainsMagazine

twitter.com/TrainsMagazine

@trains_magazine

From the Editor

Carl Swanson
cswanson@kalmbach.com
@TrainsMagazine
@trains_magazine

Welcome to the 1,000th issue! Few magazines make it to 1,000 issues. In our case the journey started all the way back in fall 1940.

Trains was there to report on the railroads' response to World War II, the transition from steam to diesel, the decline and fall of passenger trains and their revival under Amtrak, and much else consequential and otherwise.

Inside are a series of articles with a "1,000" theme, including a bridge that sees 1,000-plus trains a day, the inside story of Union Pacific's single order for 1,000 SD70Ms, and a whole lot more.

Mostly, though, this issue is about you. We wouldn't have gone far or lasted long without your steadfast support. A thousand thanks!

CUSTOMER SERVICE
phone: (877) 246-4843
Outside the U.S. and Canada: (903) 636-1125
Customer Service: customerservice@TrainsMagazine.info

For the purpose of marketing goods and services to our customers, we may make certain customer information and our customer list available to carefully screened companies that offer products and services that we believe would interest our customers. Please visit our privacy policy at www.kalmbach.com/privacy for more information. If you do not want to have your information transmitted to third party companies that offer products and services to our customers or to database cooperatives, please advise us at Kalmbach Media Data Protection Office, P.O. Box 1612, Waukesha, WI 53187-1612, email us at privacy@kalmbach.com or call us at 877-246-4843.

ADVERTISING SALES
Michael Wieloch
888-558-1544, Ext. 625
mwieloch@kalmbach.com

EDITORIAL
phone: (262) 796-8776
email: cswanson@kalmbach.com
fax: (262) 798-6468
P.O. Box 1612
Waukesha, WI 53187-1612

SELLING TRAINS MAGAZINE OR PRODUCTS IN YOUR STORE:
phone: 800-558-1544
Outside U.S. and Canada: 262-796-8776, ext. 818
email: tss@kalmbach.com
website: Retailers.Kalmbach.com

TRAINS HOME PAGE
Trains.com

Subscription rate: single copy: $7.99 (U.S.). Print + digital subscription rate: U.S.: 1 year $58.95. Canadian: Add $12.00 postage. Canadian price includes GST, payable in U.S. funds. All other international: Add $22.00 postage, payable in U.S. funds, drawn on a U.S. bank.

Trains Magazine (issn 0041-0934, usps 529-850) is published monthly by Kalmbach Media Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI, 53187-1612. Periodicals postage paid at Waukesha, Wis., and at additional offices. POSTMASTER: Please send address changes to *Trains*, P.O. Box 8520, Big Sandy, TX 75755. Canada Publication Mail Agreement #40010760.

The *Denali Star* pulls into Denali National Park station. Trains carry 59,000 visitors a year to the sprawling park. Three photos, Carl Swanson

Trains' Tour of Alaska leaves editor awestruck

DEPENDING ON WHERE YOU LIVE, *getting to Alaska can take a while. In my case, it meant waking in time to catch a 4 a.m. airport shuttle from Milwaukee to Chicago, a 6-hour non-stop flight to Anchorage, and another hour in a regional jet to reach Fairbanks.*

It was a long day. I think that's why, when I arrived in Alaska, I briefly wondered if American money was accepted. I was either jet-lagged or losing my marbles.

Fairbanks is in the middle of Alaska. It is the state's second-largest city, but that doesn't make it especially big. About 33,000 people call it home. Tour participants were met at baggage claim by our two coordinators from Special Interest Tours. They planned everything and did a fantastic job of keeping the tour moving smoothly.

I had a couple of hours to relax in my hotel room (a Marriott, across the street from the Dog Mushing Hall of Fame, and, no, I am not making that up). Then it was time to head downstairs and board the chartered bus that would accompany our tour and take care of non-rail transportation needs. With the short drive to our welcome dinner, our nine-day Alaska tour was officially underway ...

Thanks to frequent clouds, only 30% of visitors to Denali National Park get to see the distant twin peaks of Denali, the tallest mountain in North America.

The *Coastal Classic* runs between Anchorage and Seward. It offers some of the best views to be had from a train, including glaciers like this one.

Curious to know what happens next? This is only a small excerpt from *Trains* Editor Carl Swanson's recent excursion trip to Alaska. To see how it all turns out and read the full article, visit Trains.com and click on the *Trains* tab, then search, "Travel with Trains: Alaska 2023."

To join one of our next *Trains* editors on any one of four upcoming tours, go to specialinteresttours.com and click on "Destinations." — *Nastassia Putz, production editor*

BNSF, J.B. Hunt aim at trucks with new intermodal offering

Quantum service revives Santa Fe-era name, seeks traffic never captured by rail

▲ **A Chicago-bound BNSF Railway intermodal train, consisting almost entirely of J.B. Hunt containers, passes through Hinsdale, Ill., on Nov. 5, 2023.** David Lassen

J.B. HUNT AND BNSF RAILWAY have set out to bake a bigger pie. In November they launched faster, more reliable premium domestic intermodal service they say will eventually convert millions of truckloads to rail.

The Quantum service — which revives a name Santa Fe and J.B. Hunt used when they began their TOFC alliance in 1989 — shaves as much as a day from traditional schedules while offering truck-like 95% on-time performance. Flexible rates range between those of traditional intermodal and over-the-road service.

Quantum takes aim at highly service-sensitive freight that's never been on rails before. J.B. Hunt and BNSF have been working to improve their core intermodal service in order to regain market share lost to the highway over the past few years of service disruptions.

"Quantum is over and above that. We believe there's been quite a bit of freight that our customers thought was too service sensitive and they didn't want to risk service failures and … they never considered intermodal," says Spencer Frazier, executive vice president of marketing and sales at J.B. Hunt.

"We're going to expand the intermodal market," he says.

The keys to Quantum: An unprecedented level of coordination involving J.B. Hunt, BNSF, and the customer, plus transit-time customization built around each shipper's needs.

J.B. Hunt and BNSF began test moves shortly after a team of Hunt employees began working alongside railroaders at a new intermodal innovation center at BNSF headquarters in Fort Worth on July 5. The tests included shipments for several customers on several intermodal lanes on the BNSF network.

"The reliability on the loads' door-to-door, on-time performance that we've seen in that proof of concept is 98% on time," says Tom Williams, BNSF's group vice president of consumer products. "So we're pretty excited about the results that we've seen through the pilot. And we're ready to launch this now and see more volume at scale."

Knowing precise transit-time requirements is what enables J.B. Hunt and BNSF to offer faster door-to-door schedules for each customer.

A traditional intermodal load might involve a customer moving a container from a transload center near a port to an inland distribution center. In those cases, J.B. Hunt offers a transit guide that includes some built-in flexibility on pickup and delivery times.

"With Quantum, what we're doing is asking for the opportunity for a transit guide on something that they consider more sensitive, more specific," says Darren Field, president of J.B. Hunt intermodal. "And you're highly customizing and planning on the front end. You're going to have the order ready by time x, noon. We're going to have a driver there to pick it up shortly after that. We're going to make the cutoff at the front end, probably same day. BNSF is loading it on the train assigned to that transit — however we designed it. Again, it's customized. It's not necessarily an expedited product. It's a product built around meeting

a very specific set of parameters that the customer needs."

J.B. Hunt will provide priority dray movements for Quantum shipments.

For its part, BNSF aims to provide the capacity necessary to efficiently and reliably handle Quantum loads within existing service. "We're not planning a Quantum train," Williams says, noting that as volume grows the railroad will add train starts. But the key, he says, is "having that train capacity there so that the overall consistency and network reliability supports layering on this managed product so that we can squeeze that door-to-door transit time for the Quantum freight."

Quantum loads will get priority in terminals, where new BNSF systems driven by artificial intelligence have streamlined loading and unloading. BNSF's Load Planner Optimization tool manages the complexities of where containers should ride on each train. The system is operational at 11 terminals.

"It's important because we've got the service priority needs built into that optimization tool," Williams says, noting the tech systems reduce the miles of hostler rigs and speed track turn times. "A key piece of that is also making sure that we're tapping into the customer service needs for the individual units."

Based on customer reaction to the pilot program, J.B. Hunt expects Quantum volume to ramp up right out of the gate. "We've been able to convert highway freight and feel like with this particular launch, and a couple other deep service designs we're doing with customers right now, we'll be able to expand this pretty quickly," Frazier says.

Ultimately, there are between 7 million and 11 million loads J.B. Hunt believes can move via intermodal on the BNSF network. J.B. Hunt handled 2 million intermodal loads last year, while railroads carried 7.9 million domestic intermodal containers and trailers in the U.S. last year.

Intermodal analyst Larry Gross says the Quantum service seems to have the right combination of speed, reliability, and price to attract volume off the highway.

"Service consistency is key to unlocking potential intermodal growth. Shippers will accept that intermodal is slower than truck in order to take advantage of the savings that intermodal has to offer," Gross says. "But the tolerance level of shippers to unreliable service is very low, because not delivering the load when promised is hugely disruptive to their operations. Trucks provide on-time service to shippers 95% of the time or more. If intermodal can provide that level of reliability while saving shippers money, many more will be willing to trust their freight to the rail and intermodal's share of the market will grow."

Field says Quantum could become a double-digit percentage of its overall BNSF volume in the next couple of years. No interline service is planned, but he wouldn't rule it out if there were customer interest and a way to make it meet tight on-time performance standards. BNSF directly serves Atlanta and Northwest Ohio via haulage rights agreements with CSX, and shipments to those terminals are not considered interline moves.

Five J.B. Hunt employees work alongside a handful of BNSF employees at the railroad's headquarters. "There's thousands of J.B. Hunt employees and thousands of BNSF employees focused on delivering something unique," Field says. "But that team of 10 people will just keep us all focused on the right things." — *Bill Stephens*

Four passengers required hospitalization after this La Trochita Railway train derailed in a remote area of Patagonia. Jim Fetchero

Patagonia excursion marred by derailment

Four injured, one seriously, as historic narrow gauge steam train overturns

A BRITISH MAN spent an extended period in intensive care in an Argentine hospital, and three U.S. tourists were also hospitalized, after a narrow-gauge, steam-powered heritage railway derailed on Nov. 12 in a remote portion of Patagonia.

A tour group from the company Trains and Travel International — mostly from the U.S. and Britain, but also from Australia, Denmark, and France — was onboard the 750mm (2-foot, 5½-inch) gauge La Trochita Railway, which came to international fame as the "Old Patagonian Express" in the Paul Theroux book of the same name. The derailment occurred between Mamuel Choique and Rio Chico. Jim Fetchero, who was among the passengers, told *Trains* that there were 48 passengers and 10 to 12 crew members on board when the derailment occurred, only about a half-hour into the trip.

"We didn't get much warning," Fetchero wrote in an email. "But the feeling of being in a wooden coach as it rolls down the hill is pretty scary. And the wood fire" — from onboard wood stoves — "was even scarier; [on] the other coach, they had some fire damage but were able to put out the fire." On social media, he described kicking out the car's doors and crawling out through the remains of the car's vestibules. Fetchero said he suffered bruises to his ribs and a hip.

Authorities have not said what caused the derailment, but Fetchero said the train had hit a washout at 17 kilometers per hour (about 10.5 mph).

The first railroad truck arrived at the accident scene about a hour after the 11:18 a.m. derailment, Fetchero said; police and fire arrived about 1:30 p.m., with an ambulance arriving shortly thereafter. Some of those injured were taken to hospitals in Ingenerio Jacobacci, about 50 miles by road; the most serious were taken to Bariloche, some 160 miles away. None of the injuries were initially considered serious, but the condition of the British man worsened after the first night and he was on a respirator a week after the incident. The other injured passengers, all Americans, were released by then. — *David Lassen*

A conceptual image of a future hydrogen-powered locomotive and tender. Two images, Wabtec

Wabtec sees hydrogen as fuel of the future

Zero-emission technologies can follow short-term use as substitute for diesel

AS THE RAILROAD INDUSTRY searches for ways to reduce and ultimately eliminate greenhouse gas emissions, Wabtec sees hydrogen as the locomotive fuel of the future, whether it's burned in internal combustion engines or used to power fuel cells.

"We're not seeing this as a fringe thing. This is going to be the thing that replaces diesels," says Philip Moslener, Wabtec's corporate vice president for advanced technologies.

Hydrogen produces no greenhouse gas emissions when burned as a fuel. "It is not economically viable today," Moslener says, noting that hydrogen currently costs significantly more than diesel fuel.

But hydrogen production is expected to rise, which should bring the cost down to rival diesel fuel as early as 2030. In the U.S., the Bipartisan Infrastructure Law includes $7 billion in funding to develop six to 10 hydrogen production and storage hubs. There are similar efforts under way in Canada. Energy companies, meanwhile, are making investments in hydrogen production facilities.

Wabtec aims to match its hydrogen locomotive research and development efforts to the planned pace of hydrogen production in North America. Wabtec hopes to field its first hydrogen prototype in 2027.

FUEL CELLS AND BATTERIES

Hydrogen-powered fuel cells, combined with batteries to store electricity, would be a zero-emissions solution to replace the diesel-electric locomotive, Moslener says.

But fuel cells don't yet have the power density required for a line-haul locomotive. A road locomotive would need 3,300 kilowatts of power — or 10 times what's available from fuel cells that can fit on a locomotive today, Moslener says.

The development of more powerful fuel cells is expected to continue, however, much like the way batteries have gained more storage capacity and extended the range of electric vehicles in recent years. "We will get there," Moslener says.

If a fuel-cell locomotive consist ultimately needs more battery capacity, railroads could always add one of Wabtec's FLXdrive battery-electric locomotives to the train, he says.

Due to their lower horsepower requirements, fuel-cell switching locomotives may become viable sooner than road locomotives.

Road locomotives and switchers will require different energy-management systems because of the differing demands of each service. Fuel cells prefer producing a consistent amount of power, Moslener says, so switchers would draw electricity from batteries rather than the fuel cell. Conversely, road locomotives often operate with relatively steady power demands and could tap a combination of fuel cells and batteries to power their traction motors.

RETROFITTING LOCOMOTIVES

The other path is burning hydrogen in internal combustion engines. "We also see that as a viable solution, especially one where it's a transition technology," Moslener says. "The nice thing about internal combustion engines is it's engines. We know engines. Customers are comfortable with engines. They know how to maintain them. They know how to operate them."

Another plus: Wabtec's Evolution series locomotives can run on hydrogen with little modification. "That's the nice thing about our EVO family of engines is that they have the capability, the genetics, to be able to be modified to hydrogen," Moslener says.

The biggest technical hurdle is how to bring hydrogen fuel to the combustion chamber. Like liquefied natural gas, hydrogen needs a spark to ignite. Wabtec's LNG-powered locomotives in use on Florida East Coast Railway rely on port injection with diesel fuel used as a pilot. That technology needs to be adapted for hydrogen use, Moslener says.

Hydrogen makes metal brittle over time, which can lead to mechanical failure. To solve this problem, Wabtec is working with the U.S. Department of Energy's Oak Ridge and Argonne national laboratories. In a project funded by a Department of Energy grant, Argonne is doing computer simulation work, while Oak Ridge is testing a single-cylinder, hydrogen-fueled engine that uses port injection.

Once the combustion characteristics and ideal fuel mixture are worked out using the single-cylinder engine, tests will shift to a multi-cylinder engine. The next research and development stage would be fielding a prototype hydrogen-

powered locomotive.

With port injection, a locomotive could burn a 50/50 mix of hydrogen and diesel fuel. More R&D would be needed to push the fuel mix to 70% hydrogen, using a low-pressure direct injection system.

"Obviously we want to push it towards 100% hydrogen," Moslener says. That would require a leap to high-pressure direct injection, which could enable a 90/10 mix of hydrogen and diesel fuel.

Some diesel is required in order to ignite the hydrogen, so an internal combustion engine would always produce at least some carbon dioxide. "If we want to go to zero emission, we have to go to fuel cell," Moslener says.

A drawback to burning hydrogen in a traditional internal combustion engine is that nitrogen oxide emissions are not reduced because they're created during the combustion event, Moslener says. Particulate emissions, however, would fall in line with the reduction in diesel in the fuel mix.

Modifying locomotives would enable railroads to begin reducing their carbon footprint right away by blending hydrogen and diesel, Moslener says.

Hydrogen-powered locomotives would have to be paired with fuel tenders to have a range comparable to today's diesel-electrics. Like FEC's LNG locomotives, a hydrogen consist would have two locomotives sandwiching a tender. Wabtec dubs these locomotive-tender-locomotive consists "triplets."

TRANSITION CHALLENGES

Even when hydrogen production scales up, it won't be available immediately across all 140,000 miles of the rail network. And that will initially create interoperability problems within railroads, as well as with run-through power used in interchange service.

Internal combustion engines that can be powered by hydrogen or diesel is one way to attack the interoperability problem. An ES44AC or ET44AC with a hydrogen port injection system could run on 100% diesel fuel. Although less efficient, Moslener says this fuel flexibility would help ease the transition from diesel to hydrogen.

A single-cylinder, hydrogen-fueled engine is undergoing testing at the U.S. Department of Energy's Oak Ridge National Laboratory.

The other transition solution is to create hydrogen corridors between terminals that have hydrogen storage and fueling systems. "Customers hate to think about dedicated corridors — but I think we're going to have to," Moslener says.

Another mindset change: Thinking about the interaction between triplets, trailing tonnage, and topography, rather than just locomotive power.

"We have to start changing that mentality and talk about trains," Moslener explains, noting that a hydrogen triplet and a battery-electric locomotive, combined with energy the locomotives can capture from the train during dynamic braking along particular routes, all have to be factored into the equation.

One advantage of burning hydrogen directly in internal combustion engines as a bridge to fuel cells is that it will give railroads experience with refueling, safety, training, and hydrogen production, storage, and distribution infrastructure, Moslener says.

PIECES OF THE PUZZLE

A shift to hydrogen power will be complicated. It's a bit like trying to put together a puzzle without fully knowing what the pieces look like, because multiple problems need to be solved along the way.

First, there are five potential hydrogen fuel forms. They include compressing the gas at one of three different pressures; cryo-compression; and liquid hydrogen. Each form requires a different type of storage tank.

Wabtec believes liquid hydrogen is most logical for railroads, because it has twice the energy density of compressed hydrogen, Moslener says.

Refueling times also give liquid hydrogen an edge. It would take five or six hours to fill a liquid hydrogen tender today, Moslener says, compared to up to 30 hours for compressed hydrogen. NASA has significantly faster flow rates, he says, and further research and development likely could make liquid hydrogen fueling as fast as refueling a diesel.

"We are thinking the industry needs to go to liquid in the long term, so that's where we're putting our R&D efforts," Moslener says.

But Wabtec can't go it alone, and investment from railroads and governments will be required. "If the industry believes hydrogen is the fuel of the future," Moslener says, "then we need to put investments in this to figure out a multitude of issues before it can be a safe, usable fuel."

Progress Rail, Chevron, and BNSF Railway announced plans for a partnership in a hydrogen locomotive project in December 2021. Progress Rail will build a high-horsepower fuel-cell locomotive, while Chevron will develop the fueling infrastructure, and BNSF will operate the locomotive as part of a test program. The supporting infrastructure will be installed this year, with a planned delivery of the unit in 2025, BNSF says. Chevron did not respond to emails seeking additional details.

"Our project to demonstrate a locomotive powered by hydrogen fuel cells is progressing, as we continue our work with Chevron and BNSF to advance hydrogen technology across the rail industry," Progress Rail spokeswoman Amy Everett says. "We see this as an exciting opportunity for carbon reductions from mainline locomotive operations. The collaboration allows us to rapidly improve our understanding of this fuel for the benefit of our customers."

Canadian Pacific Kansas City's 6,000-horsepower hydrogen fuel cell battery-electric AC-traction road locomotive will make its debut in test service this year. The unit, converted from CP AC4400CW No. 9517, will haul Teck Resources metallurgical coal from its mines in southern British Columbia to Vancouver for export. The locomotive will be paired with a tender and will run with the conventional AC-traction locomotives that power the 152-car coal trains.

"We've got the best testbed in the world. We've got the mountains of the Canadian Rockies, we've got the snow, we've got the cold, we've got the wet, we've got every environmental condition that you want

Units converted to hydrogen fuel could look much like the LNG-powered locomotive-and-tender sets now in use the Florida East Coast. Travis Mackey

to challenge the technology through," CPKC CEO Keith Creel told the RailTrends conference in November. "If we can deploy a locomotive and harden that locomotive together, we can do something not only for our companies but for this industry. And this industry needs a solution."

CPKC's pair of low-horsepower hydrogen fuel-cell switching locomotives have run more than 2,200 miles switching customers in the Calgary area. In June, CPKC and CSX announced a partnership to produce hydrogen switching locomotives. CPKC will supply conversion kits that CSX will install on low-horsepower units at its shop complex in Huntington, W.Va.

CPKC's original hydrogen fuel-cell locomotive is part of a growing project that will see a 6,000-hp unit introduced in coal service this year. CPKC

Wabtec is closely following CPKC's hydrogen fuel-cell project. The hydrogen community is small, particularly in rail, and all of its players encourage and support each other, Moslener says.

Railroads also will have to follow developments and cooperate with other industries. "Rail is a small industry," Moslener says. "We're not going to be leading where hydrogen is going. Other industries will be driving the large investments."

THE 'HYDROGEN RAINBOW'

Hydrogen is the most common element in the universe but is rarely found as a gas on Earth. So it's produced from compounds that contain hydrogen. Most hydrogen is produced through steam methane reforming, which removes hydrogen from natural gas. It's also produced through electrolysis, which splits water molecules into two hydrogen atoms and one oxygen atom.

Green hydrogen is produced through electrolysis, using power that comes from renewable sources like hydro, wind, and solar power. An offshoot is pink hydrogen, which is produced using nuclear power.

Nearly all hydrogen currently produced in North America is what's known as gray hydrogen, from steam methane reforming or coal gasification. This hydrogen is considered "dirty" because it's produced from fossil fuel, while also using fossil fuel as an energy source in the production process.

A variation is blue hydrogen, which captures and stores the carbon produced through steam methane reforming or coal gasification.

Why does this matter? Because the true carbon footprint of any fuel needs to be measured from well to wheel — in other words, the entire production cycle from its source, refining, and distribution to its use as a fuel in a locomotive.

"Our mindset is that we don't need to wait for green hydrogen to arrive," Moslener says. "We can start now and benefit from the natural greening of hydrogen as time goes on."

This progression, he says, would be much like what has happened to battery-electric vehicles in recent years. As the electrical grid has become greener as coal-fired generation has declined and wind and solar power have increased, the overall environmental footprint of battery-electric cars has improved.

MODAL SHIFT

Moslener says that if you want to decarbonize rail, reduce and ultimately eliminate emissions from locomotives. If you really want to decarbonize transportation, move truckloads to rail. "The real decarbonization play after alternative fuels is modal shift," he says. "That's how we're going to decarbonize North America."

The transition away from the diesel-electric is likely to cost hundreds of millions of dollars including the required infrastructure. "It's going to be very expensive," Moslener says.

"We've got a global crisis on our hands now. To me it's not about cost. … We have a moral obligation to invest in this space now. It will be too late tomorrow."

NO CLEAR WINNER

"There's no clear answer today to the question of what propulsion technology will win the day," Adriene Bailey, a partner at consulting firm Oliver Wyman, told the RailTrends conference. Biofuels are likely to go to aviation, which has no other option to reduce its greenhouse gas emissions. Hydrogen currently has problems with transport, storage, and safety. Catenary is proven but has high installation costs. And battery-electric has a range of concerns.

But she says one thing is clear: railroads could save billions of dollars in the long run by accelerating research and development now on alternatives to the diesel-electric.

Railroads are striving to reach net zero greenhouse gas emissions by 2050. Yet more than half of the current 21,000-unit road fleet will need to be remanufactured or replaced by 2040 given the 30-year life of a locomotive. If the last new or remanufactured diesel-electric entered service in this decade, rather than in 2040, the industry could avoid spending up to $40 billion on diesels that would only reach an average working life of 17 years before risking forced replacement with new technology.

"The railroads have a multi-billion-dollar incentive to go faster, to go together, and have a forward leaning hand in helping us develop a practical approach, rather than be forced into an economically disastrous mandate," Bailey says. "Sitting back and waiting for someone else to figure out this problem is not wise." — *Bill Stephens*

Wabtec unveiled the first battery-electric, heavy-haul road locomotive, for mining company Roy Hill's railroad in Western Australia's Pilbara region, at an Oct. 31 event in Erie, Pa. The company paints its equipment pink to promote breast-cancer awareness. Three photos, Carl Swanson

Pretty in pink

Wabtec unveils world's first battery-powered heavy-haul freight locomotive

AT AN OCT. 31 EVENT, Wabtec and launch customer Roy Hill unveiled the world's first 100% battery-powered, heavy-haul locomotive for mainline service at Wabtec's Erie, Pa., manufacturing facility.

The FLXdrive locomotive contains 72 lithium-ion modular battery packs with a total of 36,288 cells, giving the locomotive an energy capacity of 7 megawatt-hours. This is about three times the power of the 2.4-megawatt-hour prototype that operated 13,000 miles on BNSF Railway in California with zero failures in 2021.

"This FLXdrive locomotive represents a major step in the journey to a low-to-zero-emission future in the rail industry," said Rafael Santana, president and CEO of Wabtec. "The FLXdrive is driven from within by our battery technology and the innovative spirit of our employees."

He added, "Roy Hill is an ideal customer to partner with given their leadership and excellent operational record."

The FLXdrive will undergo extensive testing in Erie, Pa., for six to eight months before it is shipped 10,500 miles to Australia to enter revenue service on the Roy Hill railway, a 214-mile privately owned iron ore railroad in Western Australia. Roy Hill owner Hancock Prospecting opened the line in 2015 and ships more than 63 million tons of iron ore annually to steel makers in Japan, South Korea, India, Malaysia, China, and Vietnam.

Currently, Roy Hill uses four Wabtec ES44ACi Evolution Series diesel-electric locomotives to pull 240-car ore trains from the mine to a company-owned port facility. The FLXdrive locomotive will replace one of the diesels in the consist. The profile of the line sees empties move upgrade and 33,000-ton loaded ore trains returning downgrade. The battery-powered locomotive helps power the train on the climb and uses regenerative braking to fully recharge its batteries on the 214-mile downhill run. The mine has no plans to install a charging station. (FLXdrive battery locomotives can be equipped to charge using a stationary overhead pantograph or cable connection.)

Gerhard Veldsman, CEO, Hancock Prospecting Group Operations (left), and Rafael Santana, president and CEO of Wabtec, pose on the Roy Hill FLXdrive unit.

Once in Australia, the new locomotive will operate in some of the most challenging conditions on the planet, with temperatures reaching 130 degrees while providing a double-digit percentage reduction in fuel costs and emissions per train.

"The foresight of our Executive Chairman, Mrs. Gina Rinehart AO, has been instrumental in establishing an environment in which we can successfully leverage the ingenuity of our people alongside key partners like Wabtec to transform our rail and mining operations through next-generation technologies," said Gerhard Veldsman, chief executive officer, Hancock Prospecting Group Operations.

Roy Hill announced in 2021 it would become the world's first battery-powered, heavy-haul railroad. The FLXdrive locomotive follows the company's practice of painting its locomotives, ore cars, haul trucks, and some structures bright pink to raise breast cancer awareness. Additionally, each of the mine's huge haul trucks is named after a Hancock Group employee who has recovered from breast cancer — a reminder the disease can be beaten.

Company officials said visitors to their facilities frequently ask about the pink equipment and that provides an opportunity to share information about the impact of the disease on Australia and the importance of regular screening.

During the unveiling ceremony at the Erie design and development center, Wabtec officials introduced representatives from Linked in Pink, a nonprofit that provides financial and emotional support for young women in the Erie area diagnosed with breast cancer, and announced Wabtec's donation of $50,000 to the group. It is the largest single donation in the nonprofit organization's history.

For more information, visit Wabtec's website at: www.wabteccorp.com. — *Carl Swanson*

A FLXdrive battery pack. The Roy Hill unit contains 72 battery packs with more than 36,000 cells, giving the unit 7 megawatt-hours of power.

MBTA aims to eliminate slow orders in 2024

Track work begins effort to address massive state-of-good-repair backlog

THE MASSACHUSETTS BAY TRANSPORTATION Authority has announced plans for a major track repair program with the goal of eliminating all speed restrictions on its transit lines by the end of 2024, a program that will require incremental, multi-day shutdowns of the Red, Orange, Green, and Blue lines over a 14-month period.

That effort, however, will only scratch the surface of a whopping $24.5 billion in state-of-good-repair needs faced by the transit agency, according to a Nov. 16 needs assessment. That figure had ballooned from $10 billion when the previous such assessment was done just four years earlier in 2019 — in part, the MBTA says, because underinvestment in the system means assets are aging faster than they are being replaced.

The trackwork program work will include rail and tie replacement, reballasting, and other forms of spot repairs. It aims to wipe out some 190 speed restrictions that existed on Nov. 9, the day the program was announced, covering 31.1 miles, or 23% of the system.

The heavy rail transit system accounted for some $9.9 billion of the $24.5 billion state-of-good-repair estimate; another $8 billion was attributed to commuter rail, and $4.7 billion to light rail. The agency estimates that more than 60% of its assets now need updating.

"The MBTA is one of the oldest transit agencies in the country," says Phillip Eng, MBTA general manager and CEO, "and while there are a number of contributing factors, it's clear that years of underinvestment have added to the cost of bringing our system back to a state of good repair. Timely and appropriate actions are key to mitigating and avoiding more costly and potentially impactful efforts."

While the Capital Needs Assessment report is extensive and detailed, it does not include a plan for funding the updates. And the *Boston Globe* reported the actual figure could be higher. — *David Lassen*

An MBTA Orange Line train departs from the Forest Hills station in January 2022. The MBTA has begun a program to eliminate more than 31 miles of speed restrictions. Scott A. Hartley

MORE HERITAGE **Metro North's third heritage-wrapped locomotive, P32AC-DM No. 211, honoring the New York Central, makes its operating debut on Nov. 14, 2023. The locomotive is the latest in the series marking Metro-North's 40th anniversary.** MTA Metro North Railroad/Brett Ulrich

1/1 SCALE **With the sponsorship help of the company, NJ Transit wrapped Bombardier ALP45DP to honor Atlas Model Railroad Co., a New Jersey firm marking its 100th anniversary in 2024. Atlas is offering a model of the special unit.** NJ Transit

Voters approve sale of Cincinnati Southern Railway to Norfolk Southern

Cincinnati voters narrowly approved sale of the city-owned **CINCINNATI SOUTHERN RAILWAY** to **NORFOLK SOUTHERN** for $1.62 billion on Nov. 7, after a campaign in which opponents marshalled a host of objections. These ranged from mistrust of NS in the wake of the East Palestine, Ohio, derailment to a belief the city was not getting enough money in return for the 338-mile line, the nation's only municipally owned interstate railroad. The issue passed by a 43,173-40,599 margin; the sale is expected to close in the first quarter of 2024. Proceeds will go into a trust fund, generating money for city infrastructure projects.

CPKC said it was in discussions with the Mexican government about possible passenger rail operations on some routes, and had agreed to fund a third-party study of capacity needs on the Nuevo Laredo-Mexico City corridor. Mexico's president, **ANDRÉS MANUEL LÓPEZ OBRADOR**, said he would require holders of freight rail concessions — which also include **FERROMEX**, in which **UNION PACIFIC** is a minority stakeholder — to operate passenger trains on their routes, or to make room for government-operated passenger trains. The government is calling for service on seven routes, with proposals from freight operators on how they will handle passenger service due by Jan. 15.

Shortline holding company **REGIONAL RAIL LLC** announced it would acquire the **INDIANA EASTERN RAILROAD** and **OHIO SOUTH CENTRAL RAILROAD**, bringing its number of short lines to 15. The Indiana Eastern is a 43-mile railroad operating between Richmond, Ind., and Fernald, Ohio; the Ohio South Central, based in Hamden, Ohio, operates 64 miles of lines.

BNSF RAILWAY and **NAVAJO TRANSITIONAL ENERGY CO.** announced a settlement that would end the coal producer's common-carrier complaint against the railroad, as well as a related court case. NTEC had claimed the railroad violated common-carrier obligations by failing to provide adequate service for its Powder River Basin export coal business; the **SURFACE TRANSPORTATION BOARD** had ordered BNSF to transport 4.2 million tons of coal in 2023, as well as another 1 million tons as equipment and crews became available.

SURFACE TRANSPORTATION BOARD Chairman **MARTIN J. OBERMAN** said he would not seek reappointment when his current, and first, term on the board ends on Dec. 31, 2023, but would continue to serve into 2024 during the "holdover" period allowed by statute until the position is filled. Oberman, a former Chicago alderman and Metra chairman, was appointed to the board in 2019 and became its chairman in 2021.

Noted transportation historian and prolific author **H. ROGER GRANT**, 79, died Nov. 17, 2023, of a heart attack in Clemson, S.C. Grant, the author of more than 40 books, had taught at Clemson University for more than 26 years and was planning to retire at the end of the semester in progress.

Railroad investors can be their own worst enemy

Wall Street's short-term focus is bad for railroads' long-term health

Bill Stephens
bybillstephens@gmail.com
Analysis: Trains.com

When Norfolk Southern CEO Alan Shaw outlined the railroad's growth strategy in December 2022, he couldn't have been more clear: Keeping train crews on the payroll during freight downturns would hurt the operating ratio over the short term. But not furloughing crews would pay off in the long run by enabling NS to maintain service levels and handle the eventual traffic upswing. And providing consistent and reliable service year in and year out will allow shippers to build more of their supply chains around the railroad, which in turn will bring NS new traffic, higher revenue, and bigger profits.

It is, as Shaw says, a better way forward for an industry that has struggled to grow due to periodic service problems related to crew shortages.

So how did Wall Street react when the railroad announced ugly third-quarter results in October? The short-sighted analysts — who cannot see beyond the next quarter, much less years down the road — tossed darts at the long-term strategy after NS's operating ratio went up 7.1 points to an industry worst 69.1%.

The first four questions from analysts on the earnings call dealt with the operating ratio (would it improve in the fourth quarter?), costs (why are they so high?), and profit margins (why are they so low and will they get better next year?). One even asked if Norfolk Southern needed to bring in more Precision Scheduled Railroading expertise.

Norfolk Southern SD60 No. 6615 leads a westbound train at Max Meadows, Va., during a crew change in July 1999. Ron Flanary

Those questions show that short-term investor patience already may be wearing thin with The Great Experiment, the term independent analyst Anthony B. Hatch applies to the no-furlough strategy that NS, Canadian National, and CSX are all following. "The questions were ridiculous," Hatch says. Indeed.

The math behind the NS strategy is simple: Furloughing crews to save $35 million during a downturn costs you more than $750 million in the long run when you factor in the cost of hiring and training replacement conductors, sluggish operations while you're short of crews, and traffic lost due to service woes.

When it was unveiled, the Wall Street analysts liked NS's long-term approach in theory. But some of them didn't like it in practice once third-quarter volume tanked and took revenue, profits, and earnings down with it. It's as if the analysts know this is the cure for the railroad growth problem yet they don't want to take the medicine because it tastes bad.

To their credit, Shaw & Co. stood their ground. They noted that NS took advantage of the lull in volume to train 250 conductors to be engineers as well as to qualify crews on additional territories. Both moves will help improve crew availability, operational flexibility, and service.

"Our investments in resiliency are investments in the elimination of service recovery costs. It's also an investment in top-tier growth and in industry competitive margins," Shaw says. "That's our vision for the future."

He adds: "We're not going to chase short-term O.R. targets."

The Great Experiment was always going to be a hard sell on Wall Street, Hatch says, and the analysts' short-term questions reflect their client base. Short-term investors are often the market's loudest segment even if they aren't in the majority, he notes.

Their noise raises the concern that an activist investor may swoop in demanding change at NS. Ask former CEOs Fred Green (Canadian Pacific), Michael Ward (CSX), J.J. Ruest (CN), and Lance Fritz (Union Pacific) how that can work out.

Wall Street's constant demand for instant gratification threatens the rail industry's long-term future. The lousy quarterly results for NS and the other Class I railroads changed nothing: The days of major cost-cutting are behind us, and to continue providing investors with double-digit earnings growth the railroads will have to bring on more volume. And that will require providing better service, which in turn requires always having enough train crews ready to climb into locomotive cabs.

NS remains on the right path. It was encouraging to hear Shaw defend the railroad's approach. Yet it's not clear how much patience some investors will have with NS, which means this year will be critical for the railroad, its strategy, and perhaps even the industry's quest for growth.

FROM THE CAB:

Inglorious. No speeding locomotive in a picturesque setting here. This is everyday railroading as experienced by a Seaboard Coast Line Railroad switching crew clinging to the railings of SCL GP7 No. 743, during a pouring rainstorm at Collier Yard, Petersburg, Va., in October 1971. It is a picture worth a thousand words. Doug Riddell collection

A PICTURE WORTH A THOUSAND WORDS

This is a picture worth a thousand words. For decades, artists and photographers awed us with images of mighty locomotives scorching the high iron with hundreds of passengers or thousands of tons of freight in tow. The sun shines brightly as the wind blows the hair of the fearless engineer, perched on the armrest. The friendly conductor waves from the caboose. Those moments exist, but to pretend that every day on the railroad is a scene right out of a travel brochure is a stretch.

My photographic images have been used to lure travelers aboard passenger trains for a glimpse of a world that can't be seen from a plane. I've also captured freight trains moving America's industrial output. Another subject of my Nikon, however, has been the exhausted faces of railroaders, the grease-covered overalls, the worn gloves, the sweat-stained shirts. I've scoured railroads from coast to coast for nearly 50 years searching for the ideal image of this other side of railroading.

The other day, I found the photograph I've always wanted to capture — one that exemplifies the daily life of the working railroader. It was snapped at a railroad yard where I had spent hours at the throttle of the very engine depicted. Working railroaders are seen, who looked very familiar, although I'm not sure if they were younger images of the same veterans with whom I later learned the ropes, or not. Yes, I found the image. However, I wasn't lucky enough to have personally taken it.

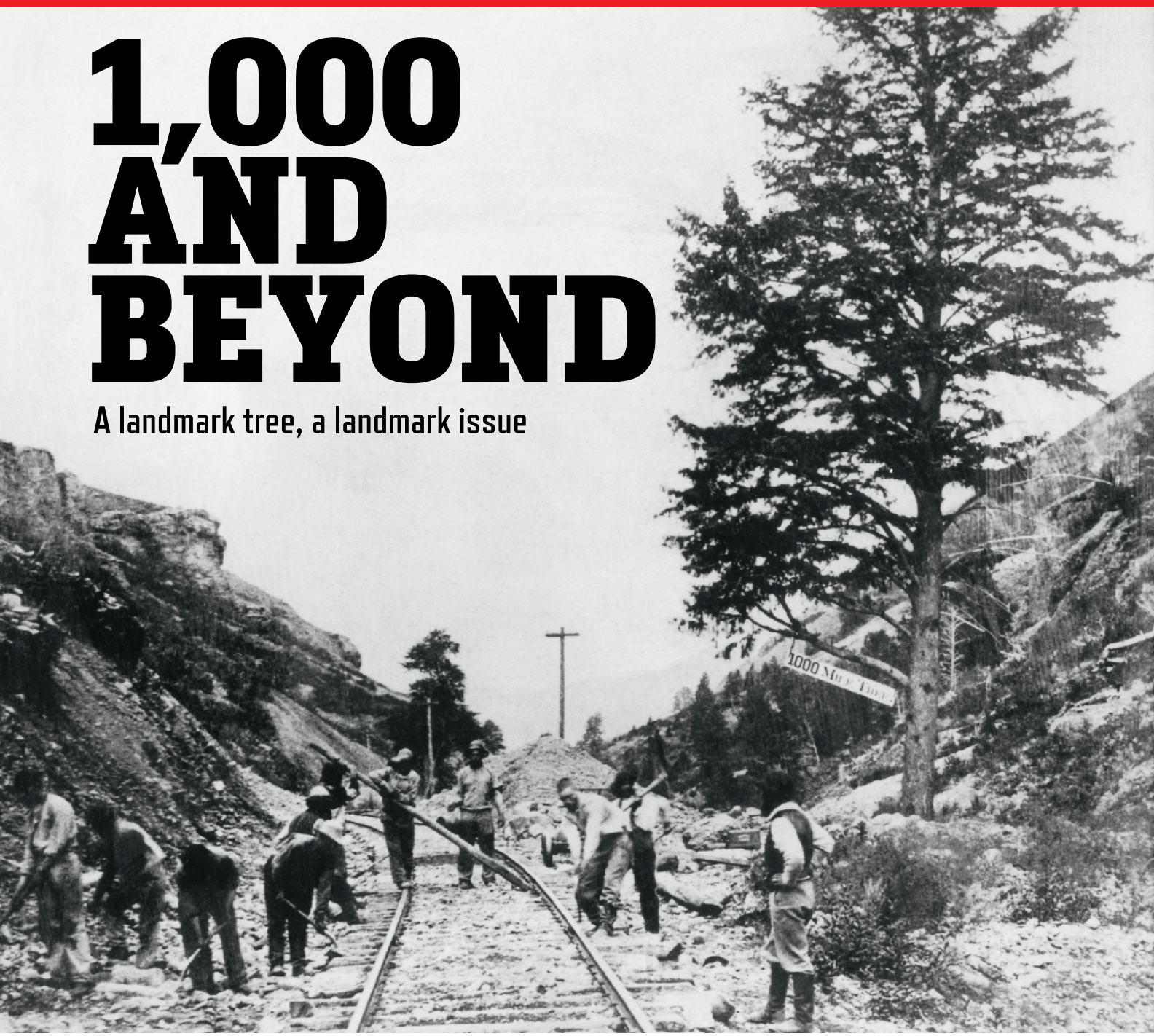
The picture is made from a negative I purchased from an estate. It was taken by an unknown photographer at Collier Yard, Petersburg, Va., in October 1971. The brakeman and conductor, braving the elements in rain gear, are grimacing in the windy downpour as they couple, uncouple, and sort cars to be forwarded on through freight trains. Whatever the actual temperature is, due to dampness and wind chill, it surely feels 10 to 15 degrees colder. But the engineer sits fairly dry and reasonably warm in the cab. I ran that engine, No. 743, and thousands more before retiring. Believe me, it was the best place to be on days like this.

From childhood, I wanted to be a railroader. Not long after I became a brakeman, I decided I might want to become an engineer. If a picture says a thousand words, this one surely explains why. When I was hired by Seaboard Coast Line in 1977, it was explained that on the railroad, it never rained or snowed. There was no such thing as lightning or thunder. I'd work in the heat of day and the cold of night. I learned not to complain. What good would it have done anyway? — *Doug Riddell*

Doug Riddell's From the Cab *column appears monthly on Trains.com.*

1,000 AND BEYOND

A landmark tree, a landmark issue



The 1,000-mile tree in Weber Canyon, Utah, marked 1,000 miles westward from the Union Pacific's starting point near Omaha, Neb. The tree was photographed in 1869 with a sign hanging from its lowest branch as workers complete the track. A.J. Russell

To mark the 1,000th issue of *Trains* Magazine, the following pages feature articles centered around the number 1,000. These include a profile of the most popular 1,000-horsepower diesel switch engines from Baldwin, Electro-Motive, and Alco; an insider's account of Union Pacific's staggering $2 billion single-contract order for 1,000 EMD SD70Ms; and a bridge in Germany that hosts more than 1,000 trains a day.

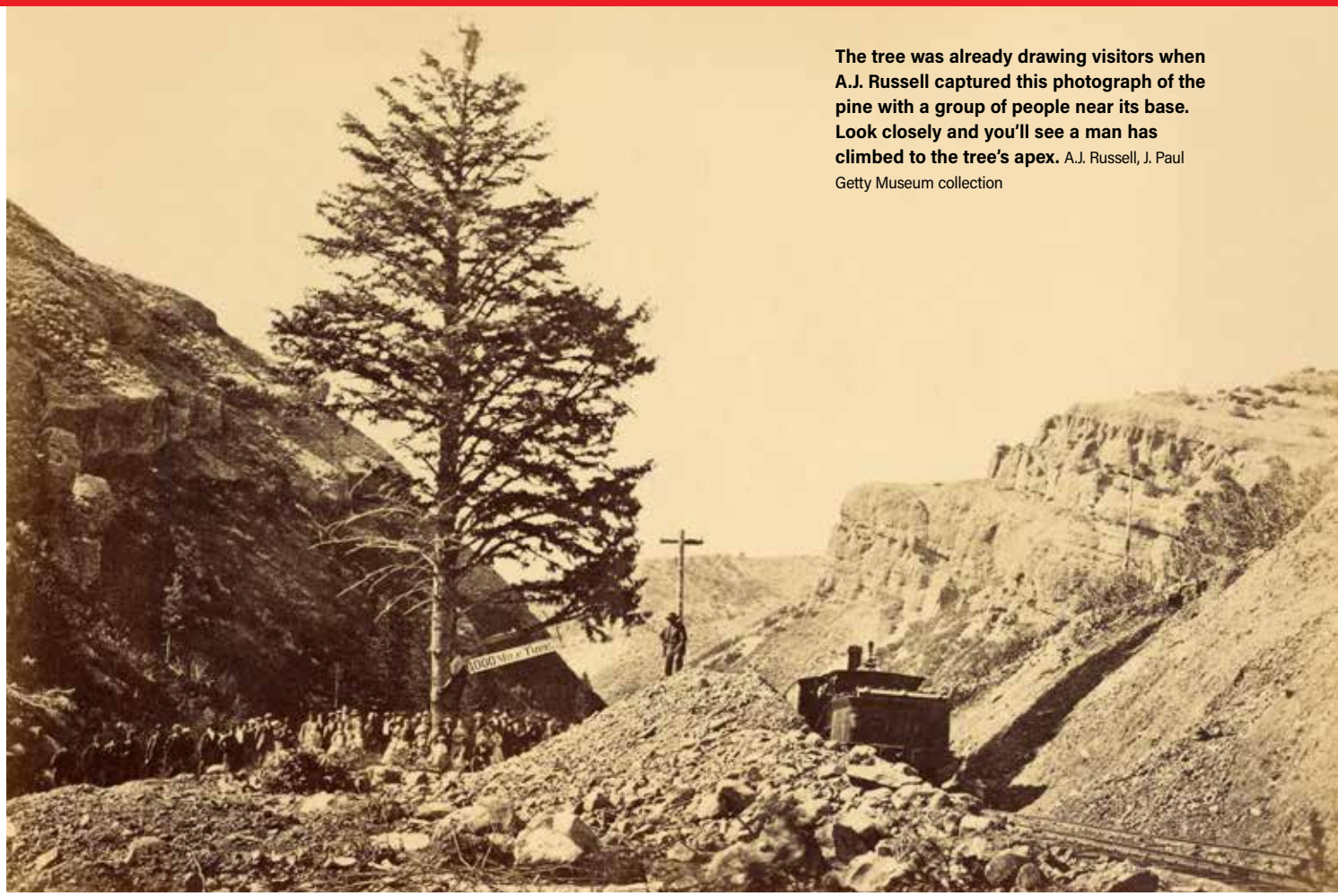
And then there's the story of this tree.

As grading crews and track gangs built the first transcontinental railroad west from the starting point in Council Bluffs, Iowa/Omaha, Neb., they celebrated a milestone achievement of their own. Milepost 1,000 was reached in Weber Canyon between present-day Henefer and Morgan, Utah. Coincidently, a solitary pine tree marked the spot. A sign reading "1,000 Mile Tree" was hung from its lowest branch and the workers kept going. They had a date with destiny about 100 miles further west at Promontory, Utah.

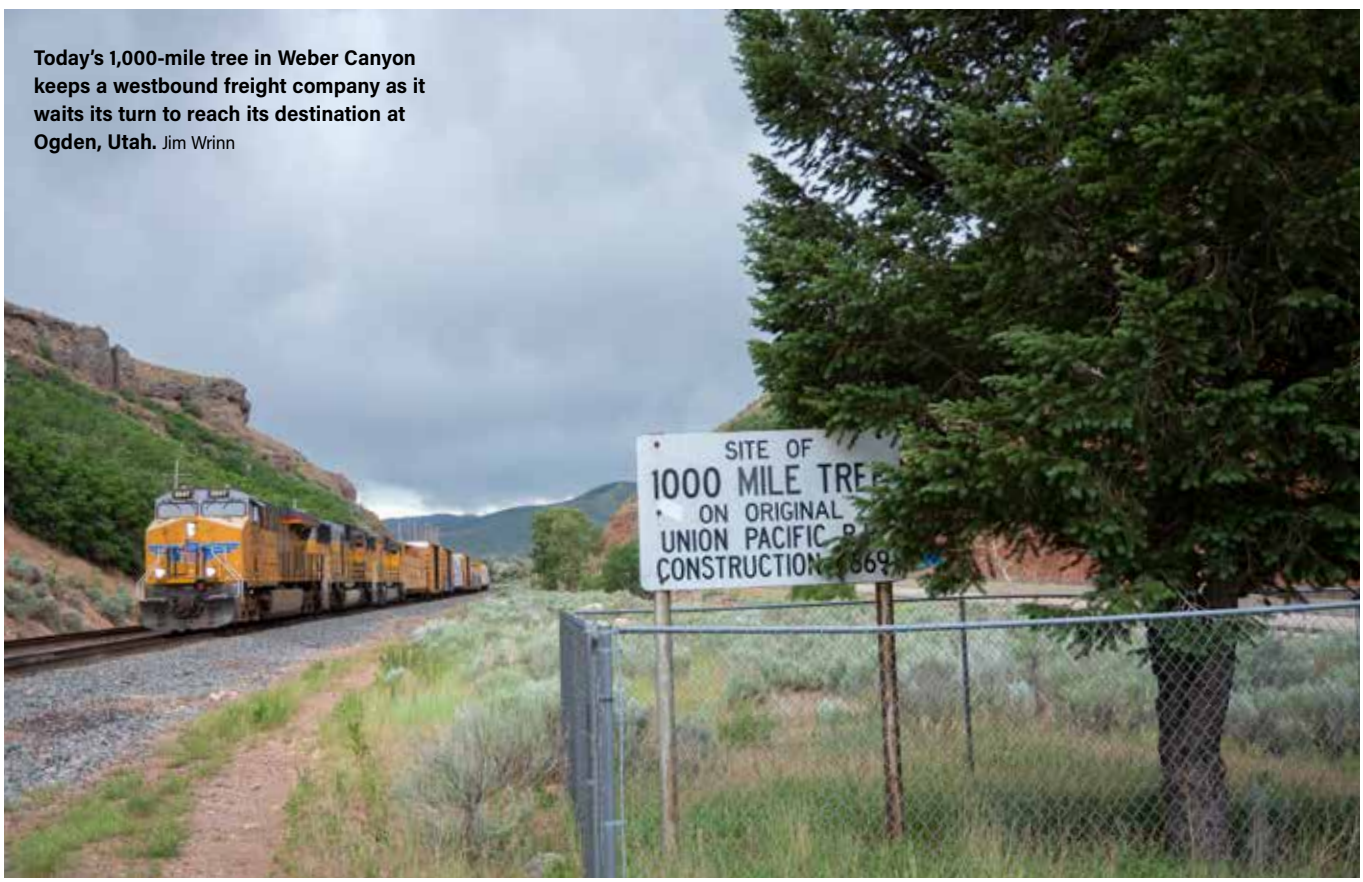
Following completion of the transcontinental railroad on May 10, 1869, travelers on the brand-new railroad were quite taken with the lonely landmark. Pioneering photographer A.J. Russell, documenting the new railroad, took several views of the tree. Over the years, riders aboard Union Pacific passenger trains crossing the Wasatch grade routinely had their attention directed to the famous pine.

In 1900, the tree died. More than 80 years later, Union Pacific planted a new tree at the spot although, after more than a century of track alignment changes, it's actually at mile marker 959.66.

But for trees or magazines, the meaning is there — 1,000 completed, much more to come. — *Carl Swanson*



The tree was already drawing visitors when A.J. Russell captured this photograph of the pine with a group of people near its base. Look closely and you'll see a man has climbed to the tree's apex. A.J. Russell, J. Paul Getty Museum collection



Today's 1,000-mile tree in Weber Canyon keeps a westbound freight company as it waits its turn to reach its destination at Ogden, Utah. Jim Wrinn

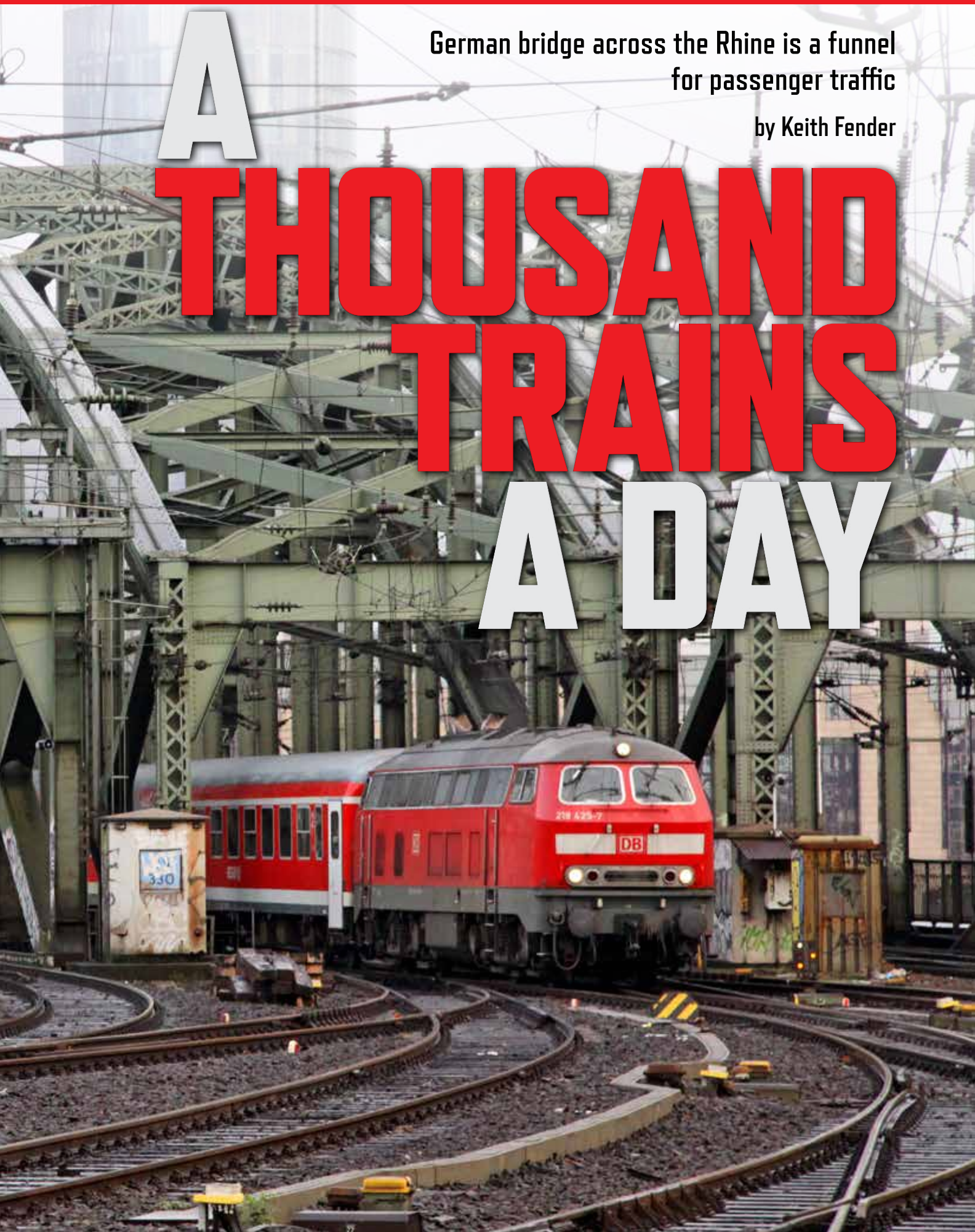
With a statue of Kaiser Friedrich III looking on — one of four such equestrian statues on the structure — a DB train crosses the Hohenzollern Bridge in Cologne, Germany, Dec. 9, 2005. Keith Fender

1,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,000

German bridge across the Rhine is a funnel for passenger traffic

by Keith Fender

A THOUSAND TRAINS A DAY



Showing how busy the bridge can be, three trains cross while a fourth (visible in the distance) approaches on Oct. 17, 2015. Two photos, David Lassen

The ancient city of Cologne (Köln in German) sits alongside the River Rhine in northwestern Germany. The city, with some streets dating to Roman times (the Roman buildings are deep underneath the modern city), is today one of the major traffic nodes on the German, and European, rail network.

Today, high speed trains can take you from Cologne to every corner of Germany, as well as neighboring countries such as France, Belgium, the Netherlands, Switzerland, and Austria. Overnight trains connecting multiple countries call in Cologne, while regional trains run on multiple routes and urban commuter rail, or S-Bahn, trains run on several high-frequency lines with stops every mile or two.

Almost all these trains serve the city's main station, or Hauptbahnhof, and cross the Rhine on the bridge immediately east of the station. Many also stop at the Köln Messe/Deutz station on the east side of the bridge, although most long-distance and high speed services do not.

This all adds up to one remarkably busy bridge.

According to German national rail operator Deutsche Bahn, about 1,300 trains a day use the bridge, making it probably the busiest rail bridge anywhere used by a variety of trains (as opposed to, say, bridges used only by subway trains).

Freight and maintenance-of-way trains are not common, as there is an alternate, primarily freight bridge about a mile downstream. Freight is, however, transported under the bridge — the Rhine is one of Europe's main inland waterway transport routes, and a wide variety of cargo can be seen passing by.

A view from the southeastern end of the platforms at Köln Hauptbahnhof helps illustrate the proximity of the Hohenzollern bridgeto the main station.

BUILT AND REBUILT THREE TIMES

Until 1871, Germany didn't exist as a single country, but was a patchwork of small states alongside one large one — Prussia, based in Berlin. When railways were first built in these countries, multiple independent companies were involved, and they normally built their own station in a city. Cologne was no exception, with

three separate terminus stations operating by 1850, and two more in the then-separate town of Deutz on the eastern bank of the Rhine.

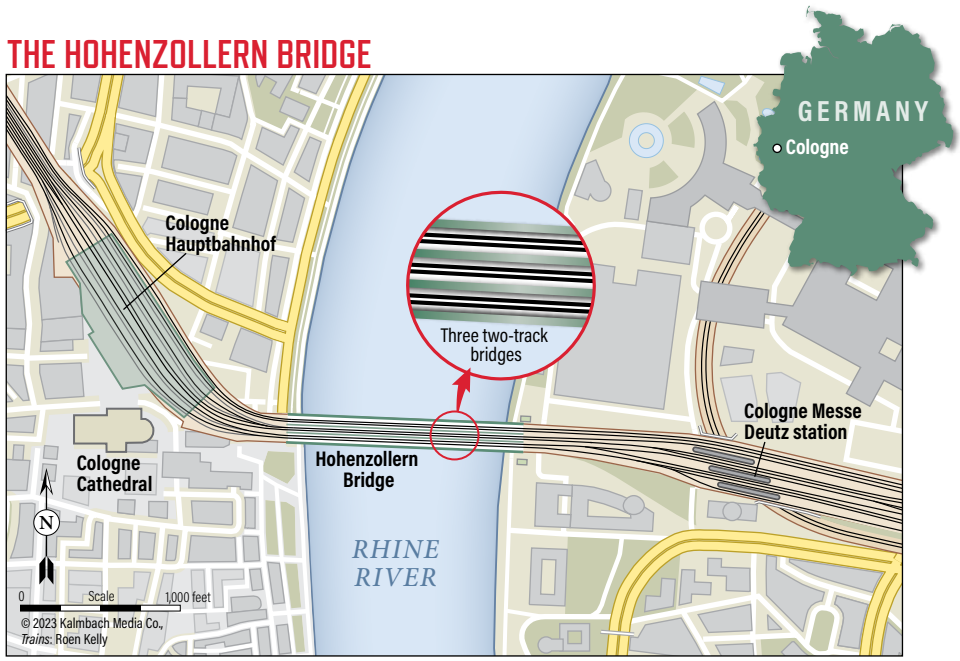
The need for more capacity and convenience for passengers or goods switching from one railway to another led to the development of central stations. In Cologne, the city led the discussion to develop such a station and offered a site next to the city's famous cathedral, inside the then-standing medieval walls. (Early stations were all outside the since-demolished walls.) The new central station was built between 1857 and 1859. To go with it, a two-track, box-girder rail bridge was built over the river, with a similar road bridge next to it. This bridge opened in 1859, at the same time as the new station, and was known as the Cathedral Bridge, as it was exactly aligned with the main nave of the Cologne Cathedral.

From 1871, when Germany became a single country, the new central government pushed for a unified rail network, partly for military reasons — to enable its army to move quickly — and partly for economic reasons. This led to a period of wide-scale construction of new central stations, or Hauptbahnhof, in major cities between the turn of the 19th century and the outbreak of World War I in 1914. In the U.S., a similar trend at the same time saw union stations bringing together multiple railroads in many cities.

Cologne was one of the cities to gain a much larger new Hauptbahnhof, on the expanded site of the 1859 central station. The new station opened in 1894, and with many more tracks and platforms needed more than a double-track bridge over the river. An entirely new bridge was built, with three triple-arched spans — two of double-tracked rail lines and one road bridge with streetcar tracks. This new 448-yard-long (410-meter) structure, the Hohenzollern Bridge — named for the German royal family — was built between 1907 and 1911. Like the two-track bridge it replaced, it was also exactly aligned with the main nave of Cologne Cathedral. Emperor Kaiser Wilhelm II officially opened it on May 22, 1911. Statues of some of his descendants on horseback were positioned at either end of the bridge; one of Wilhelm II was added later.

Targeted by British and American bombers during World War II, the bridge survived largely undamaged until the war's last months, when the German army blew up its supporting columns as U.S. troops entered the city on March 6, 1945,

THE HOHENZOLLERN BRIDGE



The bridge and cathedral are both well-illuminated by night, making for this spectacular view. The bridge survived most of World War II, only to collapse into the Rhine when its supports were blown up by German soldiers ahead of the arrival of the Allied forces. Keith Fender

Most freight trains avoid the Hohenzollern bridge and use a separate structure to cross the Rhine, as will be the case for this train pulled by a Belgian Traxx locomotive, seen at Köln West station in December 2009. Four photos, Keith Fender

leading the massive iron bridges to fall into the river. Temporary repairs allowed two tracks to be used beginning in 1948. Rebuilding in the 1950s did away with the road bridge and replaced the two railway bridges, side by side as before. Some parts of the original bridge were lifted back into place, although much of the structure was new but built to the same design as the 1911 version.

In a 1987 view from the south tower of the Cologne Cathedral — a 533-step climb — the third bridge is under construction as a West German Class 403 high-speed EMU, in the colors of national airline Lufthansa, crosses.

In the 1970s, plans to introduce high-frequency S-Bahn commuter rail service to the Cologne area meant more tracks were needed. Between 1985 and 1989 a third set of rail spans, again designed to the same basic appearance as the 1911 bridge, was built next to the existing structures, and the stage was set for the river crossing to host over a thousand trains a day. The new bridge, like the one on the southern side completed in 1959, has a foot and cycle path next to the tracks, giving good views of the river, city, and the trains.

RAILWAY OVER THE RHINE

The railway on the bridge today comprises three pairs of tracks, although switches between the track pairs exist on the bridge's western end. The two older bridges have track attached to the bridge deck using wooden ties, but the newer S-Bahn bridge has conventional stone ballast and concrete ties. All the tracks are electrified using Germany's standard 15kV AC system. Train speeds are not high — a maximum of 80 kilometers per hour (50 mph), although often much slower due to congestion.

Deutsche Bahn's infrastructure company, DB Netze, maintains the bridge. Unlike some similar large bridges, repainting the bridge is considered a one-off activity rather than something that is ongoing. The last major refit for the 1950s-built portion followed completion of the 1980s-built section. According to DB, between 1988 and 1991, a major refurbishment used some 270 tons of paint and replaced about 58,000 bolts. All this required over 30 miles of scaffolding, weighing 1,400 tons.

72 TRAINS IN AN HOUR

As almost all the trains using the bridge carry passengers, there are a lot more during the day than in the middle of the night — although there are some then, too. Unless there is an emergency diversion, freight trains are not normally seen in daylight; at night, there may be a handful. The large number of freight trains that pass through the Cologne area normally take routes that avoid the bridge and the main station.

Looking at a typical hour on a weekday afternoon, between 3 and 4 p.m., no less than 31 regional trains are scheduled to cross the bridge. Most use modern electric multiple-unit trainsets, although some diesel multiple units still see service, along with a few electric locomotives and bilevel

▲ Bombardier-built Talent 2 EMU 442 371, operated by UK-based transport group National Express, awaits departure from Cologne with a regional train on March 2, 2020. Regional services make up the majority of the trains passing over the bridge.

◀ A Siemens Vectron locomotive leads a FlixTrain — a privately operated, open-access service with backing from U.S. investment firms — at Cologne's main station on Nov. 26, 2019. FlixTrain operates a fairly extensive network within Germany.

A tiny fraction of the half-million "love locks" on the pedestrian walkway on the bridge's southern side are visible in this 2015 view. Four photos, David Lassen

A DB-operated S-Bahn local service EMU is at Köln Hauptbahnhof on March 2, 2020. While plans were drawn up for a fourth bridge span, instead, more service will be accommodated by extending platforms in the area to the right of the picture. Keith Fender

A BRIDGE OF LOVE LOCKS

THE SOUTHERNMOST PEDESTRIAN walkway over the Hohenzollern Bridge, which leads directly to Cologne Cathedral, has become a tourist attraction in its own right over the past two decades as a site for "love locks."

This custom, reputed to have started in Italy, sees people leave small padlocks emblazoned with the name of their partners attached to the bridge, and has grown into a mass phenomenon. Over half a million padlocks are now attached, adding several tons of weight to the bridge. Despite this, no attempt to remove the locks has been made so far, as has been the case at some other sites where the custom has taken hold. — *Keith Fender*

Another view from the top of the Cologne Cathedral, this time in 2015, illustrates the Rhine's importance as a freight route as two ships pass. A privately operated holiday charter train is crossing the bridge. Trains are also visible at the Messe/Deutz station across the river.

cars. Several different contracted operators operate these trains, which may cover journeys up to 100 miles from Cologne.

Next in terms of quantity are 25 S-Bahn services, all operated by DB using modern EMUs; most of these operate several times per hour on each route and do not go more than 25 miles, but may serve 15 to 20 stations in those short journeys.

Fewer in number, but longer distance, are the DB-operated Intercity Express (ICE) and Intercity trains, some of which cover hundreds of miles within Germany or in neighboring countries such as Belgium and the Netherlands. The Intercity trains feature electric locomotives.

Finally, each hour one or more of the non-DB long distance services that operate in Germany will likely cross the bridge. These include Thalys high-speed trains that run from Paris — some as far as Dortmund, north of Cologne — and long-distance, low-cost domestic operator Flixtrain, whose distinctive green livery is on the passenger cars and most of its locomotives. (Flix, incidentally, is largely owned by U.S.-based investment companies, including New York-based General Atlantic and the technology-focused Silver Lake, based in Menlo Park, Calif.)

FUTURE BOTTLENECK?

Germany has ambitious plans for a national regular-interval timetable modeled on the one already in use in Switzerland. This is known as the Deutschlandtakt, "takt" being short for "Taktfahrplan," or regular-interval timetable. This would see trains between major cities every hour or half hour; at intermediate stations, a "memory schedule" would see trains in each direction arrive at the same time past each hour throughout the day.

However, German railways already suffer from serious reliability and punctuality problems. Four in 10 long-distance trains run late, which in Germany means more than 6 minutes, although many are 30 to 60 minutes late or more. And some routes used by freight are already at saturation with a train every few minutes. So the country is embarking on expensive new infrastructure to unblock the present network's main bottlenecks and allow more trains to run.

New tunnels under major cities like

It's an easy trip across the Hohenzollern Bridge's walkway to the Messe/Deutz station, where the cathedral provides the backdrop for trains coming and going off the bridge, as shown here in October 2015.

Frankfurt and Hamburg are planned, but these take years to build, as illustrated by a similar scheme in the southern city of Stuttgart. There, a new underground central station and miles of new connecting tunnels is slated to open in 2025, about four years later than planned, after 15-plus years of construction.

The Hohenzollern Bridge is a major bottleneck despite having six tracks; plans to build another span, adding two more tracks, were drawn up. However, rather than build another bridge, the decision has been made to expand the main station by adding two more commuter rail platforms on the north side on a new section of viaduct built out over the street. Also, new electronic signalling — in place since 2021 on the S-Bahn part of the bridge — is planned on the four tracks used by long-distance and regional trains. This project, which will include the station area, will allow train frequencies to be increased. It will involve installation of 94 miles of cable and 200 new signals, plus 10 new signal gantries. The switches on the bridges will be replaced as well.

The current Messe/Deutz station opened in 1913, with this building completed the following year. Trains call on two levels; upper-level trains cross the Hohenzollern bridge, while those on the lower level connect to a high speed line linking northern Germany and Frankfurt.

The new signalling system, due for completion by 2025, should improve capacity and reliability at the main station. Longer term, DB says it enables introduction of the European-standard digital positive train control European Rail Traffic Management System, adding capacity by allowing trains to run closer together, saving the need for two more tracks over the Rhine. As part of the master plan, the other rail bridge south of the city center, dating from 1915 and of similar design — but only double track and currently normally used only by freight trains — will also gain passenger service, with new commuter routes avoiding the main station.

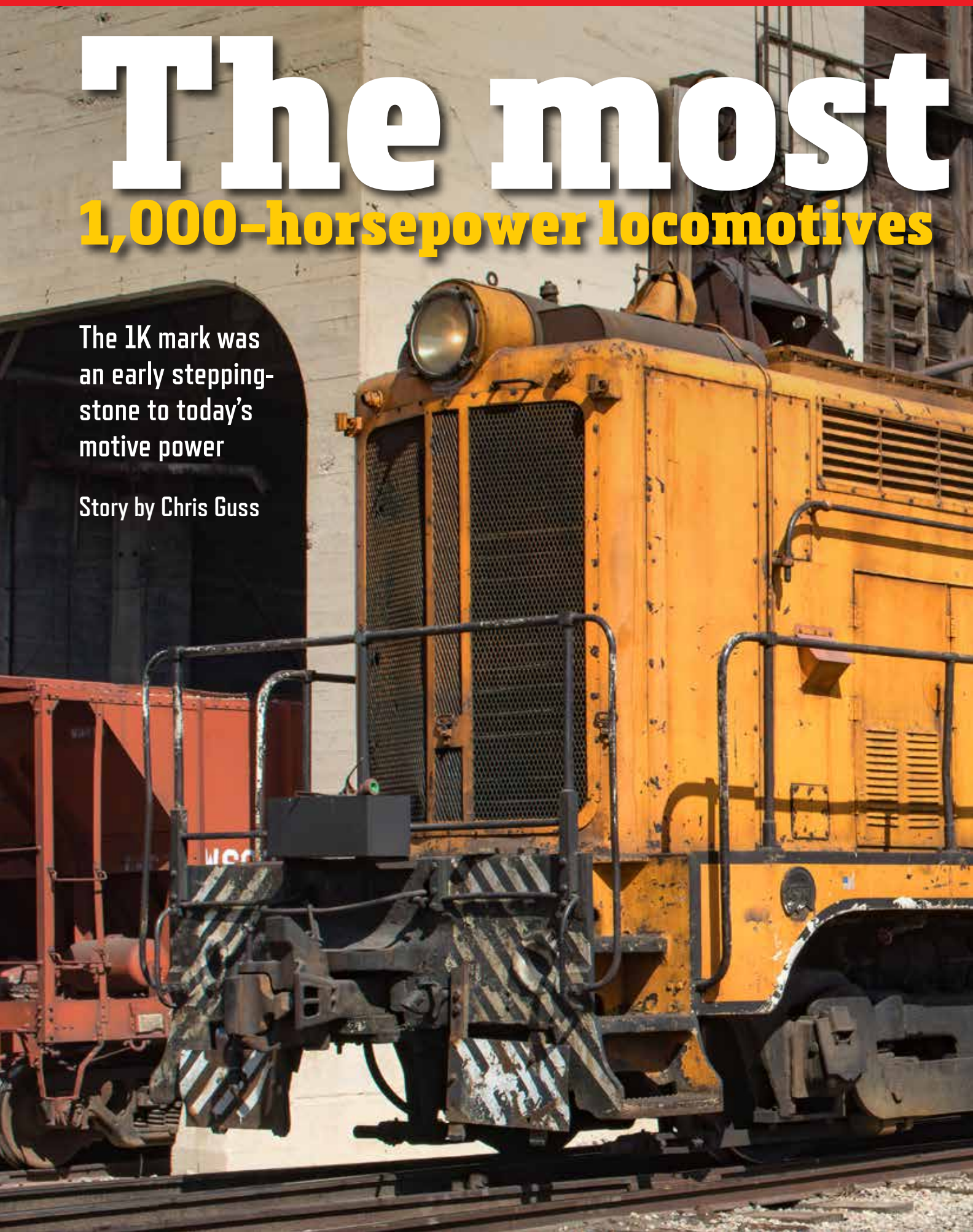
1,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,000

The most

1,000-horsepower locomotives

The 1K mark was an early stepping-stone to today's motive power

Story by Chris Guss



popular

Recently restored Kennecott Copper Baldwin VO1000 No. 801 is part of the Nevada Northern Railway's historic locomotive fleet. The diesel was built in 1942 for Utah's Bingham & Garfield Railway, a Kennecott subsidiary. No. 801 later served in New Mexico and Nevada. It is believed to be the oldest operating VO1000 still equipped with its original prime mover. Carl Swanson

Elgin, Joliet & Eastern No. 483, a Baldwin VO1000, is photographed at Joliet, Ill., on Aug. 20, 1966. Baldwin, best known for its steam locomotives, introduced its 1,000-hp switcher in 1939. Brian M. Schmidt collection

IN THE MOTIVE POWER WORLD

1,000 can mean many things. For example, owning more than 1,000 of any particular locomotive model is quite noteworthy, and only a handful of railroads can boast such a claim. In terms of horsepower, 1,000 is not much these days. The horsepower race is over, with modern road units settling in the low- to mid-4,000-hp range.

For lesser duties, locomotives producing 1,000 horsepower are harder to find today, with yard and local assignments largely performed by motive power in the 1,500-2,500-hp range.

Even these units have been bumped on some Class I railroads by former four-axle road locomotives rated in the 3,000- to 4,000-hp range.

During the steam-to-diesel transition from the late 1930s to the early 1950s, 600- to 1,000-hp switch engines seemed to be the sweet spot for many railroads, with several builders enjoying strong sales of locomotives in this range. To give their customers options, a builder would typically use a similar locomotive design for two units and apply prime movers of different cylinder quantities or utilizing a turbocharger for additional horsepower output. In the early 1940s, during World War II, the War Production Board directed different builders to focus on specific types of locomotives, which helped bump sales higher for certain models and solidify designs in the marketplace.

To tie into the 1000th-issue theme, we'll look at the most successful 1,000 horsepower locomotives.

BALDWIN'S VO1000

Baldwin's VO1000 locomotive comes in third with 548 copies of its 1,000-hp switcher produced. They were one of two builders (Alco being the other) directed by the War Production Board to focus primarily on switchers, a fact that certainly helped sales. During its eight-year production run, the VO1000's largest single customer was Santa Fe with 59 copies. The VO1000 was a frequent candidate for repowering in the 1950s and 1960s, with EMD's popular 12-

Chicago, Milwaukee, St. Paul & Pacific Electro-Motive Division NW2 No. 1649 was built in November 1947. Today it is part of the Monticello Railway Museum collection in Monticello, Ill. Two photos, Chris Guss

Of the early locomotives to reach the 1,000-hp milestone, Alco's S2 was far and away the most popular, with 1,502 built. Many of the locomotives toiled for decades, including Livonia, Avon & Lakeville's No. 72, photographed in January 2009 in Lakeville, N.Y.

567 engine. Some railroads would rebuild their locomotives in house, while others sent their VO1000s to EMD. Santa Fe rebuilt one VO1000 in house using EMD components, trucks, and prime mover before deciding it was too costly to launch a remanufacturing program. The lone unit survived on Santa Fe and BNSF's roster until 2008 when it was retired and donated to a museum.

Great Northern modified a handful of its VO1000s in a most unexpected way when it converted four retired locomotives into transfer cabooses, one of which is saved and preserved in a museum.

ELECTRO MOTIVE DIVISION'S NW2

Coming in second is Electro-Motive's NW2 switch engine with 1,143 locomotives built in a 10-year span between 1939 and 1949. During the war, EMD was directed to focus primarily on road locomotives, halting almost all production of EMD switch engines from 1942 to 1945. Like all models in this story, EMD's NW2 customer list was long and varied, from short lines to Class Is, industrial customers to the United States military. Union Pacific was the largest purchaser of the model at 95 units, with the railroad taking delivery of new NW2s almost every year EMD was able to offer the model outside of the war effort.

The NW2 has an interesting offshoot among this list of popular 1,000-hp locomotives — EMD offered the NW2 as a two-unit set. Called TR2s, EMD semi-permanently mated two NW2s together with one equipped with an operating cab and the other having a cabless design. With the TR designation referring to Transfer, the units were used primarily for transfer, heavy switching, and hump service by the eight railroads that ordered the design and originated the "cow and calf" nickname. In all, 36 cow-calf sets were produced, including two three-unit TR3 models built specifically for Chesapeake & Ohio. The TR3 had two cabless NW2s coupled to a single NW2 with a cab.

Fact Box

Baldwin: VO1000
Engine Type: In-line eight-cylinder
Model: Eight-cylinder Model VO
Turbocharged: No
Horsepower: 1,000

EMD: NW2
Engine Type: V-Type 12-cylinder
Engine Model: 12-567
Turbocharged: No
Horsepower: 1,000

Alco: S2
Engine Type: In-line six-cylinder
Engine Model: 539T
Turbocharged: Yes
Horsepower: 1,000

ALCO'S S2

The all-time 1,000-hp model produced in terms of sales was Alco's S2 locomotive. The S2 would enjoy a production run of a decade and boast an impressive list of more than 100 customers that purchased 1,502 copies for the North American market. This model would also become Alco's best-selling locomotive ever. Powered by an inline six-cylinder turbocharged 539T engine, the switcher produced 340 more horsepower than its non-turbocharged cousin, the S1, that Alco offered alongside its S2 beginning in 1940.

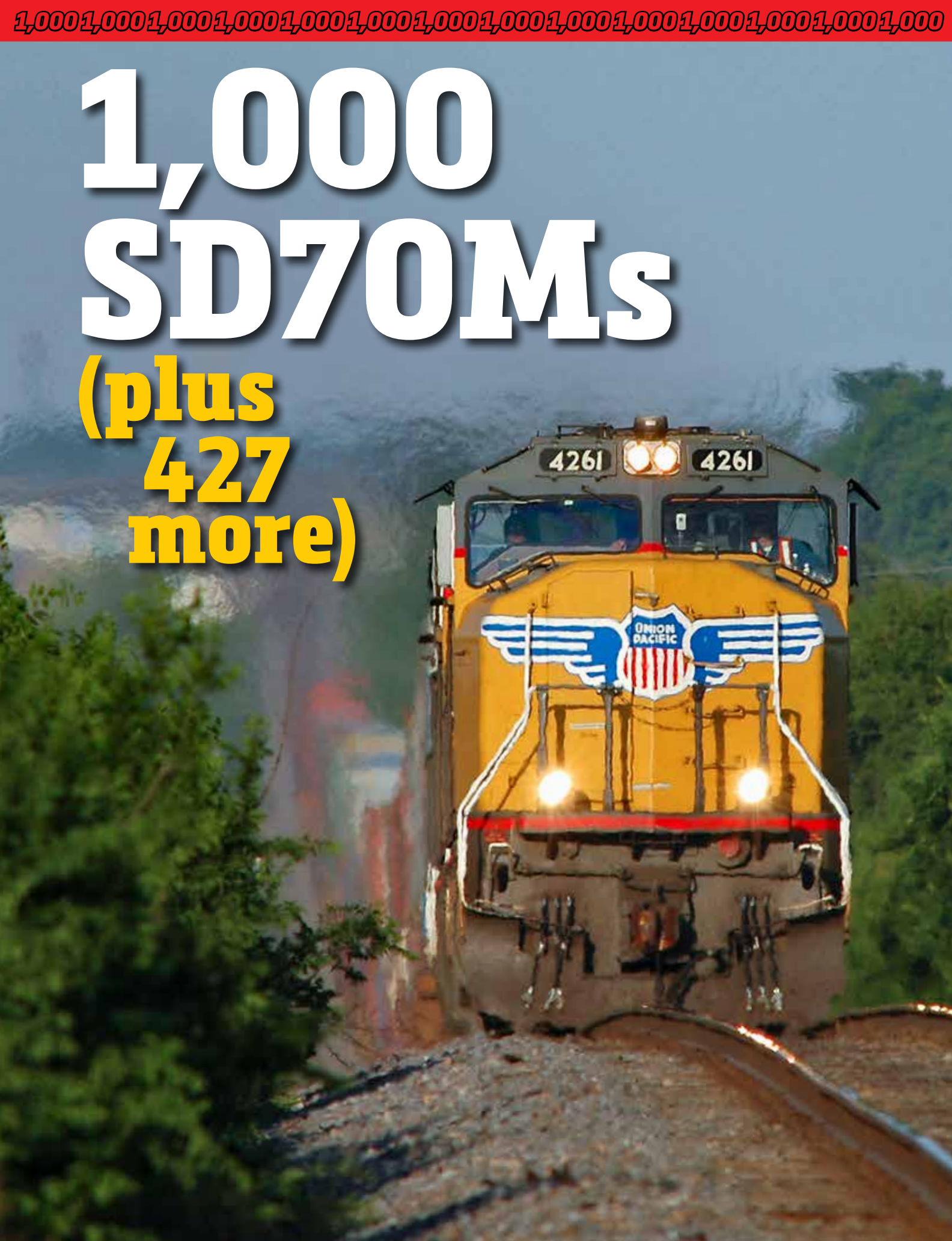
The RS1 locomotive would become the road-switcher equivalent of Alco's popular switcher model. Released in 1941, one year after the S2s debut, Alco designers stretched the S2's frame 8½ feet and added a short hood to the new locomotive, which could accommodate a steam generator if necessary. It also swapped out the Blunt trucks underneath with AAR Type B road trucks. While the RS1 only sold a third of what the S2's sales would generate, it became the longest-running locomotive model, in production for 19 years straight.

Towards the end of the S2's production run, Alco refreshed the locomotive design and introduced the S4 in 1949. The only major external difference was the replacement of the Blunt trucks with AAR Type A trucks. The S4 would be marketed for 11 years and would sell almost 800 copies. While the S2 and S4 were built and sold in Canada during their production periods by Montreal Locomotive Works, Alco's subsidiary in Canada, MLW would also build 29 S7s for Canadian National, a model that was essentially an S4 locomotive with a unique model name.

WHERE WAS GENERAL ELECTRIC?

For those of you wondering why General Electric didn't make the list, Alco and GE signed an agreement in 1940 granting Alco the ability to use GE electrical equipment exclusively in its locomotives. Part of the same agreement limited General Electric to building smaller diesel locomotives used in industrial settings and locomotives designed for export. When this agreement ended in 1953, the rise in switcher horsepower output had largely passed the 1,000-hp mark and General Electric was ready to design and build its own high-horsepower road locomotives.

1,000 SD70Ms (plus 427 more)



Union Pacific's record-setting EMD SD70M order

By Michael Iden

THE START OF THE 21ST CENTURY marked a shift in North American locomotive technology, as the Class I railroads increasingly acquired new units propelled by alternating current traction motors, especially for heavy-haul operations. Between 1993 and 2004, the last direct-current models to be sold in large quantities were the GE Dash 9 and the EMD SD70M. BNSF acquired the largest fleet of Dash 9s (1,697) in the 11 years of domestic production, 1993-2004. UP countered with the world's largest order from a single contractor for new locomotives at that time: 1,000 SD70Ms. The order was ultimately expanded to a record-setting 1,427 units in only 5 years of production, 2000-2004.

The SD70Ms were the right locomotive at the right time for a railroad recovering from the fog of two difficult mergers — Chicago & North Western in 1995, and Southern Pacific in 1996 — having been stressed unlike anything since Edward Harriman's 1898 post-bankruptcy rebirth of the UP. This is the story of how the SD70M came to be, the impact it had on UP's locomotive fleet, and the insights of those involved. Although many SD70Ms have been in and out of storage, and some are now leaving the UP for new owners, they will remain an icon of Union Pacific motive power.

With 1,427 SD70Ms on the Union Pacific roster, you would expect this locomotive class to show up just about everywhere on the UP system. They do. On Jan. 31, 2005, SD70M No. 4261 leads an intermodal stack train westbound outside Terrell, Texas. At the time, No. 4261 is not yet 5 years old, having been delivered in late summer 2000. Steve Schmollinger

The SD70Ms proved to be reliable, good-pulling locomotives. As a result, the class could be found assigned to a wide variety of trains. On Aug. 16, 2004, the early morning sun catches No. 4026 leading an auto train past Tower 55 in Fort Worth, Texas.
Steve Schmollinger

HEADLINE NEWS

I joined UP in mid-1995, largely focusing on combining the UP, C&NW (and eventually SP) locomotive fleets, integrating maintenance instructions, shop training, and managing new locomotive specifications. In late summer 1999 Joe Santamaria, chief mechanical officer, informed me that UP was considering a short-term — 2-3 year — lease of 200 SD70Ms from GM; the units would be painted black with white Electro-Motive Division lettering.

"Do whatever you have to do with the SP's [1994] SD70M specification [suggested by EMD] but don't affect their agreed-upon price," Santamaria instructed me.

Dual UP-C&NW cab signals would be the biggest addition to the SP's specification. At that early stage I never envisioned the order increasing to 1,000 units — let alone 1,427.

On Oct. 7, 1999, the New York *Times* broke the news: "International business: Union Pacific gives big lift to GM unit" announcing the $2 billion-plus commitment for 1,000 new locomotives over 5 years.

The agreement resulted from discussions between Ike Evans, railroad president, and Bill Happel, a GM vice president and EMD general manager, that followed extensive internal discussions in Omaha about the state of the railroad's post-merger fleet.

The two mergers more than doubled UP's locomotive fleet, from 3,160 to 6,330 units in only 17 months. A third of C&NW's 776-unit fleet was less than 6 years old (242 GE Dash 8s, 9s and AC4400s), while only a quarter of SP's larger fleet (2,394 units) was less than 9 years old (663 Dash 8s, 9s, and AC4400s plus 25 SD70Ms from 1994). The high age and mileage of SP's legacy EMD fleet (SD40, SD45 rebuilds, tunnel motors, and surviving Dash 7s) produced high failure rates, increased shop counts, and delayed trains. To paraphrase Prussian general Helmuth von Moltke regarding battle plans and enemies in warfare: no merger plan survives first contact with the combined locomotive fleet.

UP'S SD70M ORDER WAS WORTH MORE THAN $2 BILLION-PLUS OVER 5 YEARS

SIMPLICITY AND RELIABILITY

AC locomotives — technically AC-DC-AC — were a quantum improvement in converting engine horsepower into tractive effort at low speeds and eliminating the chronic maintenance and failures of DC motors. The "AC advantage" disappeared once train speed reached 15 to 18 mph. AC traction, however, carried a lifetime shadow price: lots of new, expensive technology, especially extensive computerization to convert DC power into AC for the motors. The SD70M, based on SP's 1994 specification, was less expensive and still largely an analog locomotive. The AC-DC traction system was computer controlled, but the human-machine

The SD70Ms proved to be a reliable class of locomotives. The Union Pacific deployed them across its network moving all types of trains. Here, Nos. 4238 and 4680 handle an auto rack train departing Portland, Ore., in June 2002. Carl Swanson

interface between locomotive engineer and locomotive, including the air brakes and fuel injection, was old technology with only one small diagnostic display screen. Over their lifetime the SD70Ms typically had fewer road failures per year — broken locomotives never move freight.

The SD70Ms were an international project involving the EMD engineering staff and diesel engine production in La Grange, Ill., and numerous suppliers. Assembly took place at three locations: EMD's Canadian affiliate, Diesel Division in London, Ontario (853 units plus SP's original 25 in 1994); EMD contractor Bombardier at Sahagun, Mexico (528 units); and EMD contractor Super Steel Schenectady in Glenville, N.Y. (46 units).

As production occurred, UP and EMD negotiated changes and improvements. Locomotives built in 2000 (unit Nos. 4000-4284) were carbon-copy SPs; the final 125 units in 2004 came with traditional upright control stands, as desktop controls never lived up to their promise and were disliked by many engineers. EMD, however, had to include display screens and electronic air brakes. The front nose was simplified, made more angular, in 2002 to eliminate labor-intensive corner radii — a trade-off of good looks for manufacturing efficiency.

GOOD TO BETTER

We were confident the SD70Ms would be good locomotives; we wanted the best. I shipped SP No. 9801 to La Grange and EMD agreed to revisit the 1994 specification and materials for reliability improvements. We particularly wanted to reduce engine cooling water leaks, typically from vibrating pipes and loosened connections. I loaned EMD a strobe lamp to do "night-time checks" of the unit with carbody doors open, so its engineers could see how the pipes were vibrating or moving at different engine speeds.

Every pipe, even the underframe and control stand, has a natural frequency at which it will vibrate; if a pipe's natural frequency matches a particular diesel engine speed, vibrations from the engine can amplify or increase the pipe's vibrations. This involved operating the SP No. 9801 at all engine speeds idle through notch 8, with the carbody doors opened and the strobe lamp at specific rates. In notch 8, the 16 engine pistons were collectively firing and vibrating the underframe 241.33 times per second. As a result, some pipe clamps and brackets were relocated, and some braided steel hoses were substituted for solid pipe.

Did UP get value by acquiring the retro SD70Ms? Yes. As the SD70M fleet grew, they increasingly powered long-distance, higher-speed, power-demanding, priority intermodal trains, and started accumulating more horsepower-hours per month (a measure of work performed) than many AC units and even the 6,000-hp GE AC6000s and EMD SD90MACs. It was racehorses versus plow duty.

One issue UP engineers encountered with the new SD70Ms was low-speed, high-throttle wheel slip, especially in wet weather. An SD70M could achieve an all-

With the reintroduction of the winged logo, the SD70M paint scheme also featured the addition of a lightening-bolt zigzag in the red stripe on the long hood. The reflective stripe can be seen on No. 4036, spotted in the West Anaheim Yard on April 24, 2022. The fireworks are from nearby Disneyland. Craig Walker

weather adhesion of 27% to 30% (percent of weight converted into tractive effort); ACs can achieve 35% to 45%. An SD70M trailing an AC on wet rail could sink down, causing a stall. As none of the SD70Ms had distributed power equipment, they were often trailing units.

THE WINGED SHIELD

The SD70Ms marked the return of the UP's historic winged shield. The medallion was designed by the railroad in late 1938 and first applied in 1939 to the LA-5 E3 cab unit for the *City of Los Angeles* passenger train. Wings had last been applied in December 1963 on UP's final E9A passenger units. For the SD70s, the winged shield was positioned high on the locomotive nose.

By 1999 I felt that UP's wingless shield — the railroad's official logotype — had shrunk on wide-nose locomotives, rendering it largely unnoticeable. Omaha decal supplier Pro-Sign, whose owner Dave Oster originally hand-cut decals in UP's Omaha Shop, sent me an old 10-foot-wide winged shield adhesive decal he found in his inventory.

"It probably won't stick if you try," Oster said.

On the afternoon of Oct. 26, 1999, I hastily unrolled and applied it, using rolls of adhesive office tape, to the nose of UP No. 7525, an AC6000, spotted near my office at Proviso Shop outside Chicago.

I emailed photos to CMO Joe Santamaria, suggesting we apply the winged shield to the SD70Ms, and quickly got approval from Dennis Duffy, executive vice president-operations, and Dick Davidson, UP chairman, to proceed with EMD on paint and decal details. The winged shield was officially coming back only on new and repainted wide-nose locomotives, but the wings started appearing virtually everywhere — on buildings, in presentations, and stitched into branded clothing.

UP, like many companies, and rightfully so, has always carefully controlled its internal and external corporate image. Despite some within the railroad not liking the winged shield, the return of the wings seemed to ignite a sense of pride within the employee ranks. Some train crews were seen cleaning the medallion on their lead unit. Ironically, UP reverted to wingless shields on repainted locomotives starting in 2023.

By Jan. 4, 2000, EMD provided a computer-generated digital image of the future UP No. 4000 showing the new wings and stripes. The legacy red stripes were also updated with a speed-effect lightning stripe on top between the gray and yellow. On April 17, 2000, in London, Ontario., GM Diesel Division employees Kevin Black and Scott Chalk applied the reborn winged shield to the nose of UP No. 4000.

THE "4000S"

The 4000 road-number series was selected for the new SD70Ms in obvious acknowledgement of the historic Big Boy locomotives — of which only 25 were built. The Big Boys were numbered 4000-4024. The immediate challenge became taking annual delivery of hundreds of new SD70Ms with road numbers already assigned to existing UP locomotives. This was compounded by the need to continue renumbering, and rebranding with paint and decals, the former C&NW, SP, St. Louis Southwestern, and Rio Grande units. This led to another "world's first," involving many of UP's 7,000-plus locomotives.

The renumbering plan also moved many UP low-horsepower locomotives — switchers and GP15s, in particular — into a new "UPY" number series. UP is the only existing railroad ever allowed to create a new re-

4000 meets 4000 — The SD70M class was given the honor of holding the same road numbers as the Union Pacific's famous Big Boy steam locomotives. SD70M No. 4017 meets operational Big Boy No. 4014 in Evanston, Wyo., on May 6, 2019. Mike Danneman

Helping to carry the flame to the 2002 Winter Olympics in Salt Lake City were two specially painted SD70Ms. Nos. 2001 and 2002 received the Olympic-themed paint in the Wisconsin & Southern paint booth at Horicon, Wis. The units still wear the Olympic paint, as seen while passing through Rochelle, Ill., on March 29, 2009, leading an auto train. Kenneth Friedman

porting mark, because it appeared the fleet might eventually exceed 9,999 units. Many computer systems in the railroad industry could not accommodate locomotive road numbers longer than four digits. Generally, only a newly created railroad is authorized to request — and can be granted — totally new reporting marks. We had considered using C&NW, D&RGW, MP, SP, SSW and/or WP reporting marks for switchers, but opted for UPY.

Working with Ed McCaddon, general superintendent-maintenance operations, by Jan. 27, 2000, we created a renumbering plan covering much of the UP-C&NW-SP-SSW-D&RGW fleet, projecting units that were likely to be retired, the arrival of additional AC units, and the massive arrival of 1,000 — eventually 1,427 — new SD70Ms. The new SD70Ms would be numbered 4000-4999 and eventually through 5231 (with the SP SD70Ms renumbered UP 3974-3984 and 3986-3999, leaving road No. 3985 for the 4-6-6-4 Challenger steam locomotive). The plan accounted for locomotives that were slated for retirement, such as SD40Ms and SD45Ms, tunnel motors, and the GE B-boats with road numbers in the high 9000s.

Another SD70M was tapped to wear a special paint scheme. Originally No. 4332, now No. 1979, the locomotive carries the "We are ONE" design representing UP's various employee support groups. The colorful unit is working in Long Beach, Calif., on Jan. 8, 2022. Craig Walker

Locomotive renumbering kits were prepared by Pro-Sign, the Omaha decal shop, including color-matched cab-side patch panels, locomotive initials and road numbers, various UP shields, and new number boards. Onboard computer systems also had to be reprogrammed. Delivering the decal kits and matching them with the units to be renumbered was scheduled at each shop.

SD70M SP No. 9801 became the first locomotive to be officially renumbered, to UP No. 3975. UP's Greg Pietruszynski, who died in 2006, applied the first renumbering kit outside the EMD Engineering Test Shed at La Grange late 1999.

A (RENUMBERED) SATELLITE TV STAR

We started preparing SD70M training materials for employees in November 1999. UP followed SP practice and largely kept the 25 SP SD70Ms in the I-5 corridor between Los Angeles and Portland, Ore. These units were maintained only in the LA Basin and Roseville, Calif., and became relative strangers to other UP shops.

SD70M No. 4529 is on the point of a manifest train passing through UP's ex-D&RGW Price River Canyon. The eastbound is working downgrade at Kyune, Utah, next to the frozen, snow-covered Price River in the sub-freezing temperatures on Jan. 31, 2008. Alex Mayes

Ed Adelman, director of locomotive training, and I had for several years been periodically making *Shop Talk* live broadcasts using UP's satellite network linking the entire railroad, especially the locomotive shops. Bill Trombello, a consultant and formerly EMD's top engine trainer, often participated in our broadcasts. Our first *Shop Talk* broadcast was, I believe, in February 1997 when we discussed troubleshooting overheated EMD locomotives, typically a hot-weather problem. To get the point across, as snow blanketed Omaha outside the studio, we were dressed in short-sleeved tropical shirts in the well-lit, air conditioned BTV studio to set the stage for a warm-weather locomotive issue.

In November 1999, Adelman and I prepared an *Introduction to the SD70M* broadcast using a professional camera crew for two days at La Grange. We filmed numerous walk-around video clips of UP No. 3975, highlighting and discussing unique SD70M features and maintenance requirements. Ironically, the massive EMD assembly plant, by then abandoned and being prepared for demolition, was in the background. The show was broadcast live on Dec. 8 (7 p.m. Omaha time for second shift) and Dec. 9, 1999 (4 a.m. for third shift and 10 a.m. for first shift).

SPECIAL SD70MS

Two of the new SD70Ms, UP Nos. 4690 and 4691, were delivered in 2001 in primer paint and then quickly painted by the Wisconsin & Southern Railroad at Horicon, Wis., to become UP Nos. 2001 and 2002, celebrating the 2002 Salt Lake City Winter Olympic Games. In 2014 they were touched-up with a high gloss applied by National Railway Equipment in Mount Vernon, Ill., and still carry the torch theme.

SD70M UP No. 4141 was considered in early 2005 as a candidate for the George H. W. Bush Presidential Museum & Library locomotive, but after inspecting the 4-year-old locomotive in Los Angeles, I recommended using a new SD70ACe instead — the six-unit merger-heritage repainting project was also just beginning. The very day that SD70ACe 4141 was presented to the former U.S. president in October 2006, the original No. 4141 was renumbered to No. 3778, making it the lowest-numbered SD70M.

ONE TOUGH LOCOMOTIVE

The SD70Ms were designed and built by EMD to meet the Association of American Railroads standards for operator-cab and front-nose crashworthiness (known as AAR S-580), and for fuel tank crashworthiness (referred to as AAR S-5506). In 2006, both standards were incorporated by reference in Federal Railroad Administration regulations, defining their function as being "… to help protect locomotive cab occupants in the event that a locomotive collides with another locomotive or piece of on-track equipment, a shifted load on a freight car on an adjacent parallel track, or a highway vehicle at a highway-rail grade crossing."

Both AAR standards were the result of cooperative research conducted in the 1990s by the AAR, the railroads, and locomotive builders to improve the survivability for operating crews involved in major accidents and to reduce the risk of fires resulting from breached older fuel tanks.

Four key features gave the SD70Ms good crashworthiness:

1. The front anticlimber — extension of the front walkway partially out and over the coupler, providing resistance to motor vehicles from riding up on the front nose in grade-crossing collisions, and to reduce the risk of locomotive overrides.
2. The exceptionally tough full-width front nose — typically 3/8-inch-thick steel — with a strengthened access door that opens outward, virtually eliminating the risk of the door caving in.

Starting with units built in 2002, the SD70M radiators were modified to help meet EPA Tier 1 emission standards. Entering Tucson, Ariz., on March 8, 2008, No. 4597, built in 2001, has standard radiator grills, while No. 3904, built in 2003, has flared grills. Ivan Abrams

Despite concerns about the U.S. flag becoming too dirty, SD70Ms (Nos. 4525-4527) began carrying the image on their long hoods beginning in late 2001. Picasa

3. A pair of massive collision posts inside the front nose — large thick steel slabs welded to the underframe — serving as "stop" posts to prevent the front nose from being collapsed rearward toward the operator's cab.
4. The fuel tank is designed to minimize risk of being penetrated by broken rails. It can support the weight of the entire locomotive resting sideways on both rails.

Why not a window in the front nose door? They were eliminated from UP new and overhaul specifications around 1997 after an AC4400 struck a crane; the boom went through the nose door window. Canadian National had earlier done the same for improved safety.

I recall several years after the SD70Ms went into service receiving a phone call from a foreman at the North Little Rock, Ark., heavy-repair shop telling me: "… something is wrong with the front coupler pocket on SD70Ms …" because he was seeing SD70Ms with accident damage particularly to the front coupler pocket, which was welded to the locomotive underframe. What he had not noticed, however, was the SD70Ms were sustaining much less damage to the front nose and cab because of the overall improved crashworthiness. Older locomotives likely would have had coupler pocket damage and significant damage to the front nose and cab.

No two railroad accidents are exactly alike, but one involving SD70Ms stands out as an example of improved crashworthiness. In August 2004, a coal train derailed, leaving a loaded coal gondola coming to rest across and blocking the adjacent main line … seconds before an opposing manifest train with three SD70Ms struck the derailed car broadside at 45 mph. After slicing through 132 tons of coal and derailed car, the three SD70Ms derailed to the right and slid, still coupled, to a stop. The engineer and conductor had just a moment to move from their seats down into the alcove behind and under the crashworthy nose and sustained only minor injuries. All three fuel tanks also remained intact and did not leak.

Greg Pietruszynski (left), Tim Keck (center), and author Michael Iden (right) stand with SD70M No. 4000 in Proviso Yard in suburban Chicago on May 15, 2000. Since they were not at the EMD plant in London, Ontario, they did not wear matching shirts. Author's collection

On June 9, 2022, Michigan's Lake State Railway introduced its first SD70M. Now wearing No. 6432, the locomotive began life as UP No. 4609 in April 2001. The short line rosters six former UP SD70Ms, which complement its SD40-2 and SD50-2 units. Lake State Railway

FLAGS AND FLARES

Carbody U.S. flags first appeared on new SD70Ms (Nos. 4525-4527) in late 2001. I'll only say I advised caution knowing how locomotives accumulate dirt. Flared radiators came about to comply with the EPA's Tier 1 emissions standard starting 2002; Nos. 4635-4639 were preproduction test beds and No. 4711 was the first official Tier 1 SD70M.

GOOD PEOPLE

In 1966 Honda motorcycle ads promoted, "You meet the nicest people on a Honda." During my career I was fortunate in meeting many great people on and around SD70Ms.

During the first two years of production, my counterpart at EMD was Tim Keck, EMD's UP SD70M engineering program manager. We regularly took trips to inspect the production line in Canada. The story in London was that we coordinated everything … on days when I wore a solid-blue shirt, Tim did as well. When I wore a striped shirt … yes. Other EMD personnel included engineers Karl Smith, Harvey Boyd, Hans Dieter-Schaller, Bob Becker, Scott Given, Dave Goding, and Tom Savage. There isn't space enough to mention everyone, especially my many fellow UP coworkers — not an intentional oversight; everyone please take a bow. My UP associate, Greg Pietruszynski, of course, was deeply involved throughout the project.

On May 15, 2000, the first four SD70Ms — Nos. 4000, 4001, 4002, and 4003, facing west, elephant-style — departed UP's Global 1 container yard in Chicago for Portland, Ore. Proviso's locomotive management staff arranged the lineup on request, duplicating to the day 20 years earlier when C&NW's first four GP50s — Nos. 5050, 5051, 5052, and 5053 — made their first trip west. Never forget history.

THE 4000 NUMBER SERIES WAS CHOSEN AS A SALUTE TO UP'S BIG BOYS

WHERE ARE THEY NOW?

Many UP SD70Ms have started new careers for Big Kaw River Railroad, Paducah & Louisville, Lake States Railway, Mexico's new trans-isthmus railroad and others.

Michigan's Lake State Railway added six former UP SD70Ms to its roster in 2022. "The six former Union Pacific SD70M locomotives have been an exceptional addition to our fleet," says W. Roger Fuehring, Lake State chief mechanical officer. "They were well-maintained, excellent pullers, and very reliable. Much like the SD40-2 became the flagship 6-axle locomotive for Class II & III railroads as they were retired, I can see the SD70M taking over that role as more become available."

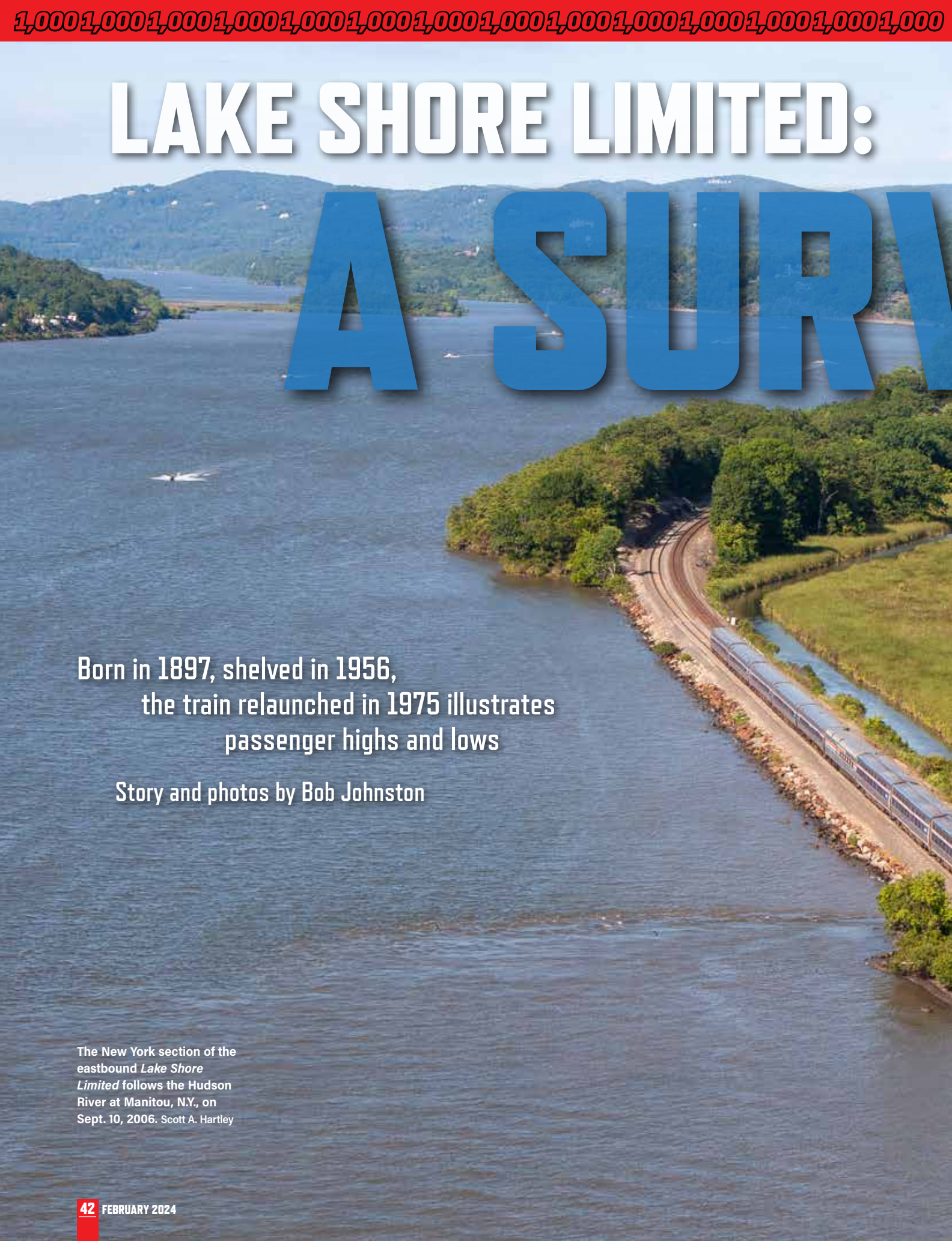
Following a 40-year career with C&NW and UP, I retired and upon doing so received a box from John Estes, chief mechanical officer. The box contained a congratulatory note and a model of UP SD70M No. 4429. When you see No. 4429, or whatever number it may become in the future, tell it I said "hello."

As our discussion concludes, return to the opening photo of UP No. 4261 — wings pulling a train out of the horizon's vanishing point. One picture is worth a thousand words … and a thousand locomotives, plus the other 427. 1

Following his railroad career MICHAEL IDEN retired to become a railroad consultant. During his time with the C&NW, Iden was the assistant vice president — motive power. At the UP, he was the general director — locomotive engineering. He wishes to thank Sean Graham-White and Don Strack for information used in this article.

Working through Afton Canyon, Calif., UP SD70M No. 4443 crosses the truss bridge over the Mojave River on March 30, 2007.
Sayre C. Kos

LAKE SHORE LIMITED: A SURV



Born in 1897, shelved in 1956, the train relaunched in 1975 illustrates passenger highs and lows

Story and photos by Bob Johnston

The New York section of the eastbound *Lake Shore Limited* follows the Hudson River at Manitou, N.Y., on Sept. 10, 2006. Scott A. Hartley

1,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,0001,000

VIVOR

The heavyweight *Lake Shore Limited* is eastbound at Camelot, N.Y., on April 16, 1939, behind class J1C 4-6-4 No. 5264, built by Alco in Schenectady, N.Y., in 1928. John P. Ahrens

There aren't any 1,000-mile U.S. passenger trains operating today that also were around for *Trains* issue No. 1 in 1940, but one comes close: Amtrak's *Lake Shore Limited*. Split at Albany-Rensselaer, N.Y., after an overnight run from Chicago, its New York section travels 960 miles and its Boston section 1,018 miles. Beyond that 1,000-mile trip, there are many reasons to delve into this survivor, which exemplifies how passenger service has morphed through stages of feast and famine, both before and after Amtrak resurrected it in 1975 following a 19-year hiatus.

HALCYON DAYS

Among all the passenger trains to operate between New York and Chicago, the *Lake Shore Limited* is in no way qualified to lead the list. The No. 1 spot may be subject to endless debate, but the top two are clearly the Pennsylvania Railroad's *Broadway Limited* and the New York Central's *20th Century Limited*.

Each train had a luxury predecessor. The PRR's originator was the all-Pullman *Pennsylvania Limited* that debuted in 1887, predating the *Broadway* by 15 years. The NYC launched the *Century* on the same day as the *Broadway* — June 15, 1902 — but it was preceded, beginning May 30, 1897, by the all-sleeping-car *Lake Shore Limited*.

Like Amtrak's version, the first *Lake Shore* was a New York-Chicago train with a connecting Boston section. The route was exactly the same as today's. As author Arthur D. Dubin notes in *Some Classic Trains* (Kalmbach, 1964), New York Central General Passenger Agent George Daniels commissioned the Wagner Palace Car Co. of Buffalo, N.Y., to build the luxury land cruiser after similar equipment was displayed at Chicago's 1893 Columbian Exposition. The seven-car consist had "a buffet smoking and library car, a dining car, a parlor car, three sleeping cars, and a private compartment stateroom observation car." Daniels had run excursions to and from New York on an ambitious 20-hour schedule, but 1897's *Lake Shore* was carded at an even 24 hours eastbound and westbound (see schedule comparisons, page 47).

Westbound No. 19 and eastbound No. 22 held the same numbers on the three railroads under NYC control at the time: the New York Central & Hudson River, the Boston & Albany, and the Lake Shore & Michigan Southern. No. 19's equipment listing in the June 1897 *Official Guide of the Railways* shows sleepers from Boston and New York to Chicago, two New York-Cleveland "cut-off" sleeping cars, and a Boston-Cincinnati sleeper switched to another train at Cleveland. Dining cars operated New York-Syracuse and Cleveland-Chicago. Not surprisingly, given the scenery and patronage potential, a "drawing room car" operated from New York to Albany. So, even from the train's first incarnation, the 140 miles hugging the Hudson River were considered a magical magnet.

There were anomalies. Although the *Lake Shore* was strictly first class, eastbound train No. 22 combined overnight between Toledo and Buffalo with coaches from the much slower *Eastern Express*. This local left Chicago 2½ hours earlier and got into New York more than two hours later. The eastbound Boston section also combined with the all-Pullman *Southwestern Limited* east of Albany, N.Y.

DIFFERENT STATIONS; SHUFFLED EQUIPMENT

Though *Lake Shore* continued to serve the same cities on tracks that passed from New York Central to Penn Central, Con-

rail, Metro-North, Amtrak, Norfolk Southern, and CSX, its route in those cities, and the stations it called on, changed dramatically. Boston's South Station and New York City's Grand Central Terminal were not built until after 1900. Albany, N.Y., Union Station was shuttered in 1969; tracks to it were torn out by Penn Central in favor of a station across the Hudson River at Rensselaer. Stations at different locations have been built at Syracuse and Buffalo, N.Y.; Cleveland, Elyria (recently, no more than a shelter), and Toledo in Ohio; and South Bend, Ind. Chicago's LaSalle Street was a fixture throughout New York Central's stewardship, but Amtrak switched all Chicago operations to Union Station in 1972.

Throughout its early decades, the *Lake Shore* remained a first-class, extra-fare train, playing second fiddle only to the *20th Century*. By 1926, with its steam-powered heavyweight consist, it continued to host New York-Albany and Cleveland-Chicago parlor cars.

World War II brought coaches, which remained when the Central jettisoned its tired rolling stock for lightweight equipment. But the massive postwar influx of railcars enabled the railroad to launch a host of other Chicago-East Coast trains that reduced the *Lake Shore*'s supporting role. That was jointly assumed by the *Commodore Vanderbilt* and all-coach *Pacemaker* to New York and the *New England States* to Boston, all leaving earlier than the *Century*. The *Lake Shore* thus embraced its function as a "clean up" train that nevertheless provided top-notch service to intermediate stops forsaken by its limited-stop cousins. That included the obligation to provide dedicated sleeping-car service to those communities (see page 48).

DISENCHANTMENT AND RESURRECTION

The westbound *Lake Shore* had a cozy relationship with the New York-Detroit-Chicago *Wolverine*, leaving New York 15 minutes behind the train that cut through Canada instead of hugging the southern shore of Lake Erie. Too cozy, in fact. With air and highway alternatives making deep inroads into New York Central patronage, the railroad axed trains 19 and 22 in mid-1956, keeping the *Wolverine* westbound and rescheduling the *Pacemaker* eastbound out of Chicago via Cleveland on the *Lake Shore*'s previous schedule.

The NYC, and later Penn Central, did maintain overnight service with dining and sleeping cars on the *Lake Shore*'s route past the demise of the *20th Century* in 1967 and the "no name" train phase that followed. Through cars to Boston at Albany and trains on the *Wolverine*'s route across Ontario via Detroit were dropped before the Amtrak axe fell on May 1, 1971.

Perhaps, in their haste, Amtrak's planners thought service to cities like Cleveland and Toledo was expendable, so a New York-Buffalo-Chicago train wasn't in the initial network. That was temporarily rectified after 10 days when the states of Illinois, Ohio, and New York hastily helped fund an extension of a New York-Buffalo train under the Amtrak legislation's section 403(b) "avoidable cost" provision. The nominal sum was meant to make up the operating cost difference if the company didn't run the service. It subsequently received the *Lake Shore* name (no "*Limited*") in the Nov. 14, 1971, timetable, but disagreements about how much each state would pay led to its demise on Jan. 6, 1972.

Amtrak's nature as a political animal was evident in its original legislation, in which Congress dictated the company launch one "experimental" route per year. The first was the Chicago-Seattle *North Coast Hiawatha* in 1971. A convergence of political pressure and common sense led to the *Lake Shore Limited*'s resurrection in 1975.

Both the Chicago-Cleveland-Buffalo and Albany-Springfield, Mass., segments

The eastbound *Lake Shore Limited*, with 16 cars, is led by E7 No. 4003 at Crugers, N.Y., in March 1955. The photographer, seeking to convey the train's speed, wrote a note on the photo: "Blur of lead unit is not a mistake." David Plowden

SEE MORE ON THE LAKE SHORE LIMITED AT TRAINS.COM/TRN/RAILROADS/HISTORY/

A passenger prepares to board the *Lake Shore*'s Boston section at the Pittsfield, Mass., "Amshack" structure on June 11, 1988. The city now has a multimodal transportation facility also served by the weekend *Berkshire Flyer*.

required stations and platforms. Penn Central had taken out the direct "Post Road" route into Albany-Rensselaer, so the Boston sections had to endure additional mileage and a cumbersome back-up move between PC's bridge route to Selkirk Yard and the Hudson River line. The direct connection wasn't restored until 1979.

Regular service began Oct. 31, 1975, following a two-day inaugural special from Chicago to Boston the previous week. It publicized Amtrak's new addition and previewed its onboard offerings for local media and civic officials. Stops were subsequently established at Sandusky and Bryan, Ohio, and Waterloo, Ind.

SCHEDULE AND STATION SWAPPING

The train's initial schedule was dictated by the fact that its New York station, Grand Central Terminal, was isolated from the company's primary servicing facilities at Sunnyside Yard. To facilitate a same-day turn in New York with three sets of equipment, the train had to leave Chicago early enough allow for a servicing once-over in the bowels of Grand Central prior to an evening departure. A fourth trainset was needed for the Boston section, since the trip over the circuitous route across the Berkshires was slow. Some efficiencies would be achieved when it began to share the Boston-Washington, D.C. *Night Owl*'s sleeping car as a same-day run-through.

Unlike its luxury predecessor of the early 1900s, Amtrak's *Lake Shore* picked up where the New York Central's 1950s version left off as an egalitarian operation. Originally assigned a hefty contingent of heritage coaches to handle substantial regional traffic in New York State and out of Chicago, the train also carried a slumbercoach — with smaller rooms at bargain fares —as well as 10-roomette, six-bedroom sleeping cars. It also offered full dining service at reasonable prices to and from New York, with a slimmed-down menu in the Boston section's café car.

The New York residency on Park Avenue at 42nd Street did pose challenges. Defects encountered en route from Chicago, especially through frequent blizzards, could not always be addressed during an often-shortened Grand Central layover. Entering a roomette on a mid-1980s trip to Chicago, a passenger encountered a half-eaten cheese-and-crackers basket under the seat. "Rats," the chief of onboard service groaned. "They jump aboard when we're parked down there."

A maintenance base had been established at Albany-Rensselaer to service *Empire Service* trains, including newly ordered Turboliners, and add third-rail-equipped, ex-New Haven FL9 locomotives to trains with traditional equipment. Malfunctions were often dealt with there "on the fly" when the New York and Boston sections joined or were split.

Rehabilitation of former freight tracks on Manhattan's west side permitted Amtrak — and the *Lake Shore* — to forsake Grand Central for Penn Station on April 7, 1991. The move also set the stage for schedule adjustments that eventually changed the same-day equipment flip from New York to Chicago, since overnight servicing could be performed at Sunnyside Yard. After Amtrak cut the *Broadway Limited* on Sept. 10, 1995, and a *Three Rivers* revival on March 7, 2005, trains Nos. 48 and 49 became the only daily Chicago-New York service. The eastbound *Lake Shore* would then reprise its former "clean-up" role accommodating travelers from tardy western connections.

SERVICE UPGRADES

Clinton administration budget cuts that resulted in the *Broadway*'s demise, however, were accompanied by Amtrak President Tom Downs' attempt to decentralize the company's sprawling operation

Grand Central Terminal is minutes away as an ex-New Haven FL9 locomotive leads the New York section approaching Harlem's 125th Street station on March 16, 1991. Added at Albany, the dual-mode FL9s remained in use when the train switched to Penn Station the next year.

LAKE SHORE LIMITED SCHEDULE COMPARISONS

EASTBOUND									
Year			1897	1925	1941	1954	1977	1992	2023
			---ALL SLEEPING AND PARLOR CARS------						
Miles	Train #		22	22	22	22	48/448	48/448	48/448
0	Chicago CT	Lv	5:30 PM	5:30 PM	5:30 PM	6:30 PM	2:30 PM	6:20 PM	9:30 PM
234	Toledo ET	Lv	11:25 PM	12:15 AM	11:47 PM	11:35 PM	8:50 PM	11:54 PM	3:15 AM
341	Cleveland	Lv	2:20 AM	3:08 AM	2:10 AM	no stop	11:15 PM	2:06 AM	5:50 AM
528	Buffalo	Lv	8:00 AM	no stop	5:38 AM	4:30 AM	3:35 AM	5:22 AM	9:05 AM
818	Albany, NY	Ar	3:05 PM	1:45 PM	11:26 AM	9:40 AM	9:05 AM	10:17 AM	2:53 PM
960	New York	Ar	6:30 PM	5:25 PM	2:30 PM	12:55 PM	12:30 PM	1:49 PM	6:42 PM
1018	Boston ET	Ar	9:05 PM	7:25 PM	4:35 PM	3:15 PM	3:40 PM	3:35 PM	8:32 PM
WESTBOUND									
Year			1897	1925	1941	1954	1977	1992	2023
			---ALL SLEEPING AND PARLOR CARS------						
Miles	Train #		19	19	19	19/33	49/449	49/449	49/449
*	Boston ET		2:00 PM	no connection	3:50 PM	3:30 PM+	3:05 PM	4:55 PM	12:50 PM
0	New York	Lv	5:00 PM	5:30 PM	6:50 PM	6:25 PM	6:15 PM	7:45 PM	3:40 PM
141	Albany, NY	Lv	8:20 PM	9:00 PM	9:45 PM	9:47 PM	9:35 PM	11:03 PM	7:05 PM
431	Buffalo	Lv	2:50 AM (CT)	no stop	3:07 AM	2:59 AM	3:20 AM	4:31 AM	12:39 AM
618	Cleveland	Lv	7:20 AM	8:20 AM	6:29 AM	6:27 AM	7:25 AM	7:46 AM	4:03 AM
725	Toledo ET	Lv	10:10 AM	11:05 AM	8:57 AM	8:40 AM	10:00 AM	10:14 AM	6:33 AM
960	Chicago CT	Ar	4:00 PM	4:00 PM	12:10 PM	12:05 AM	2:40 PM	1:38 PM	10:12 AM

*200 miles from Boston to Albany-Rensselaer via direct "Post Road" route; 218 miles via Castleton cutoff detour used 1975-79

+Through cars between Albany and Boston handled by New England Wolverine

SOURCE: Official Guide of the Railways June 1897, Nov 1925, June 1941, March 1954; Amtrak timetables May 1977, Oct. 1992, website Oct. 2023

into product lines. The idea was to make managers and their teams responsible for evaluating the market potential of a specific route, and increase its revenue while managing expenses.

This restructuring of responsibility triggered creativity on many routes. On the *Lake Shore*, it didn't take long for newly designated product line manager Marty Rush to zero in on dining and hospitality as variables that could immediately improve the onboard experience.

Later departures from Chicago meant dinner eastbound could instead become a wine and cheese "Train Departure Reception" for sleeping-car passengers. They were invited to attend with a note in their rooms and offered stationery branded with a new train-specific logo.

Direct communication extolling the *Lake Shore*'s features and virtues extended to the dining car menu, which proclaimed, "We believe that train travel should be a fun and unique experience." It went on to talk about snacks and "moderately priced souvenir items" available in the lounge car and reminded passengers that eating in the dining car is,"one of the truly unique experiences of train travel." Though sleeping-car passengers' food was (and is) included in the cost of their more expensive tickets, dinner prices under $12 and breakfasts between $4.25 and $7.50 helped encourage coach passengers to spend money in the diner.

The enduring value to the *Lake Shore* of travelers experiencing a meal while absorbing over 100 miles of Hudson River scenery unfettered by highways or headlights cannot be minimized. Whether the train was headed northbound or southbound, at dusk or in the afternoon, the draw has always been mesmerizing and unique, rivaled in the U.S. only by the *Empire Builder*'s Mississippi River vistas between La Crosse, Wis., and St. Paul, Minn.

VIEWLINERS DEBUT

Lake Shore passengers were also among the first to experience the introduction of Viewliner I sleeping cars. Commissioned in 1993 by President W. Graham Claytor Jr., in part to comply with a federal requirement for retention toilets, they debuted in November 1995. A "*Lake Shore Limited* Guest Directory" explained the new sleeping car's features, which initially included video screens in every room displaying films and providing audio entertainment. Aboard sleeper *American View*'s first eastbound run, I remember being so engrossed in a movie about a man reincarnated into a dog ("Fluke"), that I almost missed my stop at Utica, N.Y. The entertainment systems were eventually taken out in the first round of refurbishing as personal electronic options developed.

The Chicago-New York train had previ-

The westbound *Lake Shore*'s Boston section, left, is already at Albany-Rensselaer on Sept. 16, 2018, as the New York section arrives at right. The dual-mode unit on the New York section will be cut off and the Boston section will couple on to those cars for the trip to Chicago.

The New York section of the *Lake Shore Limited* is eastbound at Oscawana, N.Y., circa 1954, during an era when it handled sleeper traffic for a variety of cities. John F. McBride

PICK UP, DROP OFF, AND CONNECT

Lake Shore of the 1950s handled sleepers to and from a host of cities along, beyond its route

IN ADDITION TO the Chicago-New York and Chicago-Boston sleeping cars carried today, the early-1950s eastbound *Lake Shore Limited* dropped one at Buffalo and picked up one there from a Detroit train that it hauled only to Utica, N.Y. A venerable "10-and-6" (10-roomette, six-double-bedroom) sleeper out of St. Louis came off the *Knickerbocker* at Albany for the *Lake Shore*'s Boston section. The westbound machinations in 1954 were even wilder. In addition to a dining car, six-double-bedroom lounge, 14-section sleeper, and two 10-and-6 overnighters going to Chicago, there were:

- A Boston-Chicago "10-and-6" off of the *New England Wolverine* at Albany;
- A Boston-Cleveland cut-off "10-and-6;"
- A New York-Toledo "10-and-6;"
- A 17-roomette car coupled on at Buffalo from Toronto and dropped at Cleveland;
- A "10-and-6" from Charlottesville, Va., via Chesapeake and Ohio's Detroit-bound *Sportsman,* cut off at Toledo at 5:25 a.m. and picked up by the *Lake Shore* for Chicago about 3 hours later.

That's not all. One of the *Lake Shore*'s Chicago sleepers was shared with the Burlington-Rio Grande-Western Pacific's *California Zephyr* one day, and the Chicago & North Western-Union Pacific-Southern Pacific S*an Francisco Overland* the next. Not as glamorous as the two cars conveyed daily between the *20th Century Limited* and Santa Fe's *Super Chief*, but just as noteworthy. More remarkable — in the context of how tortured Amtrak station-yard movements tend to be these days — is that the sleeping cars were switched "live" over a few hours between either North Western or Union Station and LaSalle Street Station in Chicago. Not the easiest interchange in any era. — *Bob Johnston*

ously carried heritage dome-coaches before Amtrak decided to retire them in 1993, but restricted clearances east and south of Albany-Rensselaer limited their usefulness. Viewliners were different. The double set of windows helped enhance the sleeping car experience, especially for upper-berth passengers, and were well-suited for a route that paralleled the Hudson River and Erie Canal. Sixteen years later, the train also hosted the first run of the refurbished prototype Viewliner diner.

Stationery, a reception invitation, and a menu mark the era of individual route promotion; a directory heralds new Viewliners. David Lassen

The author enjoys made-to-order French toast in an Amfleet II cafe car on April 26, 2018, a month before the introduction of pre-prepared "Flexible" meals.

RETRENCHMENT

Unfortunately, the "golden age" of product-line individualism didn't last. Following Downs' dismissal in a 1997 labor dispute, Amtrak under successor George Warrington became more Northeast Corridor-focused. A renewed emphasis on mail and express temporarily helped grow the *Lake Shore*'s Chicago-Toledo-Boston business, but expensive-to-maintain heritage slumbercoaches, and sleeping cars that had been demoted to crew dorms, were withdrawn and sold. This reduced onboard revenue-producing capacity, and the parallel retirement of heritage coaches in favor of an all-Amfleet II consist constricted the ability to address demand surges. With those limitations locked in place and no advocate to concentrate on growing the business in other ways, patronage and revenue potential has been stagnant for 15 years.

In particular, the onboard dining experience has markedly deteriorated. Before the Viewliner II dining car fleet arrived, the train was dealt Amfleet II cafes or Horizon dinettes without full kitchens, while the diminishing number of heritage diners were shifted elsewhere. The double-windowed cars' debut in the spring of 2018 coincided, ironically, with a decision by Amtrak management to replace chef-prepared meals with pre-packaged "flexible dining" offerings.

Balsawood boxes devolved to meals in a bowl, now also served on other one-night eastern and Midwest trains except the Florida-bound *Silver Meteor* and *Silver Star*.

The ride along the Hudson has always been one of the *Lake Shore*'s leading attractions, as demonstrated by this view from the New York section heading north late on the afternoon on Sept. 16, 2018.

Customers no longer stand at the kitchen door to obtain food, but they still are encouraged to dispose of trash in the large cardboard boxes provided.

At the same time, coach passengers were allowed to eat only in the café car. But the *Lake Shore*'s café only operates, as has generally been the case, between Boston and Chicago. Anyone traveling between New York City and Albany-Rensselaer on the train's most scenic segment is stuck in their seat without access to any refreshment.

Today, passengers attempting to book the train routinely encounter coach sellouts on the eastern end. When rooms are available, the New York-Chicago fare for one passenger recently was $740 in a roomette, while prices for a bedroom range from $1,064 to $1,497. The train did fill a third sleeping car (diverted from the *Silver Meteor*) last summer, but it was dropped — and more sleeper sellouts returned — in October.

Passengers admire the view from a Viewliner II diner during a "flexible dining" breakfast on June 11, 2019. The current policy limiting diner service to sleeping-car passengers means coach passengers have no food service available between New York and Albany.

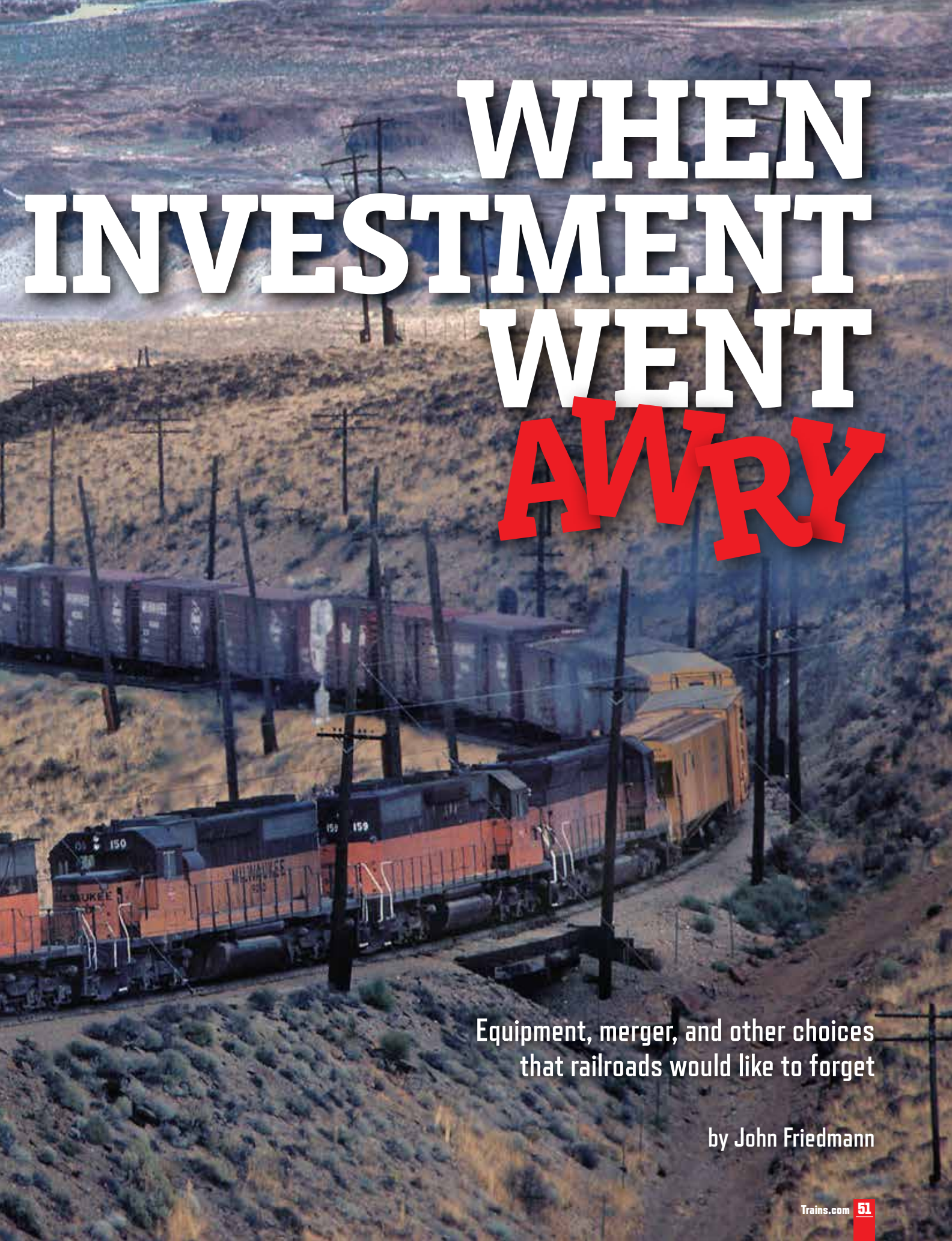
REBIRTH?

Plenty of anecdotes from the *Lake Shore Limited*'s past and examples from other trains show it could be an exceptional and unique transportation draw with investment in onboard enhancements and more capacity. Amtrak continues to sideline both Viewliner I and Viewliner II sleeping cars — the company now has 74 single-level sleepers on hand, but was assigning only 40 (plus an estimated 10 standby units) as of November 2023. The costs of returning them to service so far has apparently not outweighed potential revenue that is lost by keeping these valuable assets idle.

The biggest wasted opportunity, though, is the continued focus with cut-rate dining service on a train serving the nation's largest market via one of the country's most scenic routes. The fact that a railroad historical society regularly sells out New York-Albany excursions on the rear of *Empire Service* trains with a legacy observation car from the *20th Century Limited* is a highly relevant indication of market potential that management ignores.

Amtrak is gingerly dabbling with onboard service upgrades elsewhere on the system, so it wouldn't be a stretch to experiment on a train that offers great scenery serving America's No. 1 and No. 3 population centers with many big markets along the way. Heck, the present *Lake Shore Limited* was itself launched as an "experimental" offering in 1975. Since then it has become the backbone of the company's east-west service, so making it something special again is long overdue. T

Four locomotives (plus two midtrain helpers) lift a westbound Milwaukee Road train up the 2.2% Saddle Mountain grade at Doris, Wash., on Sept. 4, 1978. Blair Kooistra



WHEN INVESTMENT WENT AWRY

Equipment, merger, and other choices that railroads would like to forget

by John Friedmann

Railroads are extraordinarily capital intensive, reinvesting more of their revenue than almost any other industry. Even though most railroad capital investments turn out well (otherwise, Wall Street wouldn't hold railroads in such high esteem), there have been some real clunkers. These mistakes — difficult to hide in an outdoor sport like railroading, and done for the right reasons — turned out incredibly bad.

We set out to identify the worst railroad investments, figuring out what went wrong and why. My perspective comes from a career at Norfolk Southern in planning and operations. I was aided by Pete Rickershauser, who rose from a Central Railroad of New Jersey trackman to BNSF's vice president, network development; and Nick Fry, curator of the John W. Barriger III National Railroad Library and a longtime railroad historian.

Here's our criteria:

- We looked at post-1900 investments in North America, excluding prototypes and experiments.
- Investment returns are either confidential or lost to history (sometimes intentionally), so we measured how much an asset was used — less use, worse investment.
- We generally excluded investments less than a decade old because they still have a chance to turn around.

Our judgments fall into four broad categories: Equipment, physical plant, technology, and industry structure.

EQUIPMENT

Worst steam locomotive investment: N&W's 0-8-0s, built 1952-53

Hadn't the locomotive builders abandoned steam before 1950?

Shown as it rolled out of Norfolk & Western's Roanoke, Va., shops in 1953, 0-8-0 switcher No. 244 concluded a group of 30 such locomotives built by the railroad, and was the last steam locomotive constructed in the U.S. for a major American railroad. Norfolk & Western

NICK: Diesel switchers had been successful since the 1930s, so who was building new steam switch engines in the 1950s? Only steam holdout Norfolk & Western, which home-built 30 0-8-0 switch engines in 1952-53. Change was difficult because N&W had a huge investment in steam shops, facilities, and expertise — and Norfolk & Western basically existed to haul coal, but diesels came two years later. N&W's 0-8-0s were remarkably short-lived — none lasted a decade.

Switch engines are one thing. How about mainline power?

JOHN: Some advanced steam locomotives were the worst investments. The Pennsylvania Railroad bought 50 T1 Class 4-4-4-4 steam engines in 1945-1946 to pull its premier passenger trains, a contrarian decision when other railroads had bought passenger diesels for more than a decade. Despite the T1's sophistication, power, and streamlining, Pennsy realized its mistake and decided to dieselize in 1947. The T1s were quickly downgraded and retired in 1949-1952. Adding insult to injury, the T1s were outlasted by PRR's K4 Pacifics, locomotives T1s were built to replace.

Built for passenger service at time when other railroads had already switched to diesels, Pennsylvania's T1 No. 6536 is serviced at Fort Wayne, Ind., while handling the Chicago-New York *Liberty Limited*, circa 1949. Robert A. Hadley

Worst diesel locomotive Investment: Union Pacific's double diesels

Big power seems to be an easy target …

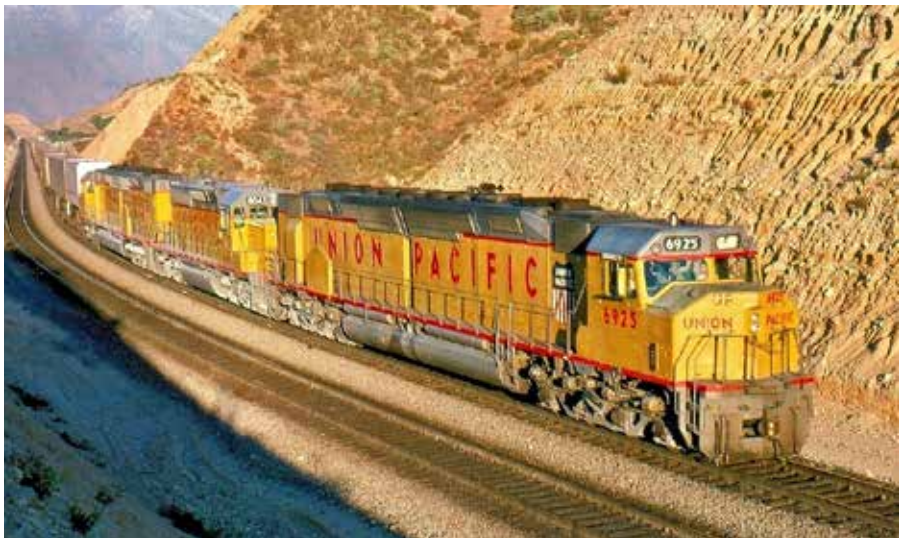
JOHN: Union Pacific pursued a "high power, high speed" diesel strategy in the late 1960s, purchasing more than 150 double-engine diesels — twice the power and size of conventional units. Unfortunately, the custom-built units were half as reliable and half as flexible and lasted less than half as long as off-the-shelf locomotives. UP had to spend heavily on replacement SD40-2s to make up for the double diesels' early retirement.

General Electric's U50C was the worst production example. UP bought 40 5,000-hp U50Cs starting in 1969, but some of the units served barely three years and none ran longer than seven, an amazingly brief time for a locomotive. Fire-prone aluminum wiring headlined a litany of the U50C's mechanical issues.

NICK: Union Pacific's 47 DDA40Xs proved that even EMD couldn't master the double diesel. DDA40Xs were the headline locomotive for UP's centennial, but barely lasted 15 years while conventional locomotives built at the same time are still racking up miles a half-century later.

JOHN: The DDA40Xs at least looked cool. The high cab and short nose made the U50Cs some of the ugliest road locomotives ever built.

The first of Union Pacific's massive but short-lived U50C locomotives, No. 5000, gleams at North Platte, Neb., on Jan. 21, 1975. Bruce D. Barrett; Chris Guss collection



A Centennial diesel in the bicentennial year, UP DDA40X No. 6925 catches the early morning sun as it leads an intermodal train at Cajon Summit, Calif., in September 1976. John Parrish

Worst passenger equipment investment: New York State's rebuilt Turboliners

By definition, isn't most passenger equipment a bad investment?

JOHN: Spending $70 million to rebuild equipment that barely gets used is definitely a bad investment. In the 1990s, New York State agreed to foot the bill to rebuild seven Turboliner trains that had handled the state's Empire Corridor. Over seven years, delays mounted, the contractor botched the rebuild, and Amtrak reneged on its participation. End result: only three turbo sets were rebuilt and those ran for only a few months. Cue the lawsuits, which resulted in Amtrak having to cough up $20 million and New York and Amtrak agreeing to bury their mistake. New York only got $420,000 in scrap proceeds from sale of the other four trainsets.

Worst freight car investment: CPC-1232 tank cars

Tank cars seem simple and useful. What makes these cars bad?

JOHN: In 2011, the industry adopted tougher standards (CPC-1232) for tank cars carrying ethanol and crude oil. But after the 2013 Lac-Mégantic crude oil train derailment and fire, an even tougher standard (DOT-117) became law, mandating a thicker car shell, full jacketing, and more. The new standards stranded the approximately $8 billion spent for new CPC-1232 cars. Many of the 45,000-plus CPC-1232 cars have been retrofitted to the DOT-117 standard (at a cost of up to $60,000 each), but still are less valued than cars built new to the tougher regulations.

One of just three RTL Turboliners to be rebuilt under an ill-fated New York State contract makes a rare appearance at New York's Penn Station on April 14, 2003. The rebuilt equipment operated for just a few months. Joseph M. Calisi

A unit oil train rolls through Galesburg, Ill., in June 2015. Changing rules for tank cars following the Lac-Mégantic, Quebec, disaster made money spent on CPC-1232 cars built prior to that event a stranded investment. Steve Smedley

Is there a freight car mistake that railroads have made over and over?

PETE: Class I railroads periodically invest in "reefers" to try and recapture fruit and vegetable traffic, but those investments are closely followed by deep regret. These insulated cars with refrigeration systems and gizmos like satellite tracking cost about $300,000 each, but get less than two trips a month even in unit-train service (and closer to one a month in carload service). Union Pacific got in even deeper by purchasing reefer logistics provider Railex: three years later, UP shut the business down. The temperature-controlled market is huge, but railroads still only nibble around the edges.

NICK: I'll bet the railroad livestock car fleet, which was about 80,000 cars at its peak, turned out to be a bad investment at the end. Railroads bought new cars ("Big Pig Palace") in the 1960s, even after most of this business had been displaced by regional meat-packing plants or had gone to truck.

Worst transit/commuter rail vehicle: UMTA SLRV

What kind of alphabet soup is that?

JOHN: It is the Urban Mass Transit Administration's Standard Light Rail Vehicle, designed to be the 1970s successor for worn-out PCC streetcars.

And this didn't work out so well?

JOHN: This road to hell was truly paved with good intentions. USDOT saw the need for a new light rail vehicle and collaborated with major transit systems on a standard LRV that could be used across the country. But helicopter manufacturer Boeing Vertol was chosen to produce the SLRVs for initial (and as it turned out, only) buyers Boston and San Francisco. The cars were operational and maintenance disasters, slower than the PCCs they were designed to replace and failing an order of magnitude more often than similar LRVs. Boston began scrapping their SLRVs after only a decade and San Francisco retirements began at 16 years old. Ironically, both systems still run the PCC cars that the SLRVs were supposed to replace.

Lessons learned?

JOHN: Boeing Vertol's SLRVs turned out to be too much like helicopters: complex, maintenance intensive, and hard to fix. They were also Boeing's last railcars.

PHYSICAL PLANT

Worst new route: Milwaukee Road's Pacific Extension

This seems an obvious candidate, but a lot of people think the route shouldn't have been abandoned.

A Union Pacific local from Hinkle, Ore., exchanges empties for loaded refrigerator cars at the Cold Connect warehouse facility in Wallula, Wash., on Sept. 18, 2018. Union Pacific shut down Cold Connect in 2020 after buying the Railex reefer logistics firm in 2017. David R. Busse

JOHN: The real issue is that the line should never has been built. The parallel Great Northern and Northern Pacific lines were already done, competition from the Panama Canal was coming and the $250 million-plus construction tab helped bankrupt the Milwaukee in both 1925 and 1935. This was a midlife crisis for an otherwise conservative Midwestern railroad and it turned out badly. The Milwaukee's predecessors could have saved a considerable amount of money by just building a bike trail to begin with.

Was Milwaukee the only granger railroad with West Coast dreams?

PETE: Believe it or not, the Chicago & North Western's "Cowboy Line" to Wyoming was intended to meet the Pacific at either Eureka, Calif., or Coos Bay, Ore. — not exactly major ports. C&NW built as far west as Lander, Wyo. (1,240 miles from Chicago), but had the good sense to quit earlier and at a cost far less than Milwaukee's gamble. The light-density Cowboy Line did last long enough to be C&NW's key to get into the Power River Basin and go head-to-head against Burlington Northern for coal traffic starting in 1984.

Worst electrification: NdeM's Mexico City-Queretaro new line

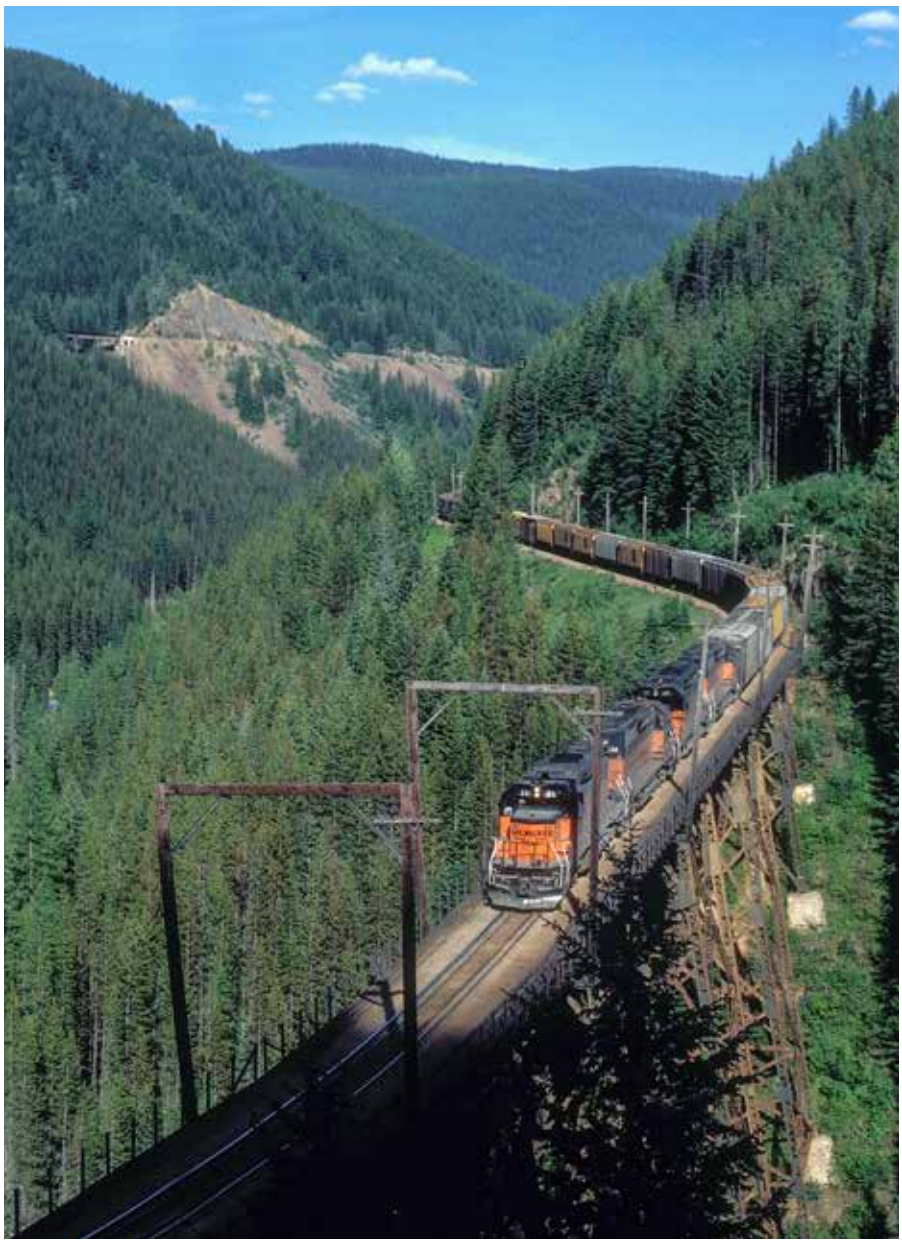
Electric trains are quieter and emit less. How can electrification be bad?

JOHN: How about when you electrify a line but don't use it? Mexico's National Railways (NdeM) built 155 miles of new mainline and bought 39 GE E60C-2 electrics for power in 1982-1983. But those E60s sat for more than a decade — the electrification didn't open until 1994 and was dismantled just three years later. Twenty-two of the E60s (some unused) were traded in on new diesel locomotives.

What about other modern freight electrification projects?

PETE: BC Rail electrified its new, mountainous 81-mile Tumbler Ridge coal line in 1983 as part of a $2.5 billion coal export project. Given the topography, long tunnels, and cheap hydroelectric power, electrification made sense at the time. But coal traffic never lived up to projections and the debt was a drag on the railway. BC Rail turned off the power in 2000.

Boeing Vertol's first light rail vehicle, the first streetcar-type equipment built in the U.S. in more than 20 years, is loaded onto a flatcar at the company's plant in Philadelphia for shipment to Boston to begin testing. The cars proved to have short service lives. Boeing



SD40-2 No. 20 leads a westbound Milwaukee Road dead freight crossing the Clear Creek bridge at Falcon, Idaho. The train's two units and 28 cars are bolstered by two helpers en route to help an eastbound train at Avery, Idaho. Blair Kooistra

A Nacional de Mexico E60C-2 poses for a builder's photo at the General Electric plant in Erie, Pa. The locomotive was one of 39 built for a line that didn't open for another decade; some never turned a wheel in revenue service before being traded in for diesels. General Electric

BC Rail's 1980s electrification project fared better than NdeM's, but still was relatively short-lived. Two EMD GF6C locomotives are rear helpers on a Tumbler Subdivision train on Oct. 5, 1985. Leonard G. Thompson

Worst yard or facility investment: UP's Global 3 terminal, Rochelle, Ill.

Chicago has 19 intermodal terminals. Why single out this one?

PETE: Union Pacific built Global 3, a $181 million, 1,200-acre greenfield terminal that could handle 750,000 container lifts per year, in 2003. But, it was a great facility in the wrong place. Global 3 was 80 miles west of Chicago, a hugely expensive dray from other intermodal terminals and the city. So instead, UP built Global 4 near Joliet in 2010 and closed Global 3 in 2019. Global 3 was a great terminal if you were sending freight to Rockford or Beloit, but not if you were aiming for markets nearer to Chicago.

What about intermodal of an earlier era?

NICK: Baltimore & Ohio used to have a big business handling imported bananas through Baltimore for United Fruit. Baltimore was the primary banana port on the U.S. East Coast, and to keep it that way, B&O opened a $5.5 million Baltimore "fruit pier" in late 1958. But soon after, United Fruit moved its banana imports from Baltimore to Wilmington, Del., saddling B&O with an expensive white elephant.

Whoops. How about hump yards?

JOHN: Precision Scheduled Railroading-driven hump yard closings stranded a lot of investment, but most are used for flat switching. CSX (Atlanta) and Norfolk Southern (Columbus, Ohio) have recently harvested big gains by selling former hump land for redevelopment.

Worst structures: Wabash Pittsburgh Terminal (tunnel, bridge, and station)

I didn't think the Wabash ever got to Pittsburgh?

JOHN: It was a classic over-extension. The Wabash Pittsburgh Terminal was to be a critical link in the transcontinental railroad empire of George Gould (son of robber-baron Jay), a triumphant entry into the Pittsburgh rail market dominated by the Baltimore & Ohio and Pennsylvania railroads. The WPT completed a tunnel through Pittsburgh's bluffs, a soaring 812-foot bridge across the Monongahela River and an 11-story station in downtown Pittsburgh in 1904 … just to go broke in 1908. WPT's failure was the first domino that

A westbound manifest freight passes Union Pacific's Global 3 intermodal terminal in Rochelle, Ill., on June 20, 2009. Opened in 2003, closed in 2019, the facility proved to be too far from Chicago to be practical. Steve Schmollinger

Impressive but ill-advised: the Wabash Pittsburgh Terminal's station in Pittsburgh, circa 1905. Detroit Publishing Co.; Library of Congress

Winter maintains its grip on Wyoming's Powder River Basin as a loaded coal train makes its way along the impressive — but now, with coal's downturn, excessive — physical plant of BNSF's main line in March 2014. Travis Dewitz

felled the entire highly leveraged Gould rail empire. Passenger service (never more than a few trains per day) ended in 1931 and the bridge was torn down in 1948. Only the tunnel still exists — as a roadway.

Lessons learned?

JOHN: You don't tug on Superman's cape, and in the 1900s you didn't mess with the Pennsylvania Railroad in its home state.

Worst capacity expansion: 2000s Powder River Basin track additions

Pete, you have personal experience with this one?

PETE: I was at BNSF during that time, and the PRB coal business showed continuing growth. Long-term prospects were bright given PRB's cheap mining costs and low-sulfur coal. BNSF and UP invested hundreds of millions of dollars in PRB capacity in the 2000s and utilities were forecasting continued expansion — 17 new or expanded coal-fired plants just in Texas! But the energy markets and political environment changed quickly, utility expansion plans were shelved and coal-fired power plants started to go offline. All the PRB players — railroads, utilities,

A pair of NRE 3GS21B genset locomotives emerge from the passage under Interstate 110 accessing the Phillips 66 refinery in Wilmington, Calif., on Feb. 17, 2018. While a few still operate, gensets largely came and went quickly as a solution to locomotive pollution issues. David Lassen

and mine owners — have significant stranded assets.

What made the investment so painful?

PETE: The routes built to handle PRB coal are high-capacity, state-of-the-art lines, and there really isn't a way to repurpose all that infrastructure or the coal hoppers. UP had talked about using about 100 miles of unneeded second main as a "test track" for new technologies.

TECHNOLOGY

Worst technology investment: Genset locomotives

PETE: I can't remember a new locomotive more despised by train crews and mechanics. Gensets work on the theory that three smaller diesel engines could replace one regular-sized prime mover, powering up or down to match the load. But that concept turned out to be expensive and unreliable.

So how did railroads end up with so many gensets?

PETE: In the 2000s, government policy to reduce emissions got backed with available funding, especially in Texas and California. UP and BNSF jumped at the chance to work with governments to replace their aging urban switcher fleets partially on the public dime and purchased more than 260 genset units. The hook with public funding was that the gensets had to be kept in service for 10 years. When that time was up, the gensets were shut down and sold off.

Railroads seem to know where locomotives are, but railcars still seem to get lost a lot.

JOHN: Railroads have been losing cars almost since the first railroad was founded in 1825. More than 140 years later, in 1967, KarTrack (commonly known as ACI or Automatic Car Identification) was supposed to be the silver-bullet fix. Instead, it made the problem worse. ACI used colored labels like barcodes mounted to the sides of railcars that scanners read optically as cars passed. But ACI labels got dirty and weren't maintained, so the system never got above 80% accuracy and was abandoned by 1977. ACI cost $150 million (in 1970s dollars) and delayed implementation of the eventually successful Automatic Equipment Identification radio-frequency system by at least a decade.

INDUSTRY STRUCTURE

Worst merger: New Haven into Penn Central (1969)

Penn Central is the textbook example of the merger that didn't work. How did the New Haven make it worse?

JOHN: After it was created, Penn Central was immediately trying to tread water in the deep end. Eleven months later, an anchor in the form of the New York, New Haven & Hartford Railroad was added and PC never broke the water's surface again. New Haven hadn't made money for more than 25 years, and freight volumes were down by a third over two decades, while passenger volumes had fallen almost 60%. Not surprisingly, PC's annual deficit jumped 40-fold once New Haven was added. New England's deindustrialization and Conrail's eventual disposition of most New Haven lines shows the ICC's demand that New Haven be included in Penn Central was a big mistake.

The Erie Lackawanna merger (1960) seemed to work even though it was in the Northeast?

NICK: Erie Lackawanna had a good paint scheme and hustled, but the Erie and Lackawanna had the same problems: too many passengers and rapidly eroding freight traffic. EL needed federal loan guarantees to avoid running out of cash only two years after the merger. To quote President Milton McInnes, "If you merge two losers, you get a bigger loser." EL's components fit better with other, deep-pocketed railroads: Lackawanna should have united with the Nickel Plate, providing the expanded Norfolk & Western badly needed Northeast access. Erie would have done the same for the Chesapeake & Ohio.

PETE: Commuter losses and exorbitant taxes (especially in New Jersey) exacted a terrific financial toll. EL didn't significantly reduce the physical plant after the merger, so it failed to help itself enough.

The New Haven anchor added to Penn Central's sinking ship is clearly evident on this train powered by PC E8A No. 4254 and former New Haven GP9 No. 7542 at New London, Conn., on Nov. 29, 1975. Dan Zukowski

Projecting something less than the picture of financial health, the Chicago, Missouri & Western's former Illinois Central facility in East St. Louis, Ill., is clouded in dust as sand is released to soak up oil on Aug. 2, 1989. Scott Muskof

Worst line purchase/ acquisition: Chicago, Missouri & Western

A regional railroad connecting Chicago, St. Louis, and Kansas City seems like a good venture.

JOHN: Chicago, Missouri & Western looked good on a map to the bankers that loaned more than $80 million for the purchase, but it only took 338 days for CM&W to declare bankruptcy.

That's the kind of speed record that no railroad wants to own.

JOHN: Illinois Central Gulf talked the buyers (Venago River Corp.) and Citibank into a worn-out railroad that depended on overhead traffic with little to no industrial base in the big cities it served. In fact, ICG had already sold the rights to serve the biggest on-line customer, a power plant, to another regional spinoff. Thus was born the Chicago, Missouri & Western Railroad, a 631-mile regional railroad whose wishbone system connected Kansas City and St. Louis with the Chicago area. Both the purchaser and lender ignored growing warning signs of a deteriorating railroad, shaky traffic data, and overly optimistic predictions.

CM&W was launched on April 28, 1987, and declared bankruptcy on April 1, 1988.

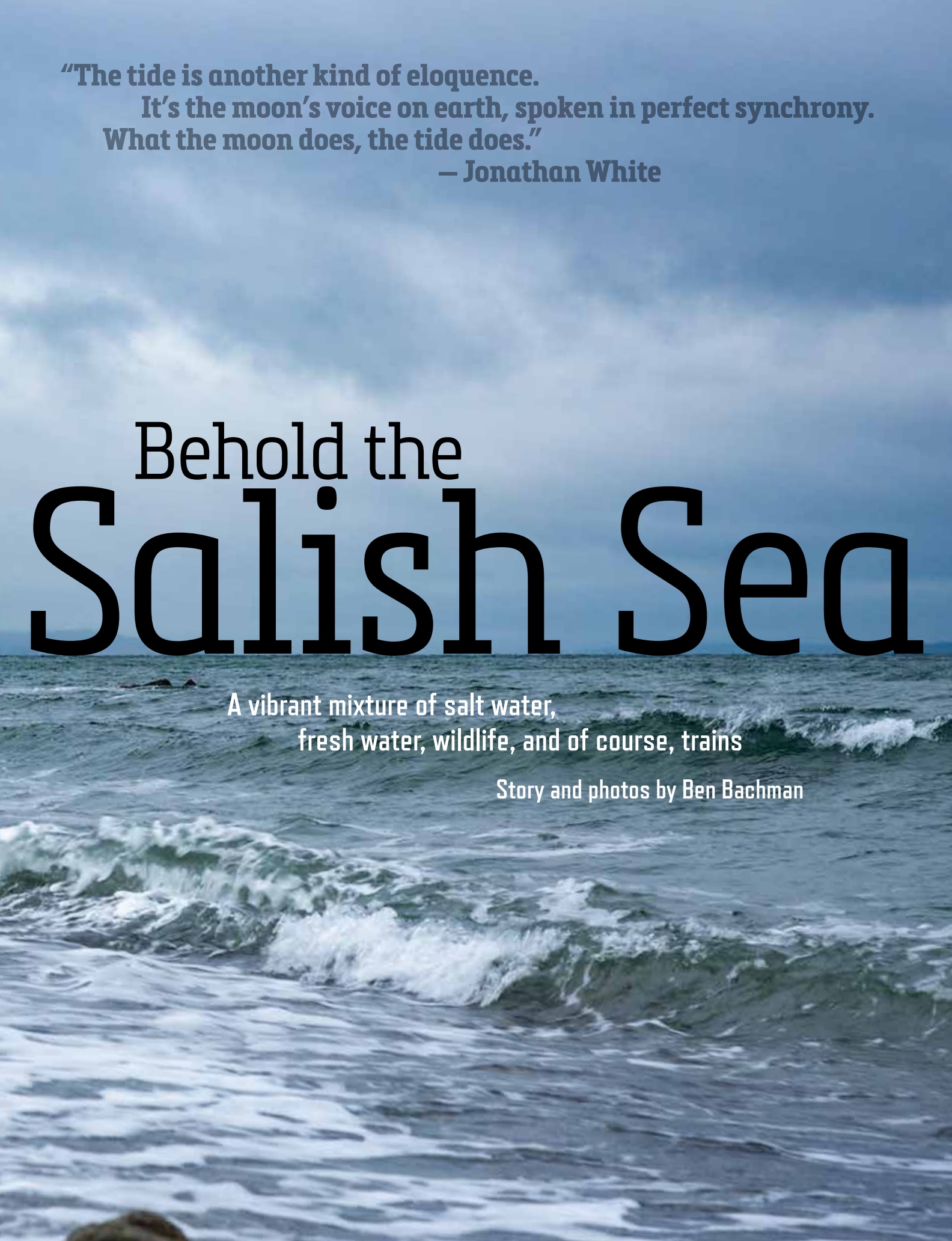
Was there a happy ending?

JOHN: Not for Citibank and Venago River. But the CM&W rail lines found deep-pocketed owners — eventually, Union Pacific and CPKC. And CM&W's Kansas City line was the subject of a heated battle as Canadian National unsuccessfully tried to land the line as a consolation prize in the CP-KCS merger.

What about line purchases that kept capital from being spent elsewhere?

PETE: At the risk of usurping Nick, our Baltimore & Ohio savant, I'd nominate B&O's purchase of the Buffalo, Rochester & Pittsburgh and Buffalo & Susquehanna railroads in 1930. B&O bought the BR&P and B&S for more than $20 million just as the Great Depression set in, back when $20 million was big money. B&O planned to incorporate BR&P in a shorter new Chicago-New York "Rainbow Route" with the lowest grade across the Alleghenies, 80 miles shorter than the previous B&O route. But then came the Depression (and a major washout). B&O needed $89 million in Reconstruction Finance Corporation loans just to avoid bankruptcy, ending the Rainbow Route dream. What if B&O had invested that $20 million into the core of its system, addressing its myriad mainline grade and clearance problems, which were the worst of the eastern railroads? Only when well-off Chesapeake & Ohio took control in 1963 could B&O afford important clearance improvements for automotive and intermodal traffic.

A Talgo replacement exits a short stretch of single track just south of Mukilteo, Wash.



"The tide is another kind of eloquence.
It's the moon's voice on earth, spoken in perfect synchrony.
What the moon does, the tide does."
— Jonathan White

Behold the Salish Sea

A vibrant mixture of salt water,
fresh water, wildlife, and of course, trains

Story and photos by Ben Bachman

A freight passes the old ferry dock at Edmonds, Wash., on another short stretch of single track.

Nature's allure

Five companies. Amazon, Microsoft, Starbucks, Boeing, and Weyerhaeuser, plus the Great Northern Railway. Microsoft transformed how we work, Amazon how we shop. Starbucks introduced us to the habit-forming concept of wasting time with expensive cups of coffee. Boeing jets revolutionized how the world travels long distances, and as for Weyerhaeuser … well, now we're getting to the olden days on Puget Sound.

Picture a great wilderness. Cold, clear tidal waters. Oyster beds. Clams. Crabs. The world's largest octopi. Thousands of ducks and seabirds. Whales and seals. Mountains thick with towering old-growth timber. Streams clogged with spawning salmon in numbers that beggar the imagination. Plus the Coast Salish Indians, in dozens of villages. Puget Sound had been their home for perhaps 10,000 years. They knew every inlet and bay intimately. White men not so much — they only imagined they had discovered it.

George Vancouver led an English naval expedition into the area in 1792, and with an arrogance typical of his time, coined many of the place names still in use today, including Puget Sound itself. Then Vancouver sailed on, leaving almost no physical evidence behind. When American pioneers finally started to arrive, they must have felt as if they had landed at the ends of the earth. In that pre-industrial era, a ferocious isolation still gripped Puget Sound. Letters from the outside world had to go around Cape Horn, or through the fever swamps of Nicaragua. It was about as far as you could get from civilization without leaving the planet itself behind. Yet the settlers persevered.

Gulls are your constant train-watching companions.

Survival of the fittest

Of course they did. They were tough men and women. They had to be. They caught the salmon, felled the giant trees, and built primitive sawmills. But what then? Yes, here was the finest, most abundant supply of lumber imaginable, but who were they going to sell it to? Nobody, until the Iron Horse provided access to populated parts of the nation.

Enter James J. Hill and Frederick Weyerhaeuser. These two men became neighbors, residing in mansions on a bluff overlooking the Mississippi River in St. Paul, Minn. Weyerhaeuser (1834-1914) was born in Germany and came to the United States in 1852. By 1856 he had migrated to Illinois, found work building the Rock Island Railroad, then began working his way up through the ranks at a local sawmill.

By the time Weyerhaeuser met Hill, he was already a well-established timber king. Hill was the Empire Builder. He built the Great Northern from Minnesota to Puget Sound without land

A manifest between Wells and Carkeek Park on a bright but cold winter afternoon.

grants, but soon acquired a major interest in the Northern Pacific — which did have land grants, some of the most generous awarded to any railroad. Seeing a mutually beneficial opportunity, Hill sold Weyerhaeuser 900,000 acres of Washington timberland at $6 an acre, setting the tone for the economic development of the Pacific Northwest for the next half a century. Indeed, both Hill and Weyerhaeuser prospered.

Weyerhaeuser became one of the largest landowners in the U.S. at that time, and was prominently featured on each list of the wealthiest Americans in history. Weyerhaeuser has since been surpassed by Bill Gates and Jeff Bezos, not to mention Warren Buffett, owner of the BNSF Railway; Weyerhaeuser's wealth was still impressive, especially when adjusted for inflation.

But is timber the first thing that comes to mind when you think of Seattle or Puget Sound these days? Obviously not. I've been out here about 40 years, and during this time, I've been able to watch a significant part of the metamorphosis. Boeing was already a well-established presence, but the spotted owl wars had just begun, and while the log export business was booming, local sawmills and paper mills were closing one after another. Logging railroads were almost gone, although for a few years, the Weyerhaeuser Co. utilized former Milwaukee Road

Bald eagles are frequently seen. This pair perched just above the track.

A freight waits for afternoon passenger traffic — and a priority intermodal — to go by a bit north of Carkeek Park.

trackage to haul logs to the Tacoma (Wash.) Tide Flats for export loading.

Emphatically on the rise were Bill Gates and Microsoft, although it's amusing, now, to remember how the local media struggled to wrap its arms around this new phenomena. Reporters and columnists, including my favorite, Emmett Watson, who ceaselessly promoted the concept of "Lesser Seattle," still thought of the Northwest as the home of rugged loggers, seamen, and fishermen. Gates didn't fit that mold. We weren't sure what mold to put him in.

So by the time Jeff Bezos and Amazon came on the scene, Bill Gates seemed like a founding father. The transformation, and the attendant growth, had been extraordinary. Millionaires were minted almost daily. The cost of living shot skyward. Traffic congealed. For a while, Seattle could boast more construction cranes than any other city in the world. The pioneer period isolation of Puget Sound was … well, it was a fascinating concept to those of us interested in history and heritage, but it seemed to have little relevance to actual life.

Curb appeal wins again

Puget Sound itself continues to exert a magnetic appeal. When a house with a big deck and a water view comes on the market, a bidding war usually

The Mukilteo lighthouse, built in 1905, with its much older Fresnel lens.

The pedestrian footbridge at Carkeek Park offers some of the best up-close train-watching in the Northwest.

erupts among the princes of technology. The rest of us can only shake our heads and make do with visits to local beach parks, although they can be inspirational.

We stare into the distance and walk alongside the tide line. We watch passing boats. We focus our binoculars on gulls or bald eagles. We examine pieces of driftwood, or perhaps giant stumps left over from the age of logging. We do all the things that people have always done at beaches. That is to say that each of us, in our own way, communes with the sea and the sky. The water's edge offers serenity, even spiritualism. Or it just makes us feel good, hence the many commercials shot at beaches, for everything from feminine hygiene products to erectile dysfunction remedies. Even Richard Nixon tried to tap into the magic of a beach-walk photo op. Too bad he couldn't bring himself to lose the suit and the shiny black wingtips.

Understand, however, that Puget Sound is not the ocean. The ocean is vast. Puget Sound is all but landlocked. At the Tacoma Narrows, the Sound is spanned by a pair of suspension bridges. A floating bridge crosses Hood Canal as well, and as far as many long-time area residents that ought to know better are concerned, Hood Canal is part of Puget Sound. They also lump the San Juan Islands, Admiralty Inlet, and many other bodies of water in with Puget Sound, which is also erroneous.

Puget Sound proper extends from Olympia in the south to Edmonds in the north; it's part of what NOAA marine forecasts refer to as "the inland waters." Other parts include Possession Sound, Bellingham Bay, Boundary Pass, San Juan Channel, the Strait of Juan de Fuca, etc., and in recent times — i.e., in the era of Amazon — people have begun to refer to this greater whole that laps well over into Canada as the *Salish Sea*.

But consider, again, the Pacific Ocean, the world's largest body of water. Should you be so unfortunate as to be shipwrecked upon its achingly lonesome expanse, you may well drift for weeks, or months, without sighting a single vessel.

Puget Sound, in contrast, appears to be thoroughly domesticated. I say, "appears to be," because if you are a boater, there will come a day when you get caught in a gale out on the Sound, and the shrieking wind and the waves washing over the deck will strike you as anything but domesticated. Terrifying is closer to the mark. But whether it scares you or delights you, the Sound is beheld, rain or shine, by human beings many thousands of times daily.

A prodigious number of passengers take Washington State Ferries, the nation's largest ferry system, which has about as many daily riders as the entire Amtrak network. Mobs of tourists venture out onto the observation deck of the Space Needle to look down on some of those ferries, along with the container ships, bulk carriers, tugs, barges, naval vessels, and pleasure craft plying the Puget Sound waters.

Many granite blocks in the seawall were quarried near Index, Wash.

Freights pass on a rainy winter evening — as seen from the Carkeek footbridge.

Then there are the passengers aboard the Amtrak *Empire Builder*, and the *Amtrak Cascades* trains between Seattle and Vancouver, British Columbia, as well as the Sounder weekday commuter trains between Everett and Seattle.

Nor is it to be assumed that the crews of BNSF Railway freight trains making their way along the shore are immune to the charms of Puget Sound views, especially when held up at a control signal, waiting for passenger trains to scoot by.

In both summer and winter months, there are the beachcombers, the dog walkers, the birdwatchers, the fishermen, the wind surfers, the stand-up paddle boarders, and the sea kayakers. Even after the sun goes down, plenty of eyes focus on the Sound. Especially people seated in the dozens of waterside restaurants, dining on salmon or halibut, and watching the lights of ships passing in the night.

The *Empire Builder* makes its first stop at Edmonds.

Most of the habitual Sound-watchers are long-time residents, drawn to the shore again and again because there's always something new to see, some fresh subtlety of light and weather, of wind and wave. Who knows, perhaps this will be the day when a pod of killer whales materializes, just off the shore, spouting and frolicking. Probably not, but it's within the realm of the possible.

It's even less likely that an *Empire Builder* passenger will get to glimpse a whale, but after watching Wisconsin, Minnesota, North Dakota, Montana, and much of Washington pass by outside the windows, just the sight of sparkling blue water and the snowy Olympic Mountains is reward enough.

I marvel at Puget Sound every time I behold it, which is usually every day. One telling indication of how important the Sound has become to the citizens of Washington state is the fact that, in the 21st century, it would be utterly impossible to build a railroad along the shore. Nobody would dream of proposing such an outlandish scheme. Today, you can't even put a dock or a boat mooring in front of your house without spending years jumping through regulatory hoops. A railroad? Absolutely out of the question.

A nod to the past

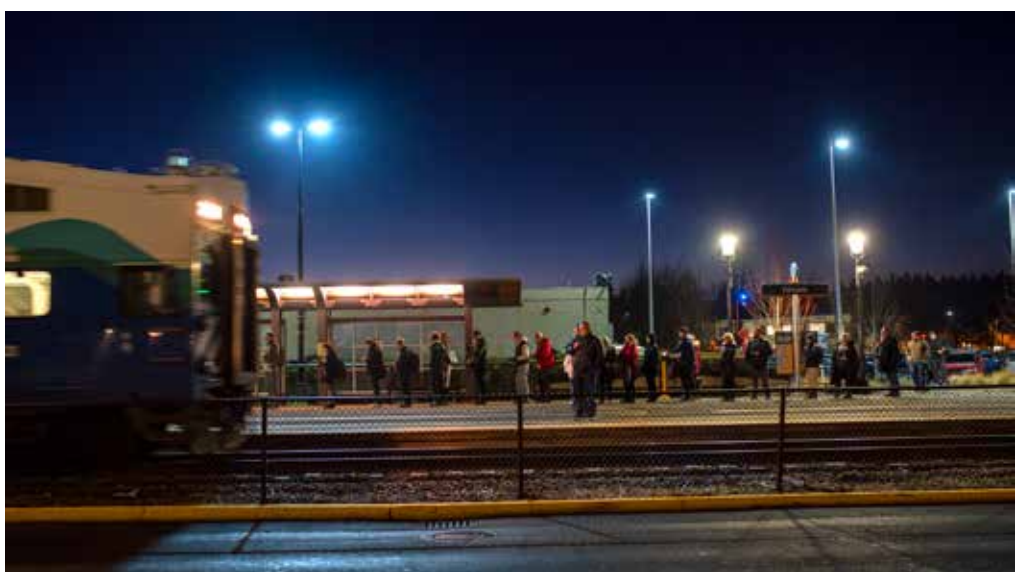
Attitudes were different in the 1880s. All the towns on the Sound, not that they amounted to much, competed for the Iron Horse's favor. Tacoma got the Northern Pacific and Seattle secured the Great Northern. GN built a line along the Sound from the barely established mill town of Everett down to the recently paved-over mud streets that had inconvenienced Seattle residents. King Street Station was still years in the future; the original depot was right on the steep shores of Elliott Bay, atop

Mt. Baker looms above the Sound in this telephoto view from Edmonds, as a freight heads south.

a forest of wooden pilings.

The route along the Sound, now the BNSF Railway Scenic Sub — which extends all the way across the Cascade Range to Wenatchee, Wash. — seldom strays more than a few yards from the high-tide mark. It's protected by a massive sea wall whose rough-hewn granite blocks were quarried near Index, Wash., in the Cascades. That wall, almost as much as the railroad itself, would drive today's environmentalists into a frenzy of outrage. On the landward side of the tracks are typically high clay bluffs, which cause havoc in the form of mudslides almost every time there is a heavy rain. Some

Continued on page 70



A Seattle-bound Sounder glides to a halt in front of early-morning passengers at Edmonds.

A Sounder meets a stack train just inside the Seattle city limits at Carkeek Park. This shot was taken from the footbridge.

A Z-train attracts folks on the Carkeek footbridge. More than one railfan has been inducted into the ranks of the faithful at this location.

What's a little rain to hardy Northwesterners?

Continued from page 67

recent measures have mitigated the problem a bit.

With the coming of the railroad, the Ballard neighborhood in north Seattle —now submerging beneath a flood tide of overpriced condominiums for tech minions — became "the shingle capital of the world." I myself remember a waterside plant near the BN's Interbay roundhouse where tugboats brought great rafts of logs to one set of doors and finished stacks of plywood came out another set, to be loaded into boxcars. Edmonds, Wash., 18 miles from King Street Station, also became a hub of waterside industry — not a single trace remains today — while Everett, Wash., hosted truly massive paper mills, sawmills, smelters, and shipyards.

Most of that is gone now, too, although there is a navy base in Everett, as well as container cranes for marine traffic.

In fairly recent memory, hundreds of thousands of export logs passed across the Everett docks, and alumina — the material from which aluminum is made — arrived in bulk carriers to be stored in a large dome on the Everett waterfront. There it awaited transport by rail to a smelter in Columbia Falls, Mont., near Glacier National Park. Hardly any aluminum is produced in the U.S. these days.

A manifest — after waiting patiently for the single-track bottleneck to clear at Edmonds — gets ready to roll.

Just about every trace of the resource economy that once dominated the Puget Sound region and western Washington — apart from clearcuts up the mountains — is long gone. The only two sources of railroad traffic between Seattle and Everett now are a tank farm at Point Wells that is probably not long for this world, and the huge Boeing plant near Mukilteo, Wash., which is reached via one of the steepest spur tracks in the nation.

There used to be stations at Ballard and Richmond Beach. For years Edmonds was the only intermediate stop, and the *Empire Builder* the only passenger train. Now there is also a station at Mukilteo, but only for Sounder trains.

A toast to today

Both Edmonds and Mukilteo have direct connections with Washington State Ferries. Seattle-to-Everett is dispatched with centralized traffic control, and is mostly two main tracks. There are short sections of single track near Edmonds and Mukilteo, and a short tunnel underneath downtown Everett. Freight traffic consists of intermodal trains on the "Northern Transcon" route to Chicago, plus traffic to and from Canada via the Bellingham Sub, which connects with the Scenic Sub at Everett.

Expect to see manifests, garbage trains, grain trains, coal trains, and crude oil trains along Puget Sound. The empties (garbage excepted) often head back east over Stevens Pass or Stampede Pass. The intermodal trains seen along Puget Sound use Stevens Pass, both eastbound and westbound. Garbage trains are routed south to a desert landfill in the Columbia River Gorge. Adding up the two daily *Empire Builders*, the four *Cascades* Talgos (which no longer use Talgo equipment), the four weekday Sounders (plus occasional extras for Mariners and Seahawks games), plus all the freights; you can expect to see 35 to 40 movements a day on this route. That is assuming you hang around and somehow manage to stay awake for 24 hours.

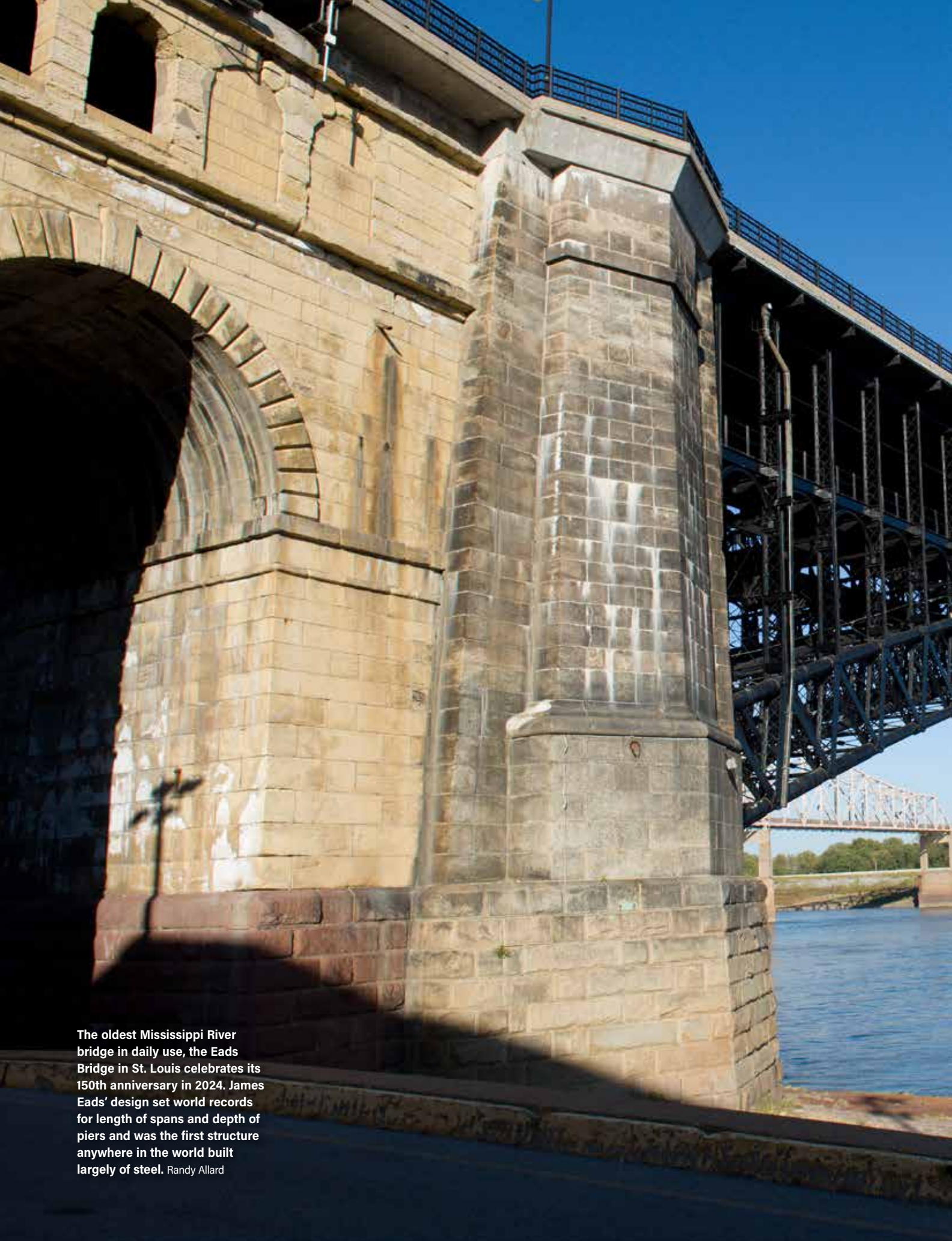
I have spent many a night aboard various boats tied up near Seattle, and sometimes, it seems as if a train goes by every 15 minutes. It's a lot different, of course, when standing beside the track with a camera. Time creeps by, especially if rain is falling. Still, if you can endure the elements for an hour or so, the chances of spotting something are good. During the morning and afternoon commuter rushes, at least a few trains are guaranteed.

To me, it always seems like time well spent. Train frequency is distinctly better, for both passenger and freight, on the BNSF Seattle Sub between Seattle and Tacoma. That route, however, passes through a thoroughly landlocked, industrial-suburban landscape that, apart from the occasional views of Mt. Rainier, could be anywhere in the country. On the waterside Scenic Sub the city is a dim, distant presence that is quickly forgotten. Access is not always straightforward, even when using your phone's navigation app. The extra effort, however, is worth it as you'll be rewarded with an assortment of ready-made public train-watching locations where no one looks sideways at you standing around with a camera. Everybody does it.

Indeed, many a little kid has had their first taste of railroading at Carkeek Park, Richmond Beach, Edmonds, Picnic Point, or Mukilteo. Some have undoubtedly gone on to become train watchers.

In the end, it's all about the water. Come to any of the Puget Sound beach parks at first light and other pilgrims will be present, no matter how bleak the conditions. At sunset a decent-size crowd almost always shows up. The winter and summer solstices are major events. Truth be told, I would make waterside pilgrimages even if no trains were involved. Although, I admit, probably not as often.

I can't really explain it adequately, but for most people, just being present at the water's edge fulfills an important need.

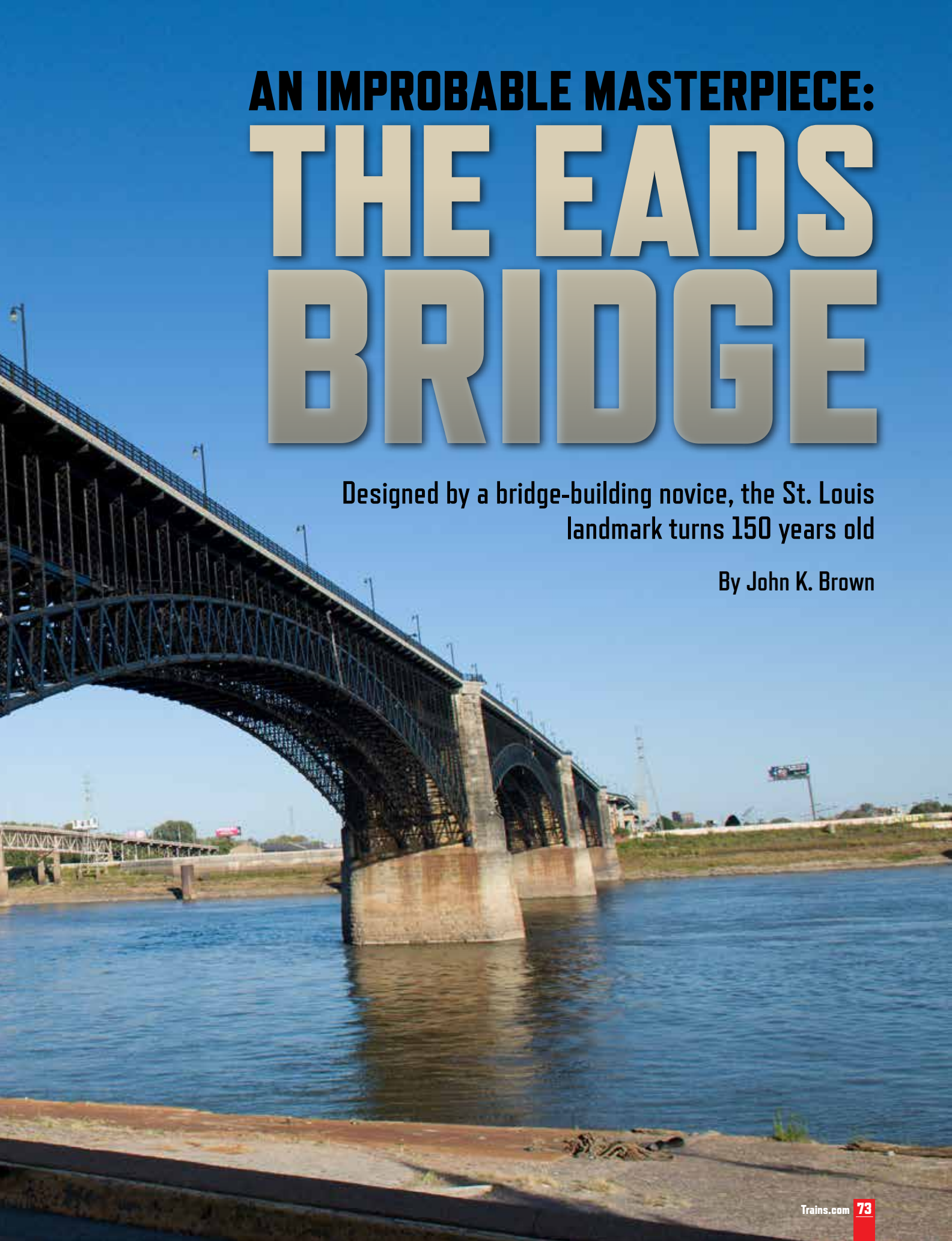


The oldest Mississippi River bridge in daily use, the Eads Bridge in St. Louis celebrates its 150th anniversary in 2024. James Eads' design set world records for length of spans and depth of piers and was the first structure anywhere in the world built largely of steel. Randy Allard

AN IMPROBABLE MASTERPIECE:
THE EADS BRIDGE

Designed by a bridge-building novice, the St. Louis landmark turns 150 years old

By John K. Brown



The Eads Bridge, a double-deck road and rail bridge across the Mississippi River at St. Louis, celebrates its 150th anniversary in 2024. It is the oldest bridge in daily use on the river, but the structure has been amazing and improbable from its origins. A riverman, James Eads, proposed it in 1867 with all its major design concepts. He had never designed or built a bridge, yet this one, his first offering, would break world records for the length of its spans and the depth of its stone foundations. To place those two piers on bedrock beneath the flowing Mississippi and its sandy riverbed, Eads became the North American pioneer in using pneumatic caissons. He was so influential that Washington Roebling went to St. Louis to learn all he could before undertaking his own bridge in Brooklyn.

On July 4, 1874, upwards of 200,000 people attended the grand opening celebration for this engineering triumph. The crowds marveled at the superstructure, for it too was unprecedented. Like no other bridge on the continent, its three shallow arches seemed to skip across the river. The broad roadway on the upper deck gave travelers unobstructed views of the mighty Mississippi and the city it had created. The lower deck carried two standard gauge tracks, finally connecting St. Louis to the national railway map. Most of those 60,000 miles of lines lay east of the river, so the new bridge promised to transform the city and the country. To carry the loads of its twin decks, Eads had specified steel for the arches. His was the first structure — of any kind, anywhere in the world — largely built of steel.

The St. Louis Bridge on Jan. 10, 1875. In years past, such ice jams blocked the ferries connecting St. Louis to the eastern railroad network, isolating the city. This view shows the grace and utility of Eads' shallow arches. Robert Benecke; Missouri Historical Society

LIFE ON THE MISSISSIPPI

Until he turned to the project of bridging the river, James Eads had spent most of his working life on, in, and under the Mississippi (see "Who was James Eads?" page 77). Captain Eads' career in salvage had taught him valuable lessons about the river: its currents, the shifting sandy bottom, and its threats — sudden freshets, crushing winter ice jams, and an endless burden of driftwood that included whole trees. By 1866, Eads was devoting his considerable energies and capital to western

In 2024, the Eads Bridge marks 150 years of service. The amazing and improbable story of its construction combines inspiration, determination, and the use of then-new materials and building techniques. Randy Allard

railroads. Investments in two lines, the North Missouri and the Atlantic & Pacific, tied him to Thomas Alexander Scott, then vice president of the Pennsylvania Railroad. Like Scott, Eads believed that a bridge at St. Louis would boost his hometown, tie his western investments to the PRR, and shower wealth on all involved.

Between 1864 and 1879, upwards of 25 major railroad bridges were built over the Ohio, Mississippi, and Missouri rivers, with hundreds more over their tributaries. These crossings played essential roles in creating regional rail systems, developing key junction points, promoting car interchange, growing the farm economy, and generating national wealth.

Notable examples included the Steubenville (Ohio) crossing over the Ohio River (1864), with its iron-truss superstructure fabricated by the new Keystone Bridge Co., and the Union Pacific's bridge over the Missouri River (1872), with 11 iron truss spans that finally connected the transcontinental line to the Eastern railroad network.

Although they served railroads, most of the biggest bridges were created by profit-seeking entrepreneurs. This private-sector approach suited many carriers, as the western lines were chronically short on investment capital. Furthermore, their own officers could profit by investing in the new crossings. The bridge promoters also drew investors from local elites, eastern bankers, and far-off Europeans. All envisioned building a no-frills iron bridge of adequate capacities to meet immediate needs, that would charge a toll for each freight car and a fee for every passenger that crossed. For their backers, this looked like a guaranteed route to wealth. Except for the Eads Bridge, all the long-span bridges were of patented designs of iron trusses. These first-generation improvements over composite wood/iron bridges had superstructures fabricated in specialized factories at the Keystone Bridge Co., Phoenix Bridge, Chicago's American Bridge, and others.

A studio portrait of James Eads circa 1874.
Photographer unknown; Missouri Historical Society

MAN OF STEEL

Ignoring this new approach, in the summer of 1867 James Eads offered his own design for an arch bridge made of steel. The proposal fell between bold and foolhardy. The first American Bessemer steel works had just fired its initial and imperfect batches that May. Iron was the new, new thing, not steel. Even as Eads launched his steel bridge project, two other promoters presented plans for iron rail bridges for St. Louis. Lucius Boomer's American Bridge Co. had a record of success in the industry. The Baltimore Bridge Co. combined the talented resumes of Shaler Smith and Benjamin Latrobe. But Eads held a key advantage, his friendship with Tom Scott. Scott, in turn, was passionate to harvest wealth out of projects across the continent.

In that long-ago summer, the long-desired dream of St. Louisans to have a bridge became a two-man contest: the neophyte Eads against the long-established Boomer. Tom Scott and his Philadelphia friends chose to back Eads. On Oct. 29, 1867, Scott instructed his young right hand, Andrew Carnegie, to convey that message. Scott and his boss, PRR president J. Edgar Thomson, were convinced that "you and your associates are the men of St. Louis to whom the Penna *(sic.)* RR should adhere."

Thomson and Scott chose Eads, despite his inexperience, because Boomer and his bridge project were aligned with promoters tied to the Lake Shore line and the New

This view shows the two pontoon boats, *Alpha* and *Omega*, building the west pier. Stone laying is well advanced, forcing the iron caisson down into the riverbed. Robert Benecke; Missouri Historical Society

York Central. They picked Eads only to block those rivals to the PRR. In fact, Thomson and Scott saw little to like in Eads' drawings. In June, the PRR's chief bridge designer, Jacob Linville, had dismissed those plans as "entirely unsafe and impractical."

Eads simply pressed ahead. As he had written to his wife years earlier, "Drive on is my motto." Because the PRR backed Eads, Boomer's project stalled, and the two bridge ventures consolidated in January 1868. For the next year, Eads focused on raising capital, issuing a new prospectus in February 1869. It envisioned total capitalization at $10 million (equal to $231.4 million in 2023), and it enticed investors with the prospect of doubling their money. With the proceeds from stock sales, work began on the two river piers in October 1869.

Thomas Alexander Scott. This portrait accompanied a flattering profile in *Harper's Weekly* (July 12, 1873) that cast Scott as the selfless servant of national progress. Wood engraving from a photograph by F. Gutekunst; author's collection

DOWN TO BEDROCK

During the previous winter, Eads had studied pneumatic caissons while touring Britain and France. Imagine a large iron box, much like a shoe box, but inverted, with no bottom. Once pinned into place with wooden pilings, that caisson floated at the spot where Eads would build a pier. The top face of the east pier caisson measured 82 by 60 feet, the largest yet attempted in the world. Crews would then bring limestone and granite blocks out to "pontoon boats," designed by Eads and tied to the caisson. Each boat had six double-beaked cranes, controlled by operators perched 50 feet above the deck. From that lofty spot, a crane man could pluck a 7-ton block off a barge, transport it over his own pontoon boat, and place it on the caisson.

Each new block of stone would add weight to the caisson, forcing it down into the river. Air compressors on the pontoon boats would adjust the buoyancy of the descending caisson until it landed on the sandy riverbed. It all amounted to a kind of brute-force ballet. European engineers

had developed the method, which Eads saw in use on the Allier River in France. He then pioneered its use for deep foundations in North America. Compared to the rivers of Europe, the Mississippi was treacherously wild.

The caisson reached the riverbed, 34 feet below the surface, on Nov. 25, 1869, one month after the first stone came aboard. Now the work entered a challenging new phase. Knowing the river's forceful currents and its winter ice gorges, Eads had decided to limit his bridge to just two piers, and to take them all the way down on bedrock. To that end, the stone pier would need to descend 60 more feet through sand and gravel. After the air compressors expelled all the water from the caisson, sandhogs or "submarines" descended an iron staircase built inside the pier. An air lock gave access to its interior. Gangs worked shifts around the clock, shoveling sand to patented "sand pumps," another Eads innovation that ejected the spoil into the river (they worked much like the steam injectors of contemporary locomotives).

The submarines were paid $4 a day (equivalent to $97 in 2023), a good wage for unskilled labor in that era. But they earned it. At a depth of 60 feet, many began to feel aches and pains in their joints and muscles. The caisson landed on bedrock on Feb. 28, 1870, 93 feet down. To keep the water out, air pressure inside reached 44 psi, or three times the norm at sea level. By then many submarines had severe pains, even bouts of paralysis. They still needed to work every day, filling the caisson with concrete to seal it forever. Before completing that essential task, 13 men died from caisson disease. Today we know that "the bends" is caused by dissolved gases forming bubbles inside the body tissues during too-rapid decompression.

The remaining stonework for the two piers and two abutments required another 18 months. Thanks to improved safety measures, only one more man died of the bends. By then, Eads was focused on the next looming issue — securing adequate steel to build the superstructure.

FINANCIAL COMPLICATIONS

As the stone piers grew above the river, Eads and his associates in the Illinois and St. Louis Bridge Co. turned to three new and intertwined challenges. They searched for a steel works capable of making the load-bearing arches (known as chords to engineers) of the superstructure. They needed a specialist bridge builder to fabricate other parts in wrought iron, then erect the three arches and two decks over the river. And they had to find a banker willing to finance all this.

For three years, Edgar Thomson and Tom Scott knew they possessed solutions to some of these challenges. If their PRR agreed to funnel its business to the new bridge, those guaranteed revenues could entice an investment banker to float a new bond issue for Eads' company. Income from bond sales would then pay the steel works and the bridge builder for their contributions. Since Thomson and Scott controlled the Keystone Bridge Co. of Pittsburgh, this solution appeared to offer more benefits to all the parties.

WHO WAS JAMES EADS?

BORN IN 1820 on the Indiana frontier, James Eads moved with his family to St. Louis during boyhood. His formal education ended at age 13 when he became a clerk in a dry-goods store. From those obscure and unpromising origins, Eads became a classic American success story. His professional life unfolded in six distinctive chapters, each novel but growing from past achievements. Three years before he died, his accomplishments earned a singular honor. He became the first American to receive the Albert Medal, joining such luminaries as Faraday, Bessemer, and Pasteur. Bestowed at a London ceremony by the Prince of Wales, the award recognized "distinguished merit in promoting the arts, manufactures, and commerce."

From 1842, young Jim Eads undertook dangerous work in river salvage, searching for sunken cargos and wrecks of the steamboats mortally wounded by collisions, fires, or explosions. Using boats, gear, and a diving bell of his own design, he amassed a fortune by the 1850s. His lifetime honorific, Captain Eads, reflected those years on the western rivers.

When the Civil War broke out, he hurried to Washington City, called there by his friend Edward Bates, Lincoln's attorney general. Eads advised the president and his cabinet to build a fleet of steam-powered gunboats to take control of the Mississippi, the chief highway into the rebellion. By August 1861, Captain Eads had taken a contract to build seven ironclad gunboats, each weighing 500 tons. He had never built a warship, and did not own a shipyard, foundry, or machine shop. Yet his fleet was ready for battle six months later. In February 1862, a month before John Ericsson's *USS Monitor* fought to a draw in Virginia, Eads' innovative ships gave the Union its first significant victories of the war, leading the river bombardment that helped capture Forts Henry and Donelson. The combined army/navy assaults made a national hero of Ulysses Grant, and proved fundamental to the Union's eventual victory in the war.

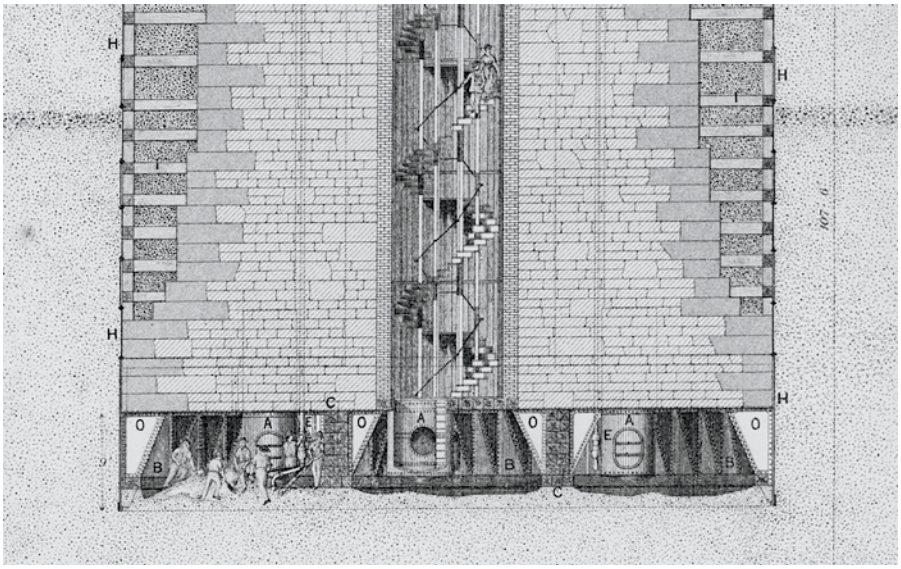
The St. Louis Bridge followed the war. His years in salvage had given Eads unique understanding of the river, while his wartime work on the ironclads had provided lessons in managing complex engineering and large organizations. Collaborations with naval officers working on ordnance also grew his familiarity with steel.

Even before the bridge opened, Eads had embarked on another novel project, advocating a navigable channel through the Mississippi River delta so that ocean freighters could reach the docks at New Orleans. The delta had grown choked with silt during the war. The Army Corps of Engineers proposed to a new canal to access New Orleans, a proposal that Eads denounced in strong language that made the Corps his enemy. By constructing jetties to concentrate the river's natural currents, Eads avoided the high cost of a canal while flushing the silt and deepening the South Pass channel from 14 feet (1874) to 31 feet in 1879. Success earned him another fortune, $5,950,000, paid by the U.S. Treasury ($185.1 million in 2023).

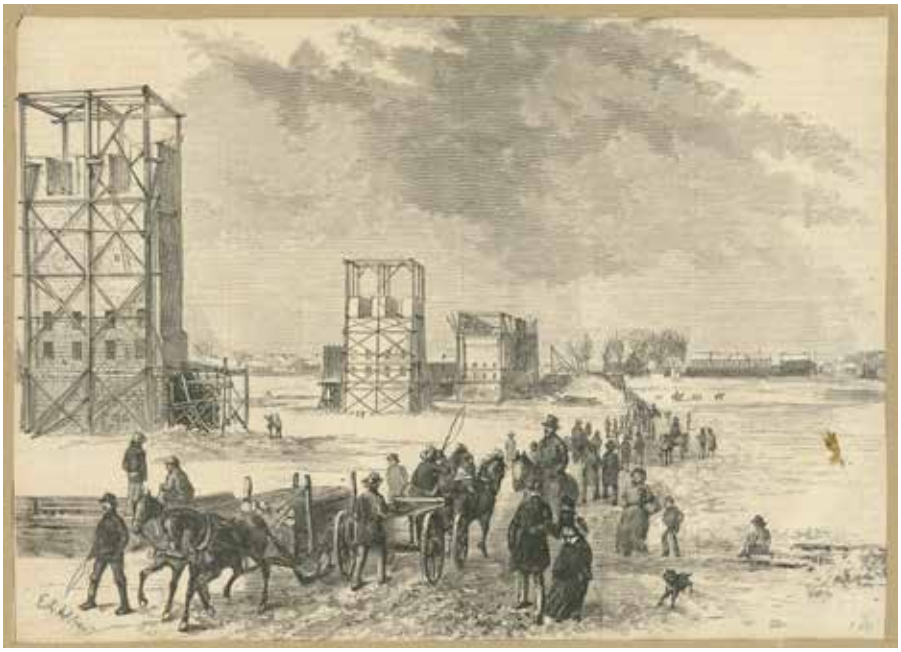
During the last decade of his life, Eads earned international regard for his expertise in the hydraulics of rivers and harbors. During this chapter, he gave expert testimony to the British Parliament, and advised the Grand Vizier about a bridge over the Bosporus. He even prepared drawings for that 3,500-foot railroad bridge to unite Europe and Asia.

The sixth chapter of his remarkable career focused on promoting and designing his Tehuantepec Ship Railway. The venture had all the Eads hallmarks. Rejecting a traditional canal, then under consideration across the Isthmus of Panama, he proposed a massive railroad over the Isthmus of Tehuantepec in Mexico. A ship-hauling railroad, capable of carrying iron freighters weighing 8,000 tons with their cargos, at speeds up to 10 mph over the 60-mile route. Fanciful or feasible, the ship railway died with Eads in March 1887.

His death by pneumonia, just shy of age 67, harkened back to a lifetime of bouts with respiratory illness and his years of breathing in and under the Mississippi. The editors of the *Railroad Gazette* marked his life with a handsome tribute, noting that "his personality inspired affection and enthusiasm in men of all ages and conditions." In their assessment, "he combined courage, enthusiasm, persistence, insight, and judgement in such measure as to amount to genius." — *John K. Brown*



This detail from an engraving illustrates the caisson's construction and the work of the "submarines." It shows the main airlock (labeled 'A') and the digging galleries. The men dig away, carting sand in barrows to the sand pump ('E') whose operator suctions the spoil. A fashionable lady and gentlemen descend the circular staircase to observe these strange sights.
Detail of an engraving from Woodward, *History*, plate XIII



In December 1872, the Mississippi River at St. Louis froze hard, allowing people, teams, and wagons to cross on the ice. By this point, Eads and his men had been laboring for 5 years.
Engraving by E.A. Abbey, "Ice Bridge," *Harper's Weekly* (Jan. 18, 1873): 52. Missouri Historical Society

Steel was another matter entirely. Thomson did not believe any American steel works could fulfill Eads' requirements. Furthermore, Keystone's Linville had dismissed Eads' arch design as unsafe and impractical — and there was no better bridge man in the country. Linville had prepared his own plans for a conventional iron truss bridge for St. Louis. Back in October 1867, Andrew Carnegie had gently tried to steer Eads away from his exotic ideas, writing that "Mr. Thomson believes you will find it necessary to modify the present plans as you proceed." Eads, however, clung to his unique design, so Thomson and Scott hung back from fully committing to Eads.

In February of 1870, money finally brought Scott, Thomson, and Carnegie to close a deal with the Illinois and St. Louis Bridge Co. Eads' company committed to pay that trio a bonus of $250,000 if those men would bring an investment banker, the PRR, a steel maker, and a bridge builder to the deal. The bonus amounted to approximately $6 million in 2023 dollars. Atop that personal reward, the three men grasped other benefits and profits: chiefly new business for the PRR and for their own Keystone company. If steel simply proved impossible, Keystone could enhance its margins by erecting Linville's iron truss bridge.

Troubles in procuring suitable steel did nearly overwhelm Eads' company. As Thomson had predicted, Bessemer steel lacked the requisite strength and uniformity. Besides, no Bessemer plant in the world would even quote for the job. Eads settled on a small Philadelphia producer of crucible steel, the William Butcher Steel Works, but its products typically failed his strength tests. Two years of troubles with steel finally drove Butcher bankrupt, ignited acrimonious revolts by Carnegie and Keystone, and caused Eads to scale back his demands.

But Eads did largely prevail in the end. The Butcher works was reorganized as Midvale Steel, and its output improved under the management of William Sellers, one of America's top mechanical engineers.

As built, the superstructure had 4.8 million pounds of steel, 6.3 million pounds of wrought iron (mostly in the bracing that connected the steel chords), and 1.6 million pounds of wood in the decks and sidewalks. A steel bridge, more or less.

The troubles with steel embittered the men at Keystone Bridge. But they remained tied to Eads' company, contractually bound to erect the arches and build the decks. That work finally began in March 1873. Here too, the unique design called for novel methods. Eads' first assistant engineer, Henry Flad, devised an unprecedented cantilevering system to support the developing chords from above as they reached out from the abutments and piers.

Flad's approach required laborious calculations and much expense, but kept the river clear for the ceaseless traffic of steamboats and barge tows that still made St. Louis the leading inland port of the continent.

As arch construction advanced, a succession of new difficulties assailed Eads and his bridge. In August, Keystone gave notice it would ignore its contractual commitment to bear all responsibility for closing the arches. Eads' men would have to meet the challenges of placing the final steel tubes that would make them self-sustaining. As they brought the first arch to near completion, the Army Corps of Engineers declared that the bridge illegally obstructed navigation on the river. And at just that moment, the Panic of 1873 overwhelmed Wall Street and the national economy.

In their combined effect, the Corps and the Panic threatened Eads' access to additional capital, funds essential to

The arches are nearing completion in this December 1873 photograph. A river ferry awaits passengers on the Illinois shore. Robert Benecke; Woodward, *History*, plate 44

completing the bridge.

Eads still drove on. In an October meeting at the White House, his old acquaintance from the war listened intently as Eads described the army's campaign against the bridge. President Ulysses Grant summoned the Secretary of War and overruled the Corps on the spot. On Dec. 18, 1873, a team of engineers and laborers placed the final tubes in the two middle chords of the east arch, making it self-supporting. Finally, the city had its bridge, seven years in the making. At noon, "a party of ladies and gentlemen walked out to the middle arch and hoisted the Stars and Stripes." Across the waterfront, whistling and cheering marked the moment.

Despite the milestone, much work remained: completing the arches and decks, building the sidewalks, painting the structure, and finishing the approaches. Eads' team also finished a 4,400-foot tunnel under downtown, connecting the bridge to a site for a new station. At the grand opening celebration on July 4, 1874, Captain Eads thanked many contributors to the project by name, including the banker Junius Morgan in London who had sustained the project with capital. He had nothing to say — not a word of thanks or acknowledgement — for Edgar Thomson, Tom Scott, or Andrew Carnegie. In a private letter to banker Morgan, Eads explained that opposition from the Pennsylvania Railroad "has, I believe, cost our company not less than a million and a half of dollars."

Eads had prevailed in building his improbable masterpiece, but Tom Scott had extracted a heavy price. The cause of his antipathy is unknown and unknowable. With Scott pushing a boycott of many carriers, the Illinois & St. Louis Bridge Co. fell into foreclosure just nine months after it opened. (Scott may have sought exactly that result, hoping to acquire the bridge at a court-appointed sale of assets.)

This final act clouds most accounts of Eads and his bridge, but casting the venture as a financial failure is woefully incorrect. Half of all American railroads passed through bankruptcies and reorganizations during the depression of the 1870s, including the Santa Fe, Burlington, and Kansas Pacific. History does not record these companies as failures.

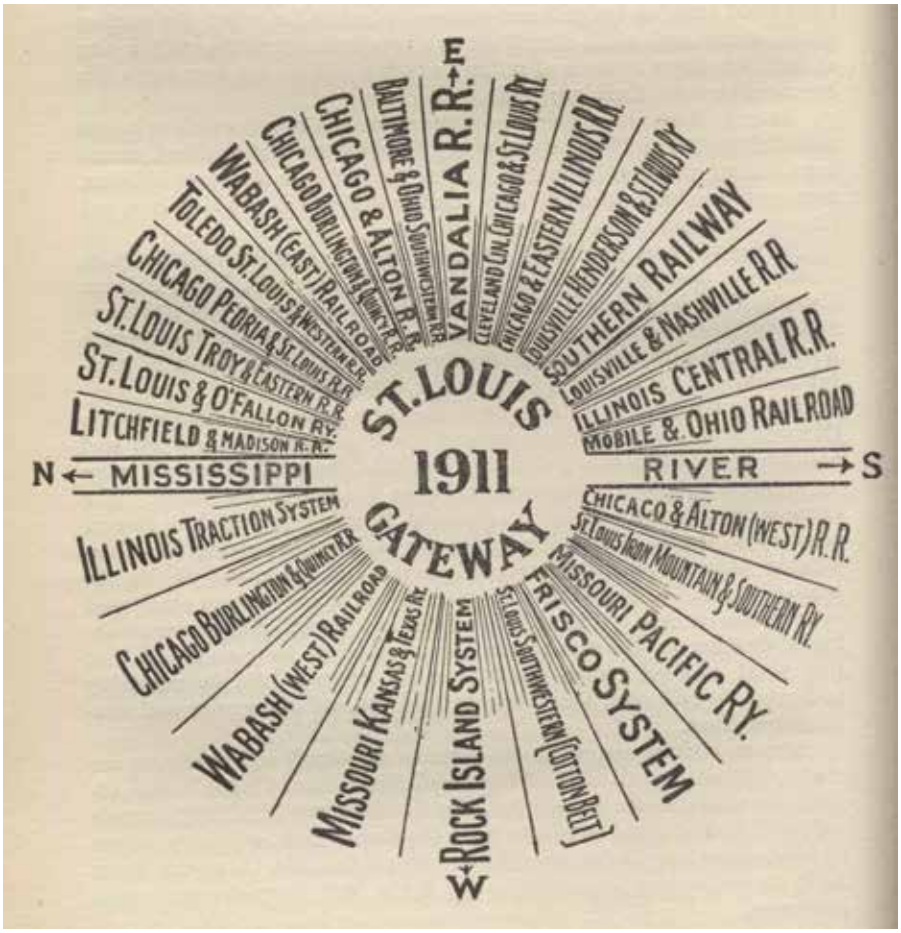
SUCCESS WRIT LARGE

After reorganization in 1879 by its London bankers, the bridge proved a great financial success and an engine of growth for the region and the nation. Between 1880 and 1900, St. Louis grew from sixth to fourth place among American cities (ranked by population). The rail connections created by the bridge powered much of that progress. From 1889, it became the chief asset of the Terminal Railroad Association of St. Louis, formed that year by six St. Louis carriers. By 1902, 14 railroads shared ownership of the TRRA, which in turn provided terminal and interchange services to all area lines.

In 1902, the Terminal Association had revenues of $1.83 million. After debt servicing, this left a cash surplus of $367,000, a 20% return on its gross (a year earlier, profits had reached 24%). Here was success writ large.

The operational history of the bridge also reflected the genius of its designer, promoter, and chief engineer. Eads planned that his bridge would gather up all the traffic of eastern lines and deliver it to a new union station serving all St. Louis carriers. It did just that, although thanks to Scott's antipathy, the Union Depot opened a year after the bridge. It was successful from the start, serving 60 passenger trains on its first day (an oft-repeated error claimed it failed too, serving just 14 trains a day). By 1891, the station served a daily average of 230 arrivals and departures by 19 carriers.

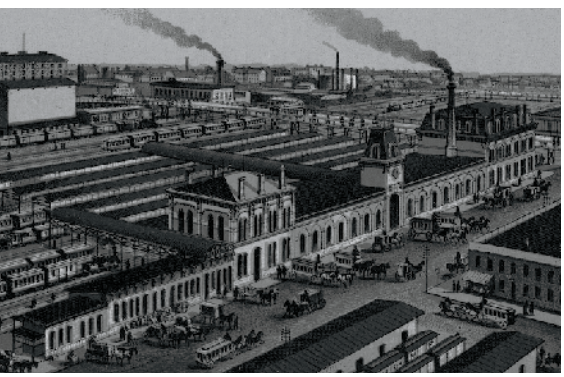
With its double tracks, the bridge had ample capacity — and strength — to bear this growth in freight and passenger traffic.



The St. Louis Merchants Exchange illustrated the city's gateway position this way. The Terminal Railroad Association connected each line. Image from Merchants, *Statement* (1910) p. 88

According to the *Railroad Gazette*, "on several occasions" freight trains started over the river with one or more cars already derailed. Once a 35-ton locomotive derailed on the span, running some distance before the engineer could stop his train. As with so many elements, Eads and his engineers had designed an unusual floor system which bore up well under these accidents, containing the damage.

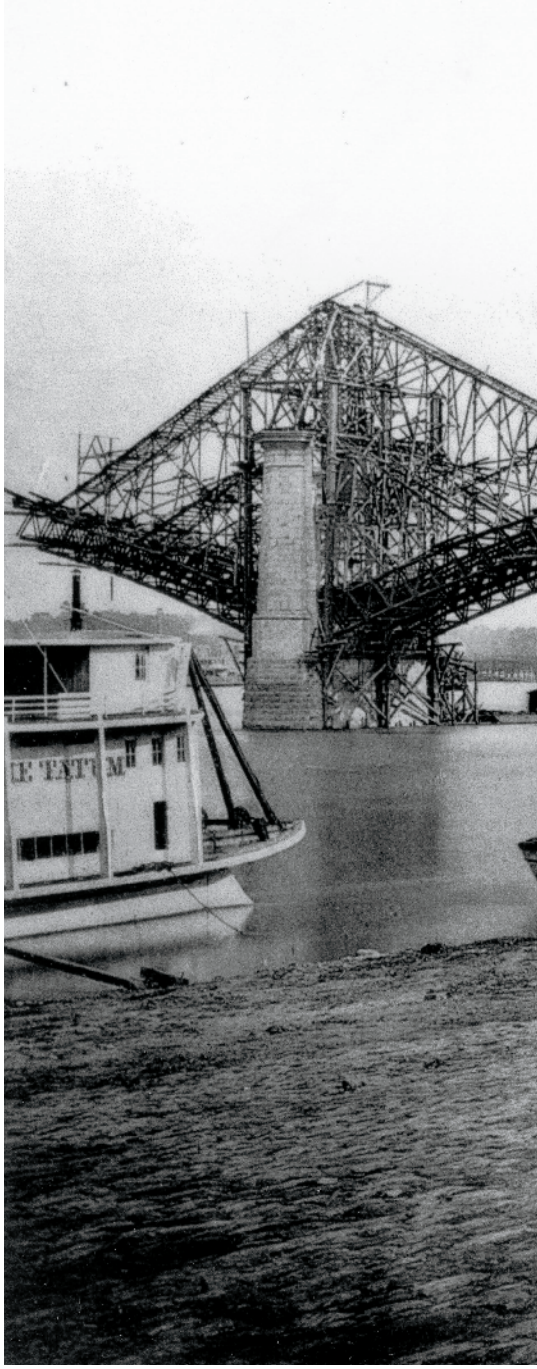
One mystifying problem on the bridge could only be managed, never corrected. Civil engineers described it as "rail creep." Quite literally, the rails moved. The northern track (for westbound traffic) crept toward St. Louis at the rate of a foot a day. The eastbound track did just that, moving at roughly the same rate. Rarely encountered at other bridges, the problem elicited detailed investigation, many theories, and no authoritative answers. Heroic efforts to fasten the rails in place failed. An engineering report from 1884 noted that "steel spikes, bolts, straps and splice bars have been sheared off and torn asunder ... and connecting tracks in East St. Louis pulled out of line ... the rails themselves so buckled and twisted that when one was removed it could not have been replaced again by eight inches." Engineers could only adapt to this problem. At three locations, short sections of rail were added or removed many times each day. This rudimentary solution required nearly full-time attention from eight men working around the clock.



Opening in 1875, St. Louis Union Depot proved a fine facility. Trains from the East continued to stop in East St. Louis, where those carriers maintained servicing facilities. *Souvenir of St. Louis* (1882), author's collection

CHANGING TIMES

During the 20th century, the Terminal Railroad Association made extensive improvements and repairs to the Eads Bridge.



Supported by temporary towers and cables, the steel tubes cantilever outward from the abutment and the west river pier. Robert Benecke, Woodward, *History*, plate XLIII

Its strength increased from a Cooper E-36 rating in 1921 to Cooper's E-45 in 1970. The shift from steam to diesel locomotives eased the stresses on the arches. And its extraordinary strength has proven essential on those occasions when strong river currents overpowered towboats or their barges, causing them to strike the bridge piers, even the superstructure.

In line with national trends, St. Louis and its rail network fell into decline after 1950, with dwindling rail traffic abandoning the bridge in 1974, its centennial year. In 1989, the City of St. Louis swapped its MacArthur Bridge (originally known as the Municipal or Free Bridge) for the Terminal

Railroad Association's Eads crossing. City planners wanted the bridge and tunnel to create a new route for electric-powered light-rail trains to serve downtown.

With its rededication in 2003, this oldest bridge on the Mississippi was back in business. The restored roadway deck carries auto traffic in four lanes without tolls. On the rail deck beneath, trains of the MetroLink light-rail system connect St. Louis's eastern and western suburbs to the urban core and the airport.

Each weekday, those trains cross the Mississippi 300 times. Passengers from Illinois enjoy fleeting views of the river and the bridge's iron and steel sinews before plunging into the darkness of the 1874 tunnel with its two new downtown stations. In 2016, the bridge and its approaches returned to like-new condition thanks to a $48 million restoration. With its original strengths intact, the restored bridge should have a service life reaching to 2091 or beyond, according to engineering projections.

By any conventional understanding, that remarkable longevity would also seem improbable. James Eads would greet that news with his characteristic self-assurance. In his remarks on opening day, he predicted that "this bridge will endure as long as it is useful to man." 1

JOHN K. (JACK) BROWN taught history, ethics, and writing in the Engineering School of the University of Virginia for 25 years. His book, Spanning the Gilded Age: James Eads and the Great Steel Bridge, *will be published by the Johns Hopkins University Press in May 2024.*

New York Central electric locomotives on the move

Historic S1 and T3a moving to Danbury Railway Museum

▲ On Nov. 2, 2023, a pair of 160-ton cranes from Flach Crane & Rigging of Selkirk, N.Y., lift the body of New York Central T3a No. 278 onto a waiting trailer for movement to the Danbury (Conn.) Railway Museum. The locomotive is the sole remaining NYC T-class electric locomotive.
Two photos, David Pickett

THE NEW YORK CENTRAL S1 AND T3A electric locomotives, stranded in Beacon Island, N.Y., have been disassembled and trucked off the site. The Nov. 2 recovery operation culminated years of planning and site preparation enabling heavy-duty cranes and trucks to safely enter the site and move the locomotives. The pieces will be moved to the Danbury (Conn.) Railway Museum.

The S1, built in 1904 by Alco-GE, is the first heavy mainline electric locomotive. Subsequent S-motors enabled NYC's 600-volt D.C. electrification, including the 1913 opening of Grand Central Terminal.

The T3a No. 278 is the only remaining T-motor. It too was developed by Alco-GE with a design to improve speed and tractive effort. It was in production from 1913 to 1926.

Weighing 87 tons, the S1 undercarriage, the heaviest piece to be moved, required a special trailer and was moved as a "super load."

Current preservation efforts began in the early 2000s when Paul Marsh, an independent preservationist, visited the engines to protect and maintain them in hopes they would be moved to a museum. His work focused on maintaining bearings so the locomotives might move by rail and securing the equipment against vandals.

The Danbury museum acquired the locomotives in 2013 and other volunteers joined Marsh. This group prepared the locomotives for road transport. The start of site development by the Port of Albany in 2022 threatened the locomotives, but also led to the work needed to lift them onto trucks and drive them away [see "Museum works to save two rare NYC electric locomotives," "Preservation," June 2022].

In December 2022, the locomotives were moved about 120 feet by Hulcher Services. The shift took the units out the immediate construction path, placing them on timber matting for temporary storage.

The Port continued site work throughout 2023, surrounding the locomotives with nearly 4 feet of compacted gravel, which would support the cranes and heavy-duty trailers needed for the move.

For the lift, two 160-ton capacity cranes were positioned next to the units. As each piece was lifted, it was threaded between the cranes and loaded onto trailers on the other side.

The S1 cab weighs 30 tons and the undercarriage is the heaviest single piece at 87 tons. Because the S1 undercarriage is so heavy and of monolithic construction, it had to be moved as a "super load" requiring police inspection, weighing, and an escort for road transport.

The T3a lifting was easier, as the cab lifted directly off the bearing surface of each truck. Before the move, the drawbar pin connecting the two trucks was removed so they could be lifted separately. The cab weighs 35 tons and each truck 57 tons.

As of mid-December, the locomotive pieces were being stored in Albany, N.Y., area, as plans for the move to the museum are completed.

For project details and locomotive histories, please visit www.danburyrail.org/electrics.
— David Pickett

CSX CEO Hinrichs to chair B&O Museum capital campaign

Museum seeks $30 million to prepare for bicentennial of American railroading

The reimagined grounds of the B&O Museum will include an amphitheater, and entrance via the South Car Works. B&O Railroad Museum

CSX TRANSPORTATION CEO JOE HINRICHS will chair the B&O Railroad Museum's $30 million capital campaign in preparation for the 200th anniversary of American railroading in 2027, the museum has announced.

CSX previously launched the campaign by donating $5 million toward building of the CSX Bicentennial Garden, an amphitheater and multi-use public space for community events [see "CSX makes $5 million gift … ," Trains.com, June 8, 2023].

"CSX is the proud successor to America's first commercial railroad, the Baltimore & Ohio," Hinrichs said in a press release. "As proud as we are of our heritage, we are equally excited about the future, both the future of our modern transportation company and the future of the dynamic and visionary B&O Railroad Museum. Which is why I am honored to chair the B&O Museum's 200th Anniversary Campus Transformation Campaign … This campaign is an excellent way to celebrate our nation's railroad history by contributing to a one-of-a-kind learning experience for generations to come."

Along with the CSX Bicentennial Garden, plans for the museum campus include restoration of the South Car Works building, used from 1869 to 1990 and believed to have been the oldest continuously operating railroad repair facility in the U.S., if not the world. The 33,000-square-foot building will become the new entrance to the museum, revising its flow to face Southwest Baltimore to spark economic development. The restored building will house an exhibit hall for present and future railroading technology, a state-of-the-art educational space, and the museum's extensive historical archives.

"We could not be more honored to have Joe Hinrichs, president and CEO of CSX, serve as 200th Anniversary Campus Transformation Campaign chair," said Kris Hoellen, the museum's executive director. "Joe is a visionary who understands the importance of preserving our past, while supporting the economic health of today's communities and preparing our children for the future of American railroading technology."

For more information on the museum and this project, please visit: borail.org. — Trains *staff*

Pennsylvania Trolley Museum's new $15 million welcome center

Facility is museum's new 'front door,' includes history exhibits, interactive kiosks, theater, classroom

Visitors to the Pennsylvania Trolley Museum's new welcome center engage with a host of interactive science exhibits. Dan Cupper

CAPPING A SEVEN-YEAR CAMPAIGN that was delayed and incurred a 40% cost increase due to the COVID-19 pandemic, the Pennsylvania Trolley Museum in Washington, Pa., opened its $15 million, 21,000-square-foot Welcome and Education Center in November 2023.

Ed Morascyzk, museum board president, called the opening "a transformational day." Officials now hope patronage will double from its current volume of 33,000 visitors per year. Attending the ribbon cutting on Thursday, Nov. 9, was a founding member and volunteer, 104-year-old Art Ellis.

Featuring history exhibits, interactive kiosks, a theater, classroom, museum store, offices, and event rooms, the facility is the centerpiece of the museum's 36-acre East Campus, the organization's new public face, replacing a 1990s-era visitor building less than a mile away. As a novel highlight, solar panels are generating electricity for both general and trolley-propulsion use.

The campaign succeeded, speakers at the event said, because of an unusually broad base of support from private companies, state and local agencies and elected officials, about two dozen foundations, and Pittsburgh Regional Transit, which runs Pittsburgh's public bus and light-rail system. Formerly known as the Port Authority of Allegheny County, the agency is the successor to the private PRCo system, which in 1918 operated 600 miles of streetcar and interurban routes, serviced by 1,700 cars.

The museum was organized in 1953 with three cars. That same year, it acquired a 2,000-foot stretch of track, part of Pittsburgh Railways Co.'s Pittsburgh-Washington, Pa., interurban line that was being abandoned. Under the name Arden Trolley Museum, the group began offering public rides in 1963.

The center, says Scott Becker, executive director and CEO, represents "a huge leap forward in telling the story of the trolley era." He observed that the railroad and trolley preservation world has pivoted to an approach that embraces education and public engagement. While equipment is still critical to the mission, Becker said, the museum now tells the stories of how streetcars enabled the growth of suburbs, and how trolleys became "rolling melting pots" in cities like Pittsburgh with dozens of ethnic neighborhoods.

In addition, the educational acronym STEM (Science, Technology, Engineering and Math) is prominent throughout the new displays, with kiosks devoted to rolling resistance and electric energy usage. These and the historical displays were developed in collaboration with Pittsburgh's Carnegie Science Center.

The museum now owns 52 cars, all of them stored under roof in five buildings, according to Becker. It offers a 4-mile round-trip ride over signaled broad-gauge track (Pennsylvania traction gauge is 5 feet, 2½ inches), and maintains a 66,000-square-foot building containing a workshop, parts storage, and archives center. — *Dan Cupper*

New Hampshire to sell 'Flying Yankee'

Restoration efforts for 1935 Budd trainset have long been in limbo

The *Flying Yankee* train set is up for sale. The new owner will need to agree to a set of permanent restrictive covenants regarding preservation and maintenance. State of New Hampshire

THE STATE OF NEW HAMPSHIRE seeks to sell the *Flying Yankee,* the 1935 articulated streamliner built by Budd Co. for the Boston & Maine Railroad. It is virtually identical to the CB&Q *Pioneer Zephyr.*

In November 2023, the state issued a Request for Proposals for sale of the three-car train set, which has long resided at the Hobo Railroad in Lincoln, N.H., and been the subject of failed restoration attempts both private and state-funded. Proposals are for "the relocation and encouraged restoration" of the train set, and will be rated under a number of criteria addressing how preservation will be addressed. The buyer will sign "permanent restrictive covenants" regarding preservation and maintenance of the train when the sale closes.

As described in the 2021 *Classic Trains* special issue, *Burlington's Zephyrs,* the *Flying Yankee* was ordered two months after the *Pioneer Zephyr* was completed in June 1934, and entered service as the joint B&M/Main Central Boston-Portland-Bangor, Maine, *Flying Yankee* on April 4, 1935. Unlike the *Pioneer Zephyr*, which included a Railway Post Office in the power car, the *Flying Yankee* had coach seating in all three cars, a baggage section, buffet, and solarium lounge. It operated on various New England and New York routes until 1957, after which it was displayed at the Edaville Railroad narrow-gauge tourist line in Carver, Mass., for 36 years.

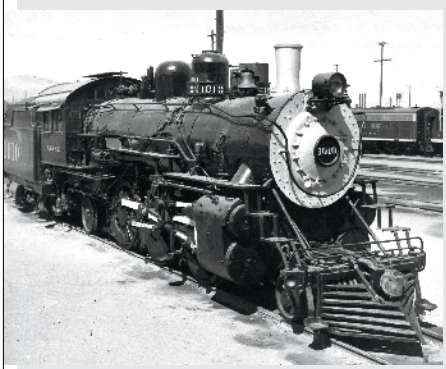
It was moved to New Hampshire in 1993 as part of a restoration effort, was acquired by the state three years later, and moved again in 1997. The restoration effort ran aground with the death of project leader Robert Morrell, and the train has been stored in Lincoln, N.H., since 2005.

A nonprofit group formed in 1996 to support the restoration effort, the *Flying Yankee* Association, says it will make a bid.

"The *Flying Yankee* Association is in a unique position, with both a dedicated team and strong partnerships, to ensure this beloved treasure not only remains true to history, but to have it ride down the tracks under its own power once again," says Brian LaPlant, association chairman. — Trains *staff*

PRESERVATION BRIEFS

'Death Valley Scotty' engine to be restored; CN donates E9



The **CALIFORNIA STATE RAILROAD MUSEUM** has launched an effort to restore Santa Fe steam locomotive No. 1010, a 2-6-2 built by Baldwin in 1901 and donated by Santa Fe in 1984, for use on the museum's Sacramento Southern excursion railroad. No. 1010 is notable for its role in the **"DEATH VALLEY SCOTTY" EXCURSION**, in which prospector and performer Walter E. Scott contracted with the Santa Fe in 1905 to break the speed record for a cross-country train trip. No. 1010 was one of the 19 locomotives used in the 44-hour, 54-minute trip from Los Angeles to Chicago — which broke the old record by about 8 hours. The locomotive powered the three-car train between Needles, Calif., and Seligman, Ariz.

One of three remaining **GMC PDA4101 COACH BUSES** from the **UNION PACIFIC STAGE CO.**, a subsidiary of the Union Pacific Railroad, was sold to a private collector in Cheyenne, Wyo. The bus, No. 23, and 10 identical units connected Glendale, Anaheim, and San Pedro, Calif., with the UP rail station in East Los Angeles. No. 23, in service until 1973, is still operational. Michael Pannell, the new owner, plans to restore the bus to original condition and operate it for community events.

The **AMERICAN INDUSTRIAL RAILROAD SOCIETY** reports progress in its effort to operationally restore **INDIANA NORTHERN NO. 4**, a 1913 Baldwin 0-4-0. Metal work has been completed on the cab, leaving woodwork, painting, and lettering to finish this phase of the project. Follow the restoration of this tiny locomotive at industrialrails.org

CANADIAN NATIONAL RAILWAY has donated an ex-**ILLINOIS CENTRAL E9** to the **MONTICELLO RAILWAY MUSEUM** in central Illinois. The unit wears a variation of CN's 1950s green-and-black paint scheme — most notably with the CN "noodle" logo in place of the maple-leaf emblem. Built in January 1950 as CB&Q No. 9940-A, it became Burlington Northern No. 9940 in 1970. It was part of the BN E-unit fleet bought by Chicago's West Suburban Mass Transit District in 1972, and was sent to Morrison-Knudsen for commuter service rebuilding. Steve Smedley

Ride Wild Mountain Rails

with Trains Magazine!

Join Editor Carl Swanson on an all-inclusive tour of the scenic railroads of the east

June 3-11, 2024

Highlights include:

- East Broad Top private charter and shop tour
- Private Everett RR charter
- Breathtaking views on the Cass Scenic RR
- And much more!

Photo: Kevin Gilliam

EXPLORE ALASKA

An exclusive rail journey across America's last frontier with Associate Editor Bob Lettenberger

September 2024

- Five rail segments aboard Alaska RR passenger trains
- Shop tour of Alaska RR's Engine 557 steam restoration
- Naturalist-led tour of Denali National National Park

Majestic Switzerland by rail

Experience Switzerland's mountain railways with Senior Editor David Lassen

Sept. 19-30, 2024

- Ride first class on the Gotthard Panorama Express
- Experience the legendary Bernina Express
- Chocolate train excursion

SPECIAL INTEREST TOURS | Trains MAGAZINE

For more information call 845-202-3327

Or visit www.SpecialInterestTours.com

Many journeys, many photographs

Seeing an industry through iconic images

▲ **At sunset, three Belt Railway of Chicago diesels go about their business in the BRC's West End yard.** John Gruber

ONE THOUSAND ISSUES of *Trains* Magazine have put tens of thousands of railroad photographs in the public eye. The most memorable of these images do far more than portray a locomotive or a train in motion. They preserve a moment of railroading and capture the spirit of a place, a railroad, and time. Our perceptions of railroading are shaped by our experiences and by the shared words and images of others.

Some of the most iconic images in the pages of *Trains* are those that stir a fascination for the journey. Railroads are about motion — not just the movement of trains between stations, but the movement of people and material across the landscape and across the decades.

Long-time Editor David P. Morgan had a keen eye for effective photographs and put into print some of the best known railroad images from the 20th century. Many skilled and intuitive photographers saw their work illustrating the pages of the magazine. This helped shape the way we saw railroads and the places they served.

Richard Steinheimer's photos of Western railroading conveyed the majesty of Donner Pass, the sinuosity of the Tehachapis, and the mystique of Milwaukee Road's Pacific extension. Jim Shaughnessy preserved the identities of railroads in the East during the key transition from steam to diesel and the rapidly unfolding amalgamations of the 1960s and 1970s, which in just a few years swept away most of the classic names in the region's railroads. John Gruber distilled elements of Midwestern railroads with his photo essays, including the image reproduced here from his 1966 article on the Belt Railway of Chicago.

Mel Patrick preserved elements of railroading and railroad landscape so perfectly as to defy description. William D. Middleton traveled across the nation and around the globe. His focus on electric railroads included more than trains and wires, but an era of railroading on the cusp of greatness that remained unfulfilled. Phil Hastings was master of the craft who, in close collaboration with Morgan in the 1950s, put pictures on paper that captivated the generation mourning the loss of steam and preserved a period of railroading now long past.

In the 1980s and 1990s, color photographs by Ben Bachman, Gary Benson, and Steve Schmollinger helped redefine how we saw railroading with magnificent images of ordinary trains in their environment. Growing up in New England, I was especially fascinated by Bachman's two-part article portraying railroads of the Connecticut River Valley in New Hampshire and Vermont. His evocative article on the rails along Seattle's Salish Sea is featured in this issue.

Scott Hartley delineated the unusual from the ordinary in my native New England, while taking memorable forays South and West. Where John Gruber

put the telephoto in the pages of *Trains*, Scott should be credited for the successful application of the wide-angle lens to color railroad images.

Among the greats of contemporary photographers are the Danneman brothers, former Art Director Mike and current *Trains* Art Director Tom. They shaped this magazine's visual content and set high standards for photography for decades.

Blair Kooistra is a photographic savant who, from a young age, graced the pages of the magazine with his photos of the Milwaukee Road in the Bitterroots and since has created railroad memories from across the West.

In the digital age, railroad photography has become much easier to produce, quicker to master, certainly more versatile and more readily available, but only occasionally results in images with better staying power than the classics from the age of film. Yet *Trains* continues to print memorable photographs and provide a venue for those skilled with the use of a lens.

Eric William's cover photo on February 2023 *Trains* offers a stunning image that defies most railroad photography conventions and is among the best to appear in recent years. His article focused on Norfolk Southern's SD40E diesels, but his photographs capture the essence of the former Pennsylvania Railroad's Main Line west of Altoona, Pa. Scott Lothes is another digital imaging master who has produced colorful essays showings us railroads in Japan, the Pacific Northwest, and the upper Mississippi River valley.

So many photographs, so many places, and too many photographers to even begin to credit all of them: month after month for more than 80 years their individual visions have swept us up on virtual journeys around the world and on railroads of all descriptions.

I wrote this essay without going through the 1,000 issues one by one, but simply recalling from memory the photographs and the photographers who made them. Each and every one of us that has taken the journey with *Trains* will have their own recollection of images that stayed with them, and that in itself proves the power of the individual photographs. — *Brian Solomon*

Dust off the bucket list

2024 *Trains* Tour schedule released

EXPERIENCE SOME OF THE WORLD'S BEST rail travel destinations with the editors of *Trains* Magazine this year. In partnership with Special Interest Tours, *Trains* offers the following tours for 2024 of the railroads in Alaska, Switzerland, and the East Coast of the U.S.

WILD MOUNTAIN RAILS

The first tour kicks off in June with Editor Carl Swanson leading a nine-day, all-inclusive tour of the top scenic railroads and museums of West Virginia, Pennsylvania, Maryland, and Virginia. Rail excursions include a shop tour and private charter on the East Broad Top, a private steam charter on the Everett Railroad, a ride on the Cass Scenic Railroad to Bald Knob and Durbin & Greenbrier, plus rides on the *Tygart Flyer* and Western Maryland Scenic Railroad.

ALASKA BY RAIL

In September, *Trains* Associate Editor Bob Lettenberger will lead a nine-day tour of the Alaska Railroad from its northern terminus in Fairbanks to its southern end in Seward. Five ARR rail segments are planned highlighted by luxurious GoldStar travel on the railroad's flagship *Denali Star*, the *Hurricane Turn* flag-stop train, and GoldStar Class on the *Coastal Classic*. A naturalist-led driving tour of Denali National Park, a tour of the ARR's Anchorage Shops, plus a visit to the team restoring ARR steam locomotive No. 557 are also included in this exclusive tour.

MAJESTIC SWITZERLAND

Experience the magic of Switzerland's mountains and railways on an 11-night, 12-day adventure with Senior Editor David Lassen. Train travel includes the *Bernina Express*, the Gotthard *Panorama Express*, and the Furka steam train. Rail trips are planned to Gornergrat, Rochers-de-Naye, Jungfraujoch, Rothorn, Pilatus, and Rigi.

NEW ENGLAND FALL COLORS

In October 2024, join *Trains* in the colorful fall season for a fully private car adventure exploring the best of New England's scenic railways and museums. This tour features memorable rides on narrow gauge trains, cog railways, steam charters, and more! Included is a private charter and photo runby on the Maine narrow gauge, a tour and train ride at the Seashore Trolley Museum, private car tickets on the Hobo & Winnipesaukee Dinner Train around Lake Winnipesaukee, a shop tour and ride on the Mount Washington Cog Railway, a full day in private cars through Crawford Notch on the Conway Scenic, and an excursion and photo runbys on the Belfast & Moosehead. A welcome cruise and a lobster bake dinner at Boothbay Rail Village round out the activities.

Itineraries are subject to change. For more information on all our tours, visit www.specialinteresttours.com.

The Western Maryland Scenic Railroad is home to the "Beast of the East." The giant 2-6-6-2 No. 1309 is the last Baldwin steam engine produced for domestic use. Carl Swanson

RAILROAD ATTRACTION DIRECTORY

STEP BACK IN TIME to experience the golden age of railroading. North America's railroad museums and tourist lines provide affordable fun for the whole family! Plan your complete vacation with visits to these leading attractions.
For information on advertising in this section, call Michael Wieloch at 262-798-6625.

COLORADO — **Leadville**

LEADVILLE RAILROAD
326 East 7th

Open year around. Check our website for train schedules and upcoming specials. **NEW** this year holiday specials for friends and family. Raft and rail and zip and rail packages. Check out the website for updates on schedules, restrictions, and fun in the Rockies!

www.leadvillerailroad.com **1-866-386-3936**

FLORIDA — **MILTON**

WEST FLORIDA RAILROAD MUSEUM
5003 Henry Street

The Museum occupies the L&N Milton combination freight and passenger depot that was built in 1907-09 on the site of the original 1882 P&A depot. Unique to this museum is the relocated bridge tender's home, and the Globe Coffeehouse, one of the only Louisville and Nashville diners remaining. The Museum is open Wednesday to Saturday from 10:00 a.m. to 3:00 p.m. and other times by appointment for group tours.

www.wfrm.org **(850) 623-3645**

INDIANA — **Connersville**

WHITEWATER VALLEY RAILROAD
5th and Grand

Travel through time on Indiana's most scenic railroad. 33-mile round trip to Metamora, May through Oct. Special events Feb through Dec. Vintage diesels: 1951 Lima-Ham. (2) 750 HP & 1000 HP, 1954 EMD/Milw. Rd. SD10, 1948 Alco S1, 1942 GE 65 Ton. Gift Shop.

www.whitewatervalleyrr.org **765-825-2054**

OREGON — **Baker City**

SUMPTER VALLEY RAILROAD
12259 Huckleberry Loop

Take a trip back in time and ride or operate the train.

Tickets available on our web site when the 2024 schedule becomes available.

Give the gift to someone or yourself of an "Engineer for a Day" or an "Engineer for an Afternoon."

Love trains, maybe you or a friend would like to be an engineer for a day? Give a gift they or you will remember for a lifetime. For more information contact us at **info@sumptervalleyrailroad.org**

Details on our web site.

www.sumptervalleyrailroad.org **541-894-2268**

PENNSYLVANIA — **Marysville**

BRIDGEVIEW BED & BREAKFAST
810 S. Main St.

At The Bridgeview B&B The action comes to you! Freight Trains are rolling in and out of Enola Yard right past our front porch. From the spacious decks and sitting room, you can watch the Susquehanna River, Blue Mountains and trains crossing World Famous Rockville Bridge, all in one spectacular panoramic view! Relax, in a comfortable, "home away from home" atmosphere at The Bridgeview, where we feature 10 clean, cozy rooms, all with private baths, A/C, WiFi, plus a freshly prepared breakfast to start your day! Visit Harrisburg, Hershey, Gettysburg, Adamstown and PA Dutch Country. See our website for more information, and give us a call. Come experience The Bridgeview Bed & Breakfast, where you never know, **what**, you might see next!!

www.bridgeviewbnb.com **717-957-2438**

TEXAS — **Rosenberg**

ROSENBERG RAILROAD MUSEUM
1921 Avenue F, Rosenberg, TX 77471

The Rosenberg Railroad Museum is dedicated to preservtion and education of railroading history and its impact on Fort Bend County. Exhibits Include 1970's Caboose, 1903 Tower 17, 1879 passenger car, Garden Railroad, model train layouts, and more! Open Wed-Fri. 10-3pm, Sat. 10-4pm, & Sunday 1-4 pm.

www.RosenbergRRMuseum.org **(281)633-2846**

WASHINGTON — **Othello**

OTHELLO'S MILWAUKEE ROAD INTERPRETIVE CABOOSE

Explore the history of the Milwaukee Road in an original caboose turned interpretive center. Photos, memorabilia, maps and more ignite your imagination. Bay window, rib side caboose is open year round, Tuesday through Saturday from 10am-5pm. Groups welcome. Various train items and artwork available for sale in adjacent historic Old Hotel Art Gallery, originally built as a train hotel.

www.facebook.com/theoldhotelothello **509-488-5936**

WISCONSIN — **Green Bay**

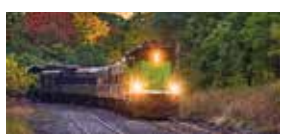
NATIONAL RAILROAD MUSEUM
2285 South Broadway

Explore dozens of historic trains and engaging exhibits at the National Railroad Museum, which is open year-round. Among our popular attractions are: the General Motors Aerotrain, Union Pacific "Big Boy" #4017, Pennsylvania Railroad GG-1 electric locomotive #4890, the Dwight D. Eisenhower A4 locomotive, and the world's largest collection of drumheads. Train rides are offered daily May-September (weekends in October).

www.nationalrrmuseum.org **920-437-7623**

WISCONSIN — **Osceola**

OSCEOLA & ST. CROIX VALLEY RAILWAY
114 Depot Road, Osceola, WI 54020



Join us for a scenic and memorable trip through the St. Croix Valley. Come for the 1920's-1950's passenger rail experience, the awesome scenery, or special events such as pizza or picnic trains, the popular Pumpkin Express, or our new Adventure Express with Trollhaugen Adventure Park. Individual, family and group tickets available. And visit the Minnesota Transportation Museum in Saint Paul to experience railroading history.

www.trainride.org **651-228-0263**

YOUR STATE — **Your City**

Advertise your tourist railroad here!

Contact Michael Wieloch at 888-558-1544 Ext. 625

CLASSIFIEDS

Word Rate: per issue: 1 insertion — $1.57 per word, 6 insertions — $1.47 per word, 12 insertions — $1.37 per word. $35.00 MINIMUM per ad. Payment must accompany ad. To receive the discount you must order and prepay for all ads at one time. Count all initials, single numbers, groups of numbers, names, address number, street number or name, city, state, zip, phone numbers each as one word. Example: Paul P. Potter, 2102 Pacific St., Waukesha, WI 53202 would count as 9 words.
All Copy: Set in standard 6 point type. First several words only set in bold face. If possible, ads should be sent typewritten and categorized to ensure accuracy.
CLOSING DATES: April 2024 closes Jan. 24, May closes Feb. 21, June closes Mar. 25, July closes April 23, August closes May 20, September closes June 24,
For TRAINS' private records, please furnish: a telephone number and when using a P.O. Box in your ad, a street address.
Send your ads to: *Trains* magazine – Classified Advertising 21027 Crossroads Circle, P.O. Box 1612 Waukesha, WI 53187-1612 Toll-free (888) 558-1544 Ext. 551
Fax: (262) 796-0126 E-mail: classads@kalmbach.com

RAIL SHOWS AND EVENTS

JANUARY 27, 2024: The 32nd Annual Great Tri-State Rail Sale. La Crosse Center, 2nd & Pearl Streets, La Crosse, WI. 9:00am-3:00pm. $5.00, under 12 free. Model, Toy & Antique Trains & Memorabilia, Sale & Swap Meet. 608-781-9383, www.4000foundation.com

FEBRUARY 3-4, 2024: Monticello 2024 Train Show. Saturday 10am-4pm and Sunday 9am-2pm. Berndes Center, 766 N. Maple St., Monticello, IA 52310. Tables $30. Admission: $5, children under 12 free w/paid adult. Monticello RR Club, PO Box 169, Monticello IA 52310 or email Ron Ackermann: rack611@gmail.com

FEBRUARY 17-18, 2024: Mad City Model Railroad Show. Alliant Energy Center, Madison, WI. 100,000 square feet of layouts, clinics, exhibits and vendors. Adults $14, Seniors $13, Children (5-15) $6, under 5 Free. Two-day pass $18. Saturday: 9am-5pm, Sunday 9am-4pm. Ticket deals: nmra-scwd.org

FEBRUARY 24-25, 2024: 28th Annual Train Show. New Bern Riverfront Convention Center, 203 S. Front St., New Bern, NC 28560. Saturday 9:00am-5:00pm; Sunday 10:00am-4:00pm. Admission $8.00 (good for both days), under 12 free w/adult. Operating layouts, 90+ vendor tables, food concessions. George Creathorne, 201-213-6907, or CarolinaCoastalRailroaders.org

APRIL 6-7, 2024: Lewis County Model Railroad Club, Annual Spring Train Show and Swap Meet. Southwest Washington Fair Grounds, Blue Pavilion Building, 2555 N. National Ave., Chehalis, WA. Saturday 10:00am-4:00pm, Sunday 10:00am-2:00pm. Admission $5.00. Free parking. Information: Ted, 360-985-7788, or TedsTrains@LewisCounty.com

APRIL 6-7, 2024: Rocky Mountain Train Show. National Western Complex, 4655 Humboldt St., Denver, 80216. Saturday, 9:00am-5:00pm, Sunday 9:00am-4:00pm. 3 acres of model trains, all scales, 30 layouts, 700 sales tables, clinics and more. Admission $14.00, under 12/scouts in uniform FREE. Free Parking. 303-364-0274

All listed events were confirmed as active at the time of press. Please contact event sponsor for current status of the event.

LODGING

INN ON THE RIVER: Book your stay for a relaxing getaway overlooking the beautiful Mississippi! Guests are minutes from quaint restaurants, stores and many outdoor opportunities. Each room has a private balcony for stunning views of the Mississippi River and the Burlington Northern-Santa fe Rail Line. Reservations: 608-534-7784 www.innontheriverwi.com or email: innontheriverwi@gmail.com

BOOKS AND MAGAZINES

CAN DAN AND HIS CLUB SAVE their favorite engine from the scrap yard? Read the Deltic Disaster and Other Tales, and the sequel, That Which Was Lost, Deltic Disaster Part Two, available at Barnes & Noble.

COLLECTIBLES

TOP DOLLAR PAID for steam/diesel or electric builder plates. mr_slides@hotmail.com Telephone: 216-321-8446

TOP PRICES PAID for original steam, diesel and electric builder's and number plates. Have some quality plates for trade as well. rjmuldowney@comcast.net – 609-397-0293.

PHOTOS, PRINTS AND SLIDES

TOP DOLLAR PAID: for 35mm slide collections especially pre-1980. Mr. Slides, mr_slides@hotmail.com Telephone: 216-321-8446

MISCELLANEOUS

RAILROAD PATCHES: Engineer caps with insignia. 1,000 designs. Catalog $5.00. Patch King, Box 145, York Harbor, ME 03911.

WANTED

ARE YOU GETTING THE BEST PRICE FOR YOUR TRAIN COLLECTION? Our list of discriminating buyers grows each day. They want bigger and better train collections to choose from! We specialize in O Gauge trains- Lionel, MTH, K-Line, Williams, Weaver, 3rd Rail, etc. as well as better trains in all scales. We also purchase store inventories. Plus, we can auction your trains with rates starting as low as 15%. We travel extensively all over the US. Give us a call today! Send us your list or contact us for more information at www.trainz.com/sell Trainz, 2740 Faith Industrial Dr., Buford, GA 30518, 866-285-5840, Scott@trainz.com Fax: 866-935-9504

ORIGINAL SLIDE COLLECTIONS, B&W Negative Collections, any railroads, any subjects. sales@morningsunbooks.com

PRR LW PULLMAN CAR Cast-iron door nameplates, 1938-1950. J.H. STEVENSON, Rocky River, OH 440-333-1092 jhstevenson8445@gmail.com

AUCTIONS

AMERICA'S PREMIER RAILROAD AUCTIONS: Consign your quality items. One piece to an entire collection. Large 8-1/2 X 11" auction catalogs contain full descriptions and hundreds of photographs. Auctions are jointly sponsored by the Depot Attic and Golden Spike Enterprises. The combined knowledge and experience of America's largest railroadiana firms will earn you "top dollar". Mail and fax bids are accepted. Information: Railroad Auction, PO Box 985, Land O Lakes, FL 34639. Phone: 813-949-7197.

ADVERTISERS

The Advertiser Index is provided as a service to TRAINS magazine readers. The magazine is not responsible for omissions or for typographical errors in names or page numbers.


ABERDEEN

Checking under the long hood

The engineer of Aberdeen, Carolina & Western SD40-3 No. 6926 checks under the hood — the long hood — as he prepares his locomotive at Candor, N.C., on June 4, 2014. Steve Smedley

Rerolling, rerolling, rerolling

Inside the Durango & Silverton Narrow Gauge roundhouse at Durango, Colo., Daniel Webb and Tony Garcia perch in the smokebox of a steam locomotive undergoing its 1,472-day FRA inspection. They are working to reroll the flues. It's June 2006.

Brian Killigrew

Not rolling at the moment

Mechanic Dan Bazzy works in the shop of the Portland & Western Railroad, part of the Genesee & Wyoming shortline family, to replace the main generator on SD9m No. 1853 on Nov. 5, 2009. The locomotive began life in January 1953 as a Southern Pacific SD7.

Scott Lothes

At the worst time

Just outside Sublette, N.M., on the Cumbres & Toltec Scenic Railroad, locomotive No. 463, leading the train from Antonito, dropped a pin on its spring hanger. Before all was done on this Oct. 5, 2014, six crew members were involved in the repair, including the master mechanic from Antonio, and the train's conductor holding a coal scoop to catch hot water so it wouldn't drip on the crew lying below. An hour of tough work with jacks, hammers, and a big pry bar got the pin in place.

George Weeks

On the advertised

Amtrak train No. 55, *The Vermonter,* is in the midst of its stop at Hartford, Conn. With all passengers on board, conductor Michael LaBouliere waits for time before giving the engineer a highball on Dec. 22, 2010. Scott A. Hartley

Between trains

The leverman in CSX's Q Tower takes a break before setting the plant for the next train. Located at the foot of a 20-mile grade leading to the Allegheny summit, Q Tower is the on the ex-B&O Pittsburgh Division west of Cumberland, Md. It's the summer of 1988. Barry Trogu

Cleanup on track one

In early December 2006, a number of grain hoppers from a New England Central Railroad train derailed at Mansfield, Conn. R.J. Corman, a railroad service company, was called in to help with the cleanup. Using side-boom rigs, the Corman crew sets an errant truck back on the tracks. Thomas J. Nanos

Pride

The time to maintain a locomotive is incredible. Pride shows in the details, especially when you are a guest, as Southern Pacific 4-8-4 No. 4449 was during Train Festival 2009 at the Steam Railroading Institute of Owosso, Mich., July 25, 2009. Thomas J. Bunce

A game of inches

Convincing Eastside Railroad SW1200 No. 109 it belongs on the rails is a game of inches. A wide-gauge track put the locomotive on the ground on May 31, 2013 in Woodinville, Wash. Now wood cribbing, shims, and creeping forward under the engineer's careful control, attempt to reverse the effects of gravity. David Honan

The forklift sand tower

The Eastern Washington Gateway is a small outfit with a smaller number of people. Each employee works many different jobs and when something has to be done everyone pitches in. After determining No. 2891 was low on sand, the crew takes a few minutes to fill the sand box by hand at Davenport, Wash., on Sept. 19, 2011. Steve Eshom

Tough sledding

The BNSF Railway La Crosse (Wis.) local is having a tough time switching the Maiden Rock, Wis., sand plant in this raging blizzard on Dec. 11, 2010. A couple of maintenance-of-way workers arrived earlier to clean snow out of the switches and stayed to help protect the crossing and assist with anything else that might be needed. Travis Dewitz

Looking up

One of Amtrak's *Acela* trainsets has pulled over the inspection pit at its Ivy City maintenance facility in Washington, D.C., on Nov. 12, 2013. The inspector will work his way along the underside of the train before it is again released to travel the Northeast Corridor. Fred W. Frailey

Somebody needs to dust

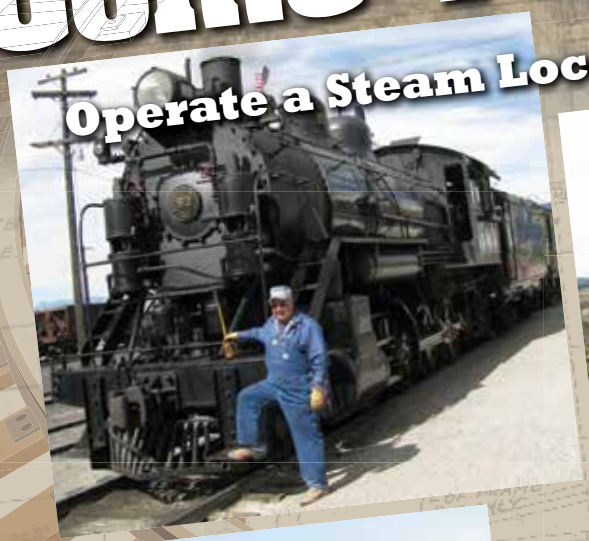
It is a mundane and unusual railroad chore, but necessary in the name of safety. A Metrolink signal maintainer dusts the cobwebs and other dirt from the lights of the Fulton Avenue grade crossing in Pomona, Calif., on the San Gabriel Subdivision. Call it spring cleaning on this March 31, 2017. Jon Waide

NEVADA NORTHERN RAILWAY

HANDS ON HISTORY

SEE IT • FEEL IT • RUN IT!

Come Touch History!



Operate a Steam Locomotive!

Operate a Diesel Locomotive!

Railroad Reality Week!

Operate a 1956 Pontiac Hi-Rail!

Treat Yourself to an Intense, Unforgettable Experience!

Nevada Northern Railway Museum

HANDS ON HISTORY

Ely, Nevada · (775) 289-2085 · www.nnry.com

Instant Gift Certificates Available!