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HIGH HURDLES FOR SHORT-HAUL IN

EACH DAY, Florida East Coast Railway does the impossible: It loads its own containers on double-stack cars at Jacksonville, Fla., and then launches them to Miami, just 351 miles to the south. They arrive on time, nearly every time. It's profitable business that, combined with trailers and containers that truckers bring to Jacksonville, accounts for nearly half of FEC's intermodal traffic.

Conventional wisdom says that you cannot do this. You can't possibly make money on short-haul intermodal, defined as moving containers or trailers less than 500 miles. And you certainly can't provide the speed and service that matches trucks.

Yet FEC does so, day in and day out. Its secret? There are three, really. First, FEC uses its own trucking company to bring containers to the railroad via highway from Georgia, the Carolinas, and beyond — so it pockets the revenue from both the highway and the rail portions of the move. Second, the boxes ride general-purpose trains that depart multiple times a day. Third, truckers hate South Florida. The congested Miami area consumes stuff by the trainload, but makes almost nothing, so truckers are happy to hand their business to FEC at Jacksonville.

FEC even offers intermodal service to intermediate points. "To us, Jacksonville to Cocoa is short-haul," Jim Wiggins, assistant vice president of marketing, says of the 150-mile rail routing.

The Class I railroads look at short-haul intermodal and shrug their

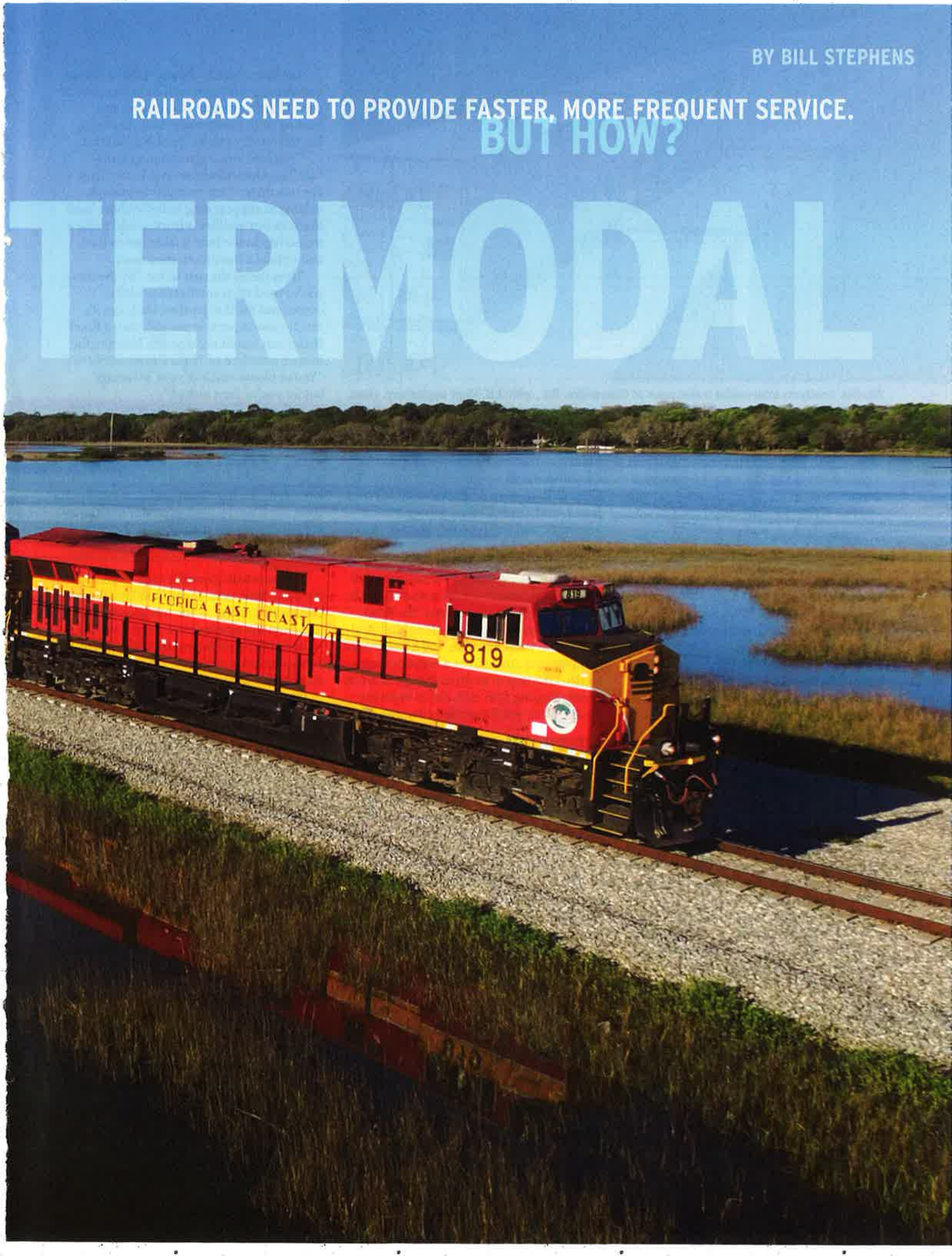
Florida East Coast train No. 226 crosses a causeway in St. Augustine, Fla., in April 2017. FEC stretches just 351 miles from Miami to Jacksonville, exemplifying short-haul intermodal traffic. Dean Mastoras

BY BILL STEPHENS

RAILROADS NEED TO PROVIDE FASTER, MORE FREQUENT SERVICE.

INTERMODAL

BUT HOW?



Norfolk Southern intermodal trains pass at Cassandra, Pa., with J.B. Hunt containers. Hunt, a trucking company, is a traditional customer of long-distance rail service. George W. Hamlin

shoulders. Why bother? The big systems are blessed with long hauls between major metropolitan areas that can support massive double-stack trains. It's a successful formula that has supported intermodal growth while boosting efficiency and profitability.

But nearly all of the freight moving on highways travels less than 500 miles, representing a vast untapped market for railroads. With coal traffic in long-term decline and carload business struggling nearly everywhere, short-haul intermodal presents a rare growth opportunity.

It's also something shippers want. "We have not seen enough short, service-sensitive lanes being developed by the railroads," Jason Lau, senior logistics manager at medical device company Medtronic, told a shipper conference in 2017. "It's a huge concern."

FEC has drawn the blueprint for how fast, frequent trains that run to schedule can compete with trucks. Yet there are a host of obstacles to short-haul service. Among them: Class I railroads' current business model, meager short-haul profit margins that don't justify the costs to build terminals and buy equipment, and extremely tight service requirements.

As a result, short-haul intermodal is so small that "niche market" is too big a term. You can count true short-haul service on just one hand. The Class I domestic short-haul experiments — Triple Crown Services RoadRailers on Norfolk Southern and the Montreal-Toronto Expressway service on Canadian Pacific — flirted with success. But CP pulled the plug on Expressway, effective June 1, and Triple Crown now operates a lone route and will probably go away after its equipment wears out.

So, against this backdrop, where does short-haul intermodal go? What's a catalyst for Class I railroads to look at short haul? Is an alternate platform required, like RoadRailer, Expressway, or something else? And if railroads won't innovate, will a technology company like Amazon or a logistics company like UPS step in to drive change, much as ocean shipping firm APL did to begin the double-stack revolution three decades ago?

INTERMODAL TODAY

Current railroad intermodal networks are focused almost exclusively on double-stacking international containers and domestic loads from major trucking companies like J.B. Hunt and Schneider, along with boxes from intermodal marketing companies like XPO Logistics and Hub Group.

These networks require large terminals in major metropolitan areas. Because the terminals are expensive to build and operate, they must handle high volumes of traffic. The Class I railroads choose to move this volume in long trains that may exceed 12,000 feet.

"IF YOU REALLY WANT TO GROW INTERMODAL TO ITS FULL POTENTIAL, THEN YOU NEED TO GET COMPETITIVE IN SHORT-HAUL MARKETS."

The beauty of this system is that it wrings maximum profit from each container. And it plays to rail's strength: Hooking up and hauling large volumes over long distances. But this won't work for short-haul service.

"You can't run a giant train in short-haul," says intermodal analyst Larry Gross. For one thing, there wouldn't be enough volume to support long trains in short-haul markets. For another, a truck would make a round trip in the time it takes just to load and unload a mammoth stack train.

Then there's the cost factor. "By the time you've used these multimillion-dollar cranes and the five-position stack car, it's much more expensive per well than a RoadRailer seat would be," says Jim Newton, the former president of Triple Crown Services. "You've blown much of your advantage before you've even moved."

Lift costs disappear in the 800- to 1,500-mile range because they shrink as part of the overall cost of the move, says Jim Blaze, a consultant and former Conrail executive who has studied short-haul intermodal. In a nutshell, the high intermodal terminal costs are offset by the low cost of moving a container over the main line for more than 800 miles. Rail can be competitive down to 500 miles.

But terminal operating costs loom large for short-haul intermodal. Combine those costs with drayage — the trucking move to and from the terminal to a shipper's dock — and short-haul intermodal doesn't make economic sense under the current double-stack business model.

There are exceptions, of course. Where railroads currently field short-haul service, it's due to one of two things.

The first is unusual circumstances, like the BMW traffic Norfolk Southern handles 235 miles between the German automaker's assembly plant in Greer, S.C., and the Port of Charleston. Public money built the inland port and port terminals. When BMW's volumes eventually grew to support intermodal, traffic shifted from road to rail.

The second is where short-haul has risen more out of desperation than inspiration. With only 351 miles of railroad, short-haul is by definition all that FEC can do. At the opposite end of the East Coast, regional Pan Am Railways sees hauling containers of Poland Spring bottled water from Maine to Massachusetts as a necessity while its traditional traffic base, paper from mills in Maine, dwindles.

You also could add a couple other categories for short-haul intermodal: A growing number of inland port moves on CSX and NS in the Southeast and one on BNSF Railway in the Pacific Northwest, as well as regional railroad short hauls that are part of a longer-haul Class I railroad move, like Canadian National's service from Vancou-

Along its route from Charleston to Atlanta, Norfolk Southern intermodal train No. 237 picks up a block of Atlanta-bound cars at the South Carolina Inland Port in Greer on Aug. 29, 2015. The facility supports a nearby BMW assembly plant. Casey Thomason

ver and Prince Rupert, B.C., that reaches Indianapolis over the Indiana Rail Road.

OPPORTUNITY AND OBSTACLES

Around 75 percent of truck trips are between 300 and 500 miles, generally considered the absolute minimum range for intermodal. "The railroads really hardly dent that market," says David Clarke, director of the Center for Transportation Research at the University of Tennessee in Knoxville.

The market is huge. The trucking industry generates nearly $700 billion in revenue annually — or roughly 10 times the combined revenue of the Class I systems. "If you really want to grow intermodal to its full potential, then you need to get competitive in short-haul markets, which is not an easy thing to do," Clarke says.

That's an understatement. Everywhere you look there are obstacles to short-haul intermodal service.

The first barrier is the industry's obsession with ever-lower operating ratios. Railroads focus on traffic with higher revenue and profits, which, when combined with low costs, helps keep the operating ratio down. And that means short-haul service, with its razor-thin profit margins, almost never makes it to the drawing board.

"Mae West said too much of a good thing is a good thing, but I don't know if she meant operating ratio when she said that," Newton says. Truckers, after all, live in an industry with operating ratios above 90 percent, or roughly 30 points higher than the Class I railroad average.

"At some point you cross the line where you are sacrificing things with adequate rates of return just to torture a statistic, which is a low operating ratio," Newton says. "There has to be some kind of relief from that if you want to compete in short-haul markets."

Short-haul intermodal can't generate enough profit to support new terminals, particularly if they're built for double-stacks. "How is the railroad going to do this on a fast, cheap loading basis? That remains the fundamental unanswered question," Blaze says.

Locomotives are another issue. Today's standard 4,400-hp, six-axle, A.C.-traction locomotive is expensive overkill. "They're not the best at getting a short, light intermodal train over the road," says C. Tyler Dick, senior railroad research engineer at the University of Illinois at Urbana-Champaign's Rail Transportation and Engineering Center. In fact, locomotives are the largest above-the-rail cost for a short-haul intermodal operation. "There are no more GP38s," Newton laments.

Out on the main line, short-haul intermodal trains collide with an unfortunate but common-sense reality: Railroads prioritize more lucrative longer-haul traffic. "When capacity gets tight, equipment is diverted to longer hauls," Gross says. The same goes for scarce space in terminals or

Indiana Rail Road train SAHW passes Bargersville, Ind., with containers up front. The westbound boxes go to a Canadian National connection in Illinois. Randy Olson

Four-axle power, like these former Union Pacific GP38-3s now leased to Illinois Railway, is better suited to light, fast intermodal trains than today's ubiquitous six-axle units. Brian Schmidt

on the line of road.

The Triple Crown network once spanned the Norfolk Southern system, and the fast RoadRailer trains ate up mainline capacity on the largely single-track railroad. "It drove the operating people crazy," recalls Tom Finkbiner, who was vice president of intermodal at NS from 1987 to 1999.

"If you look at short-haul intermodal at its ideal, it looks an awful lot like a passenger operation," Clarke says. Fast, frequent trains would move over corridors with double-track CTC and reverse signalling. And that's a problem. "Passenger corridors are expensive to operate," Clarke says.

Even if a railroad could clear the technical, cost, and management hurdles facing short-haul intermodal, there's another challenge: Ticking off your existing intermodal customers. By launching door-to-door intermodal service, a U.S. railroad would wind up competing with the trucking and intermodal marketing companies who provide the lion's share of domestic intermodal loads. "Maintaining good relationships with your large customers and not competing against them is certainly something that's in the heads of many railroad executives," Clarke says.

In light of these obstacles, the Class I railroads currently have little incentive to invest in short-haul intermodal. "The problem is the board rooms are about being risk-averse rather than taking risk," Finkbiner says. Three decades ago, when NS was developing the Triple Crown network, the board was concerned about the future of the industry and the very survival of the company. Now every railroad is making money. "The impetus just isn't there to make that change," Finkbiner says.

NEED FOR SPEED, AND SERVICE

But looming changes and converging trends in freight transportation threaten to leave railroads behind. To grow meaningfully — and even to remain relevant — they'll need to offer faster, more flexible, and more dependable service over shorter hauls, says Rodney Case, a partner at the consulting firm Oliver Wyman.

The argument goes something like this. Railroads are taking an ever smaller slice of the overall transportation pie. If this trend is accelerated by autonomous trucking, railroads that go about business-as-usual will eventually become like barges that ply the Mississippi River. They'll be quaint and functional, Case says, but would be left out of the fastest-growing areas of the economy. In fact, railroads stand to gain little of the projected 50-percent growth in overall freight transportation over the next two decades.

Why? Supply chains are getting tighter, and producers are locating closer to customers. So more freight is moving in smaller shipments covering shorter distances. Think containers of consumer goods moving from ports to distribution centers or new cardboard boxes heading from paperboard plants to e-commerce fulfillment centers.

Companies also are demanding better service. Walmart, for example, this year began fining suppliers who fail to deliver to warehouses on time. Good service pays: While railroads earn $41 for every 1,000 revenue ton-miles with long trains, truckers hauling smaller shipments over shorter distances earn nearly five times more, Case said at the RailTrends 2017 conference. Yet railroads fear to tread in those shorter hauls despite the higher value of each shipment.

One thing rail has going for it is the state of the decaying interstate highway system. Highway congestion in urban areas, already bad, is projected to grow even worse in the next 20 years. These bottlenecks will raise costs for truckers while posing service reliability challenges. Railroads, meanwhile, own their own infrastructure — and it's in tip-top shape.

"Railroads have underdeveloped corridors in urban areas," Case says, including the Northeast Corridor, around Los Angeles, and the San Francisco Bay area. "If you believe that's true, then rail's ability to provide short-haul service in congested areas is a new market opportunity."

It won't be an easy transformation for the rail industry, Case says. The effort would involve overlaying an entirely new business model on the existing network. Keep the long-haul, pipeline-on-wheels type of traffic. Coexist with passenger and commuter service. And then toss in new short-haul intermodal.

There are at least three ways to do this: Dedicated short-haul intermodal trains that depart frequently; intermodal traffic imbedded in general-purpose trains with multiple daily departures; or by hitching a ride on the tail of passenger or commuter trains in densely populated corridors to

Short-haul intermodal service could benefit from the lower costs and shorter build time of trailer-on-flatcar service, like this lift on Florida East Coast at Fort Pierce, Fla. Drew Halverson

Norfolk Southern train 24M rolls south on Amtrak's Northeast Corridor through the MARC commuter rail station at Aberdeen, Md., in October 2011. The populous Northeast could be a major market for intermodal service during lulls in passenger traffic. Michael S. Murray

tap unused train capacity.

Using distributed power, Case says, allows the train to be quickly tied to the last coach. Imagine an intermodal consist waiting for an Amtrak train to pull into a station in New Jersey. It would tie on, then enjoy the ride to Harrisburg, Pa., where it would uncouple and make a beeline for a FedEx sorting center and back several times per day.

Railroads could fund pilot programs at minimal cost, Case contends, and experiment in the Northeast, California, Texas, and in various Midwest lanes radiating from Chicago.

INGREDIENTS FOR SUCCESS

What would a domestic short-haul operation look like? To have a chance at success, short-haul intermodal needs a Goldilocks environment where everything is just right.

"Key ingredients include a high-density freight corridor, a timely and reliable service product, and a market where intermodal can offer a real value proposition vs. over-the-road trucking," says Brad Hall, FEC's senior vice president and chief commercial officer. "FEC Railway's fast and reliable intermodal network on the Florida peninsula checks all three of these boxes for our customers."

For short-haul to work from a service perspective, the railroad has to have mainline and terminal capacity, and the route can't be much more than 10 percent longer than parallel highways so rail can compete on cost and speed. "Fifteen percent circuity is killer," Blaze says.

Boxcars and trailers punctuate an Amtrak train at Cresson, Pa., in 1998. A new passenger partnership could be the right route to short-haul intermodal expansion. David C. Warner

There has to be enough volume — say, 40 containers or trailers per train at a minimum — and loads need to be balanced equally in each direction. Drayage has to be short or, ideally, no drayage at all by having a distribution center or logistics park anchor one or both ends of the route. Terminals can be simple — not much more than gravel and a forklift — to keep construction and operating costs down.

Service needs to be frequent to compete with trucks and their ability to go anywhere, anytime. "We find that multiple daily departures is an important differentiator for FEC's service product, as it allows our customers to tailor their service to meet the needs of our mutual customers further along the supply chain," Hall says.

From a management standpoint, it's important to put all aspects of the operation under one roof, with the exception of the locomotive and the rail portion of the move. A short-haul operator would need to control the terminals, its truck fleet, drivers, and its own information technology systems. "What that does is get one unified enterprise looking at return on investment and governing use of assets," Newton says.

Bound for the Triple Crown hub at Fort Wayne, Ind., Norfolk Southern train No. 241 cruises through Lackawanna, N.Y., on its 375-mile run from Buffalo, N.Y., July 1992. Bill Stephens

The Brandt truck, seen on UP at Wauwatosa, Wis., could be the ideal power for short, light intermodal trains. Mike Yuhas

A BETTER MOUSETRAP

If double-stack is not the best tool for the short-haul job, what other options do railroads have? Plenty, but all would require a willingness to invest in new equipment — and a solid business case for doing so. "Short-haul economics are totally different. As such, they require a clean-sheet approach — to the equipment, to the manning of terminals, to linehaul approach, and to partnerships with customers," says David DeBoer, a retired intermodal executive and author.

Operationally, RoadRailer and Expressway are both proven systems that have rolled off millions of miles in revenue service. Commercially, however, they presumably didn't meet growth and profitability targets. Expressway once had twice-daily departures linking Detroit; Windsor, Ontario; Toronto; and Montreal. Prior to June 1, CP fielded a lone daily departure providing overnight service in the 350-mile Toronto-Montreal corridor. NS collapsed its RoadRailer network into a single Detroit-Kansas City, Mo., lane in 2015. "The likelihood that they'll reinvest and keep this going is close to zero," Blaze says.

RoadRailer remains a viable option, Newton says, because of its low terminal costs, ability to operate on road or rail, and relative ease for a highway shipper to switch to rail. A similar approach, the RailRunner system for carrying containers, also could work, Newton says. (RailRunner executives did not respond to requests for comment.)

Expressway debuted in 1999 and brought intermodal full circle, back to the days when early piggyback trains were loaded circus-style. Its trainsets, essentially conventional five-pack flatcars modified for circus-style loading, split into three sections, allowing quick loading and unloading.

"Roll-on, roll-off capability would have to play a factor in a pure short-haul business model," Dick says. It's easy to see why. Few highway trailers in service today are modified to withstand being lifted onto flatcars. Fling open the terminal gates to them, and you greatly expand your potential intermodal universe. And you've kept your costs low by eliminating lifting equipment.

There are roll-on, roll-off options beyond Expressway. A French company, Lohr, makes what might be called an elegant, 21st-century version of New York Central's pioneering Flexi-Van concept. Each articulated flatcar carries two trailers on a pair of decks, dubbed pockets, that pivot in terminals. This allows trucks to be loaded or unloaded nearly simultaneously. A train with 40 trailers can be unloaded and reloaded in just 30 minutes, enabling the fast terminal turnarounds essential for frequent service.

What about futuristic concepts? These include using autonomous trucks that could deliver and automatically load trailers on flatcars, then rely on a one-person train crew or even a fully autonomous train. "You've got to look at concepts like this," Clarke says.

Motive power, Newton suggests, could be a hot-rod version of something like the Brandt R4 Railcar Mover, a Freightliner truck-based vehicle found on short lines. Modify a trucklike vehicle to move at mainline speeds and you've got a relatively inexpensive locomotive.

LESSONS FROM OVERSEAS

North American freight railroads are the most efficient and profitable in the world. So they can't possibly learn anything from European railroads, right? Not so. And no-

HERE'S HOW THE THREE TYPES OF INTERMODAL STACK UP

	Double-stack containers	Triple Crown RoadRailers	Expressway trailer on flatcars
Length	10,500 feet	8,175 feet	5,000 feet
Size	350 containers	150 trailers	75 trailers
Cubic capacity	3,970 cubic feet pc	4,100 cubic feet pt	4,100 cubic feet pt
Weight capacity	44,900 pounds pc	46,300 pounds pt	47,700 pounds pt
Loading time	525 minutes	390 minutes	60 minutes

*pc=per container; pt=per trailer

A southbound Freightliner intermodal train passes Clay Cross Junction, near Chesterfield, England, in September 2015. This train operates from Leeds to Southampton, a distance of just 200 miles, and offers a short-haul lesson to U.S. operators. Colm O'Callaghan

where is that more apparent than short-haul intermodal. "The European carriers seem to have the basics figured out in terms of general terminal and line-haul equipment," DeBoer says. "With a little tweaking, I think one of the major big seven carriers could put together an interesting demonstration project that could end up a real game-changer."

By the Class I definition, the rest of the world operates short-haul intermodal. Short-haul service in Europe is driven by cost savings versus highway, traffic congestion, and scheduled service that has the ability to mesh with larger supply chains. It works in Europe because equipment is low tare and terminals are low cost. They often involve nothing more than a wide spot in the tracks and a forklift that can wrestle a 25-ton container on and off a flatcar. Much higher fuel costs are also a factor.

Genesee & Wyoming's Freightliner operations in the United Kingdom look nothing like anything on this side of the pond. Freightliner handles 770,000 containers per year from four deepwater ports to inland destinations. All those boxes move in 30-car, single-stacked trains on fast, frequent schedules that average just 200 miles. By comparison, the average North American intermodal train is five times longer, carries twice as much freight due to double-stacking, and travels four times as far, says Michael Miller, G&W's chief commercial officer.

"In the U.K., the keys to success for short-haul intermodal center around service and flexibility," Miller says. "Frequency of service is critically important due to train length constraints, volume surges, customer service demands and the competitive service offering of trucking given the shorter lengths of haul."

In the U.S., state transportation planners would love to see intermodal shuttle trains operating between ports and inland terminals and distribution centers. Port shuttles have long been on the wish list of California officials, who say short-haul rail service would help relieve truck congestion around the ports of Los Angeles and Long Beach, as well as the Port of Oakland. The ports back the concept. And California transportation officials are including short-haul intermodal in the state's latest draft freight rail plan.

"It's always on the state's radar," says Todd LaCasse, associate transportation planner with the Caltrans division of freight planning. "If you can find a way to do short-haul shuttles, you really alleviate significant problems with trucks." But BNSF and UP have shown little interest in bringing on business that competes for capacity with their long-haul service.

States could help make short-haul service viable by shouldering some or all of the terminal construction costs. "That would decrease the terminal cost hurdle, making the short-haul economics competitive with the direct origin-to-destination truck journey," Blaze says. Transportation officials also could tilt the balance in favor of domestic or international short-haul by tinkering with highway tolls. "It would give short-haul a shot," Blaze says.

WHAT'S NEXT?

If Class I railroads are thinking about dipping their toes into short-haul intermodal, they're keeping it quiet. All of the big systems declined to speak with TRAINS. But railroad executives are keenly aware of the challenges coming at them from a rapidly evolving transportation market. How they will respond is not yet clear. Will they copy the FEC's success story? Will the railroads innovate, as they have when faced with challenges in the past? Or will they hunker down and survive by clinging to captive traffic?

One thing's for sure. "Innovation is coming, either from inside rail or outside," Case says. "The opportunity for rail compared to the coming congestion on roads is so massive, actors outside of rail may take the lead. Consider that Amazon's outbound shipping costs alone were larger than the total revenue of five of the seven Class I railroads in 2016." 1