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Cundy's Harbor is the terminus of a short branch on Bob Hayden's previous Carrabasset & Dead River HOn30 layout. *Dave Frary*

15

Dave Frary and Hal Reynolds built this On30 scale scene as part of a display for the Nantucket Whaling Museum. The layout depicts the Nantucket Central Railroad Company, a three-foot narrow gauge railroad on the island of Nantucket. That railroad linked the villages of Nantucket and Siasconset. *Hal Reynolds*

track to top Canada's total trade value with the United States. Container vessels carry the majority of China's trade value, whereas container trade accounts for only a fraction of the value of U.S.-Canada trade.

In 2010, the United States imported about 12 percent of world merchandise trade and exported about 8 percent, according to the World Trade Organization. Ships carried a large portion of this. The U.S. Department of Transportation reported that in 2010 ocean vessels carried 53 percent of U.S. imports and 38 percent of exports by value, the largest share of any mode, although land exports accounted for 33 percent. More than 62,000 vessels—about 172 a day—called at U.S. seaports in 2010. Tankers and container ships accounted for about two-thirds of the vessel calls.

The widespread adoption of containerization has had a major effect on the nature of world trade. Prior to containerization, loading or unloading a ship was a very expensive and time-consuming task, and a cargo ship typically spent more time docked than at sea. (Chapter 7 has more about container shipping.)

In addition to foreign trade, North American ports used to conduct

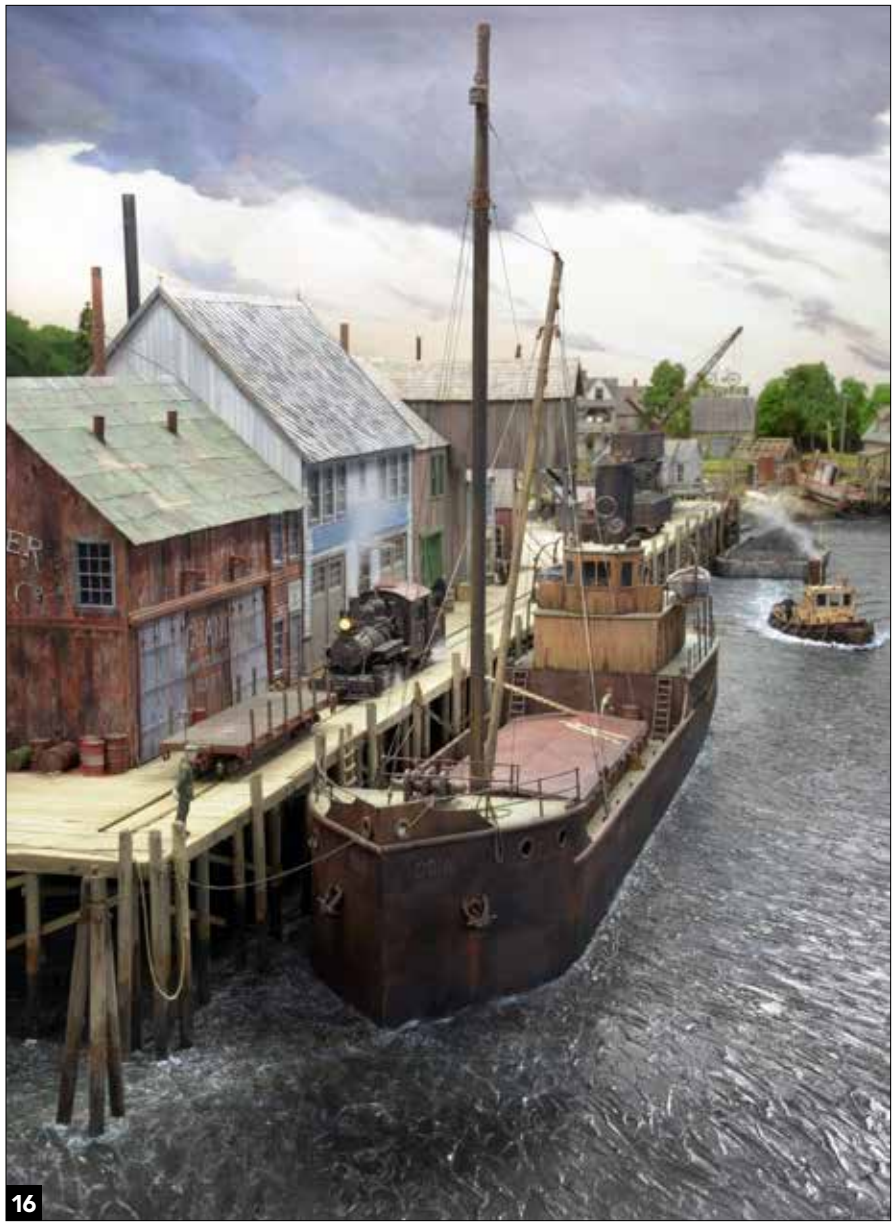
considerable maritime trade with each other. This is called *short sea, coastwise,* or *intracoastal shipping*. For much of the 19th and 20th centuries, North American ports shipped coal, lumber, grain, and general cargo to each other. Now, North American short sea shipping competes with railroads for long distances, and trucking for short distances. With present railroads and trucks being so efficient, short sea shipping now only serves niche markets and provides feeder service to the East and to Gulf Coast ports from Caribbean transshipment hubs such as Kingston, Freeport, Cartagena, and Panama.

Narrow gauge railroad waterfronts

Narrow gauge railroads and their waterfront terminals present an interesting and colorful footnote to the rail-marine model railroad genre. Many model railroaders think of spindly trestles spanning mountain chasms when narrow gauge railroads are mentioned. They may not be aware of the extensive use of narrow gauge railroads to link harbors with land-side industries. Narrow gauge railroads terminated at harbors in many of North America's coastal regions. Perhaps the best known were the harbors that served the Maine two-foot railroads such as the Wiscasset, Waterville & Farmington harbor at its namesake city, Wiscasset. Modelers have been inspired to create waterfront layouts featuring Maine two-footers in a variety of gauges including the correct-to-scale HOn2 and On2 as well as the more popular HOn30 and On30, **12**, **14**, and **16**.

Aside from Maine, there were many other locations where narrow gauge railroads maintained waterfront terminals including Alaska, California, Louisiana, Hawaii, Massachusetts, and Virginia in the United States, and Yukon and British Columbia in Canada.

One of the more interesting was the Dolly Varden Mine Railway on the coast of Alice Arm, British Columbia, **13**. This pint-sized railroad served a small but rich silver mine. The 18-mile-long route passed through spectacular coastal mountain scenery.



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Forney engine no. 2 shifts a flatcar on the deck of Cranberry Wharf on Troels Kirk's On30 narrow gauge model railroad. *Troels Kirk*

The White Pass and Yukon Railway was a three-foot gauge railway that still has some portions active in tourist service. In its prime years, it had waterfronts at both ends: Skagway on the Pacific and Whitehorse on the Yukon River.

Nantucket had a tiny three-foot gauge railroad, the Nantucket Central Railroad Company, that primarily served tourists to the island, **15**.

Louisiana once had an extensive array of narrow gauge railroads that served sugar plantations. The first was probably built in 1833 on Little Versailles Plantation in St. James Parish. At its peak in 1925, southern Louisiana had more than 150 plantation railroads, 3,000 miles of track, 500 locomotives, and more than 15,000 pieces of rolling stock.

Hauling cane was the chief business, but they also had other uses. A spur usually went down to the bayou from the mill to haul processed sugar and molasses to the landing, where a steamboat would pick them up. Supplies brought to the plantation by the steamboat were also hauled from the water's edge aboard the trains.

13

Beaumont stevedores unload an Army MRAP vehicle from the hold of a break bulk ship. *U.S. Army*

ocean vessels passage into the interior of North America through the Great Lakes, completely cutting Buffalo out of the shipping chain.

Other cities on the Great Lakes developed major marine grain terminals including Toledo, Duluth, and Milwaukee, **7**. In Duluth, ore docks rivaled grain elevators in terms of physical scale, but the grain elevators had greater economic impact than the famous ore piers. Duluth's first steam-powered grain elevator was constructed in 1869. It held 350,000 bushels—just 20 percent the capacity of its modern counterparts. Since then, dozens of grain elevators were built, destroyed, or abandoned on the city's waterfront, enhanced by the construction of a ship canal across the narrow spit of Minnesota Point. One of the more famous grain companies was the Peavey Company, which built the first circular concrete grain silo in 1900. Several grain elevators are still in operation, and in 2010, they shipped more than 2.7 million tons of grain.

During much of the 20th century, ports along the East Coast had grain elevators that were rail served. Just about every major railroad owned a grain elevator situated for ocean shipping. Some were quite large, like the former PRR elevator in Canton, Maryland, **8**. But in the 21st century, most of these grain elevators closed. Their older designs could not compete with the newer and more efficient elevators on the Mississippi River and Great Lakes, **9**.

The Pacific Northwest still has a vibrant grain export business with nine grain shipping terminals, two on Puget Sound and seven at ports along the Columbia River. More than a quarter of all U.S. grain exports and nearly half of U.S. wheat exports move through the Columbia River and Puget Sound grain terminals. The Northwest's proximity to Asian markets drives grain exports from the region. Vancouver also has a half dozen grain export terminals.

Louis Dreyfus grain terminal

It is not often that a modeler gets to design a balloon loop layout based on a prototype that is fully to scale with no selective compression, **10**. But such is the case with the FREMO module design based on the Louis Dreyfus grain terminal in downtown Portland, Oregon. (See track plan on page 31.)

First built in 1914, this grain elevator just north of the steel bridge in Portland is one of the nation's longest serving grain terminals. It was recently upgraded by Louis Dreyfus and remains very busy.

The elevator is adjacent to Union Pacific's north-south main line from California, **11**. Lying just to the north of the elevator is Albina Yard, Union Pacific's main classification yard in Portland. Trains can continue north to Washington via trackage rights on BNSF or head east along the Columbia River. It is a busy spot as they switch power there, and yard lead switch jobs break down inbound trains and assemble outbound ones.

The FREMO module utilizes three sections to capture the facility without compression. FREMO is a module standard that allows a lot of flexibility in model design.

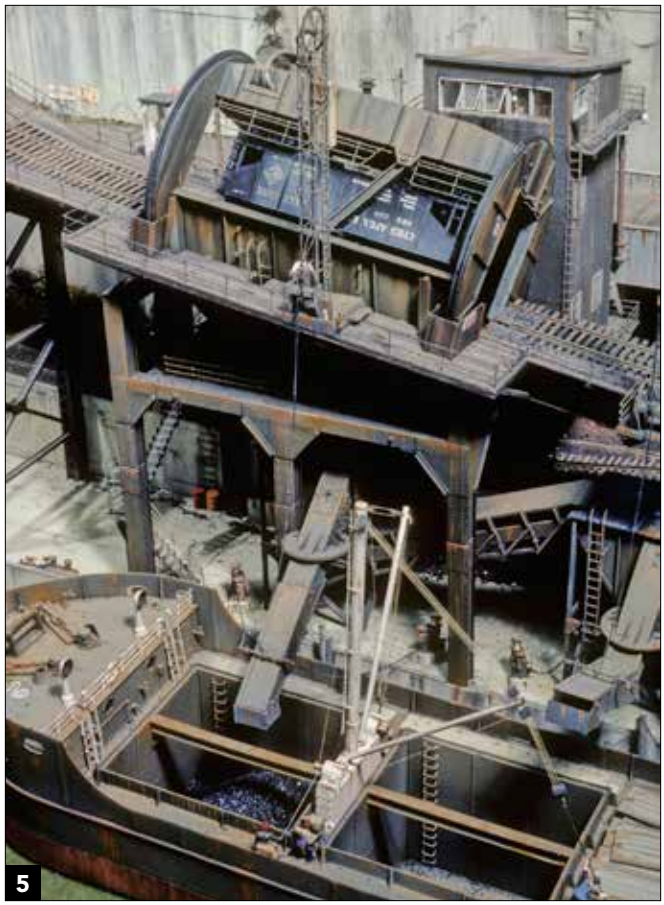
The loop track has a radius of about 16". The facility uses a small Trackmobile to switch the cars from the storage tracks to the unloading shed, but larger engines drop off cars at the shed lead track.

Each of three pieces of the module set are rather large. To make the sections smaller, the riverfront and ship could be omitted or built as a removable section. If transporting such big sections is an issue, the module could be built with room to spare on two smaller 3 x 4-foot modules in N scale. The module could also be incorporated into a home layout as Layout Design Elements.

The model grain elevator silos are tricky to make using the standard PVC tube technique because the prototype silos tubes overlap. You could simplify the model construction by omitting that feature and simply place the silo tubes side-by-side, but that would result in a fewer number of silos.

4

In this detailed photo, a McMyler-type car dumper unloads lump coal from a PRR two-bay hopper into a lake boat's fuel bunker at Sandusky, Ohio, in May 1943. Note the spilled coal on the deck and heavy weathering. *Library of Congress*



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Modelers at the Severna Park Model Railroad Club in Severna Park, Maryland, built an operating rotary dumper for their HO scale layout. Compare this amazing model to the prototype in photo 4. *Paul Dolkos*

Ideally, they should load the entire cargo aboard without moving a vessel, and be able to handle the loaded and empty railcars to and from the machine. From a model railroader's perspective, most of those factors are determined when you select a facility to model. A model railroad designer does not need to be overly concerned with the subordinate engineering details that might affect a real facilities operation, but they are worth understanding to ensure that your models are as realistic as possible.

Bulk terminals for loading ships

All mineral bulk terminals have three main functional components: loading or unloading machines, material-handling systems, and storage areas. On a model railroad, the process starts when loaded railcars arrive at a port terminal. The railcars must be unloaded, either directly to the ship or to a storage area.

The pier with a trestle and pocket system was the first of the dedicated bulk mineral ship-loading terminals. The ore pier at Two Harbors, Minnesota, built before World War I is an example. This pier was 1,368 feet long and 56 feet wide, and it carried a trestle 80 feet high with car tracks on top. Iron ore ports on Lake Superior and Lake Michigan all had similar piers, although variations were possible, such as the loop pier at Taconite Harbor (for more on that port, see my earlier book, *Mid-Size Track Plans for Realistic Layouts*). Port operators built similar trestle and pocket piers for coal, gravel, and other minerals, **2**.

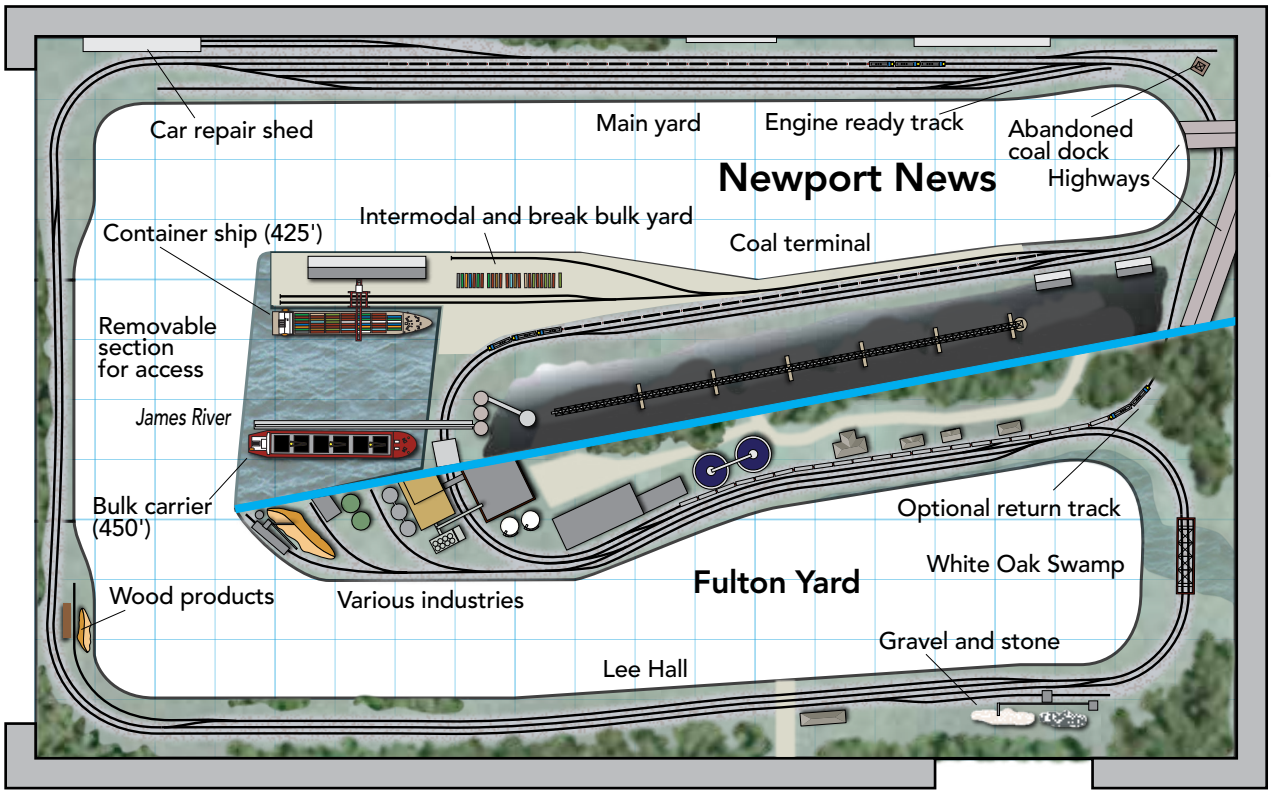
In a trestle and pocket system, locomotive engines shove cars from a railroad marshaling yard over pockets on each side of the pier. The cars dump their loads into the pockets using the hopper doors on the car bottoms. The pier acts as a transit shed as the bins hold the material until the ship docks alongside the pier.

By adjusting the type of material dropped in the bin, terminal technicians could blend the material to a user's specifications. When modeling a trestle and bin system, you can simulate the blending operation by giving each car a waybill to a particular pocket. Model train operators would have to spot each car over a particular pocket. This adds complexity and interest to the switching job in what otherwise could be a straightforward and uninteresting task of spotting cars over bins.

The pockets, cars, and ship hatches all have to be of corresponding dimensions to align and register correctly. If the ship's loading hatches are not aligned, the process is less efficient as the crews would have to move the ship during loading. At the

22

An overview of the coal loops at Newport News. The surge silos at the water's edge hold the coal being transferred to the ships.



Peninsula Subdivision

Scale: N (can also be built in Z)
Size: 12 x 20 feet
Prototype: CSX
Era: 1985–2105
Style: Walk-in
Mainline run: 110 feet
Minimum radius: 18"
Turnouts: No. 6
Train length: 24 cars
Scale of plan: 5/16" = 1 foot, 12" grid

Alternatively, empty trains that arrive in Fulton Yard from Newport News would stop. Their engines would swap ends of the train. Then the train would return to the Newport News yard using the partially hidden return track.

The plan includes the modest container and break bulk terminal at the port. In addition, there are several industries in Fulton Yard and along the main line to justify running a local freight. But the main action is running coal trains to and from the port.

The layout depicts two ships at the dock. To improve access for maintenance of the track in the coal loop, the James River section could be removable.

This layout would be easy to convert to Z scale, as its emphasis on running trains is perfect for a Z scale layout. The track plan would remain the same, perhaps with a few additional yard tracks. The structures, ships, and curve radii would not change. The large radii in Z scale would make the layout look and run well.

1

CHAPTER SIX

Barge terminals

A large diesel towboat pushes two standard 15-barge tows lashed side by side on the lower Mississippi River. These barges carry the cargo equivalent of five 100-car unit trains or 1,740 tractor trailers. *U.S. Army Corps of Engineers*

Barges are the unsung heroes of the transportation industry. They move about 14 percent of all U.S. intercity freight by volume, while using the least fuel and having the best safety record when compared to trucks or trains, **1**. They excel at moving bulk materials long distances at low cost. There are hundreds of barge terminals in the United States on inland waterways and coasts, and many are served by rail. If a railroad contacts a navigable river, there is a good chance it serves a barge terminal nearby, **2**. A rail to barge terminal makes for an interesting compact model railroad, **3**.

Towboats range in size from about 117 feet long by 30 feet wide to more than 200 feet long and 45 feet wide. (American rivermen call them towboats due to tradition, even though now most actually push the barges.) On United States' rivers, the standard barge is 195 feet long and 35 feet wide, and can be used up to a 9-foot draft. It has a capacity of 1,500 tons. Some newer barges today are 290 feet by 50 feet, double the capacity of earlier barges.

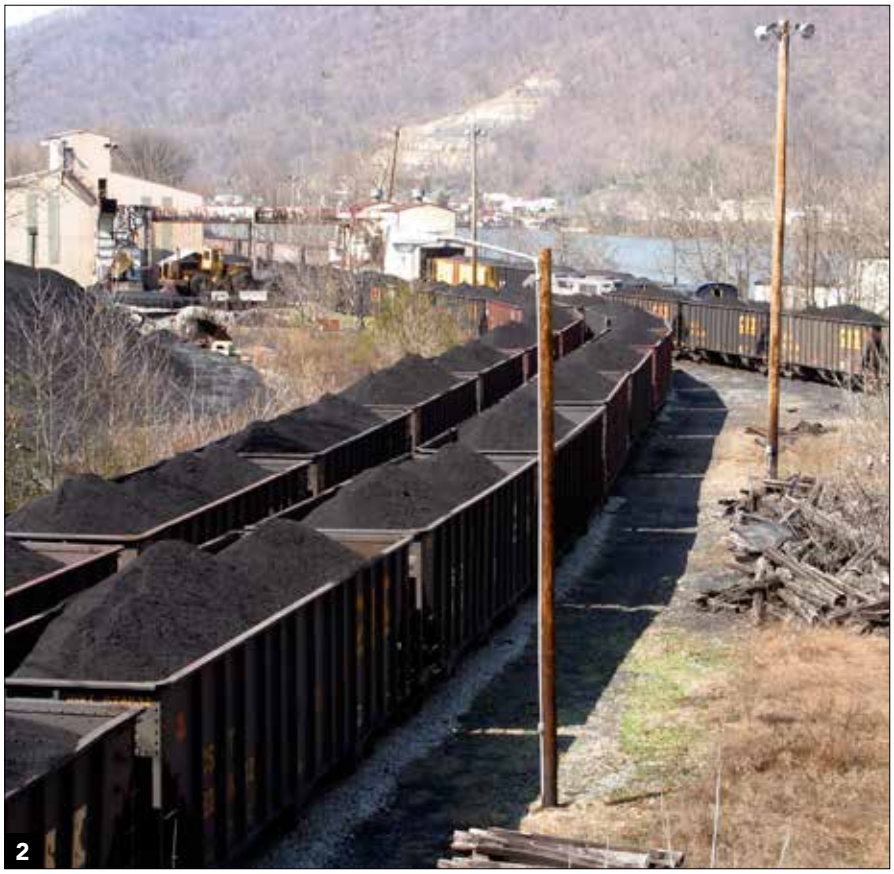
Just like railcars, there are different kinds of cargo barges including flat deck, open hopper, covered hopper, tank, container, and car floats. In addition, there are many specialized work barges including dredges, cranes, pile drivers, and barracks (housing).

Similar to a rail open hopper, open hopper barges carry dry bulk cargo that does not need protection from the weather. Covered hopper barges have watertight covers and commonly carry grain or dry chemicals. Deck barges do not have a cargo hold and are used to move machinery, construction materials, large fabricated items, or a combination of cargoes. Some deck barges have locking fixtures to carry containers. Tank barges carry liquids.

The average river tow has 15 barges, but they can go up to 40 barges, depending on the type of cargo, the river segments being navigated, and the size of the towboat. Because of their meandering nature and varying width, smaller tributaries can support only 4-barge tows. In addition, their locks are smaller.

It is difficult to appreciate the carrying capacity of a barge until you understand how much tonnage a single barge can move. One loaded covered hopper barge carries enough wheat to make almost 2.5 million loaves of bread. A loaded tank barge carries enough gasoline to satisfy the annual demand of about 2,500 people. A 15-barge tow can carry 22,500 tons, the same as 2½ 100-ton unit trains or 870 tractor trailers, **4**.

Barges transport more than 60 percent of U.S. grain exports, about 22 percent of domestic petroleum and petroleum products, and 20 percent of coal used in electricity generation.



2

CSX coal hoppers await unloading at the Winifrede barge loadout on the Kanawha River in West Virginia. The Winifrede loadout has been in service on and off since 1881.

3

My paper mill model depicted a barge loadout for wood chips on the front edge. The large paper mill at West Point, Virginia, on the Mattaponi River served as the prototype inspiration for the model.

CHAPTER EIGHT

Project layout: Port of Los Angeles

Three BNSF engines pull a loaded train out of the Pasha Stevedoring Terminal. Ramon Rhodes owns and detailed the locomotives. The distinctive stucco pier shed (as seen prototypically on the opposite page) is a signature structure on the model railroad.

With a volume of more than 7.5 million containers a year, the twin ports of Los Angeles and Long Beach are the busiest container ports in the United States. But the area is more than just a series of container terminals. In its 16 square miles, there are dozens of other terminals and wharves for break bulk, project cargo, liquid bulk, scrap metal, bulk mineral, and aggregate terminals. There are also fishing boat docks, ferry boat ramps, and cruise ship terminals. When those operations are included, the twin ports are the third busiest in the world.

I took this prototype image of a BNSF consist switching steel slab cars at the Pasha Stevedoring Terminal on a gorgeous spring afternoon in 2014. Replicating this scene was a primary objective of the project layout.

While containers are the main business of the ships and railroads in the port, this project layout features Mormon Island, a small section of the Port of Los Angeles that does not get a lot of container traffic.

Mormon Island was originally a sandbar in San Pedro Bay. After a century and a half of dredging, filling, and construction, it is now a peninsula surrounded by basins and man-made islands of the Port of Los Angeles. Mormon Island is largely an industrial area with no homes and few retail business. The industries on the island have changed over the years. In the contemporary time period that this layout models, the primary industries are the Rio Tinto Borax factory, Pasha Stevedoring Terminal, and three petroleum terminals. Only Rio Tinto and Pasha are served by rail now, and the Pacific Harbor Line (PHL) serves these industries.

Pacific Harbor Line

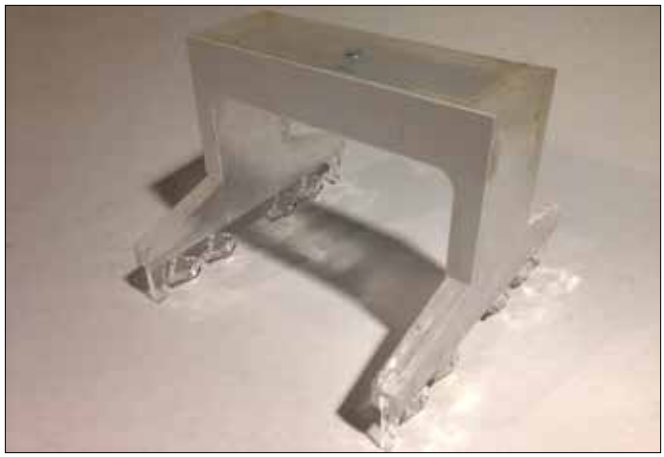
In the steam and transition eras, "Assigned to the Harbor Belt" was a phrase often heard among trainmen, clerks, and other railroad employees around Los Angeles Harbor. Formed on June 1, 1929, after five years of negotiations, the Harbor Belt Line was a joint operating agency set up by agreement between the City of Los Angeles and four railroads—Pacific Electric, Southern Pacific, Union Pacific, and Santa Fe—to conduct unified switching service at the harbor. Each participant in the agreement furnished its quota of employees and equipment to run the railroad over 117 miles of track.

While this arrangement worked for many years, the rise in containerization in the 1970s and 1980s greatly expanded business in the port. Some shippers had problems getting their goods to or from the port because the tracks were owned by the different Class 1 railroads that supported the Harbor Belt Line. To level the playing field, the port authorities took ownership of most of the harbor tracks in 1988. They then leased the tracks to the newly formed Pacific Harbor Line, a private company owned by the Anacostia & Pacific Company, which would act as neutral party. The PHL became responsible for making up and breaking up trains, storing and classifying cars, and serving the industries within the harbor.

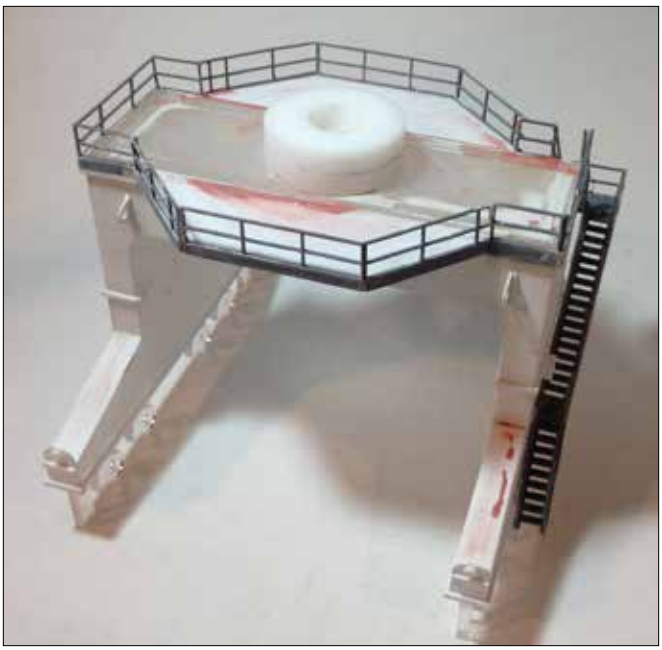
Today, PHL provides all rail movements on 75 miles of port-owned track. It offers interline, intra-plant, intra-terminal, and inter-terminal switching; car storage; unit train movement; and intermodal car repositioning. It dispatches all BNSF and UP trains within the ports, and serves nine on-dock intermodal terminals.

With an uncomplicated layout, simple details and a good backdrop go a long way in adding interest to a scene.

Mike Spoor operates a train during an early test operating session. He holds the switch list in his hand along with a radio DCC throttle. Test operating the layout before adding scenery is a good idea, as you can work out bugs without having to rip out finished work.



I lasercut acrylic to make the portal core. The lasercut parts include the wheel control arms.



I then covered the core with 0.040"-thick styrene. The handrails and stairs are spare parts from a Walthers blast furnace kit.

I test-fit the rotating crane on the base.