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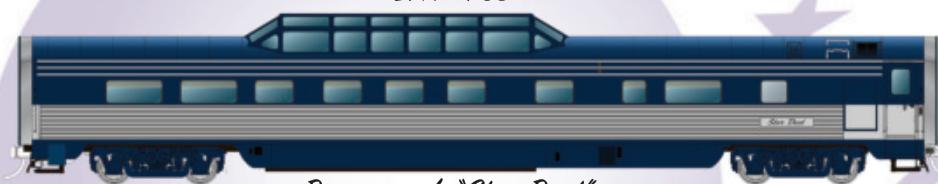
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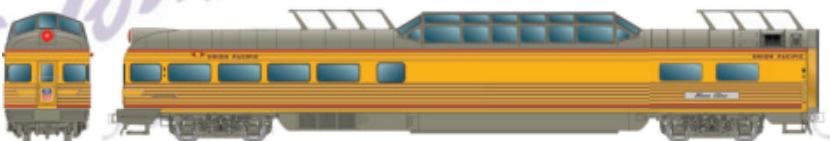


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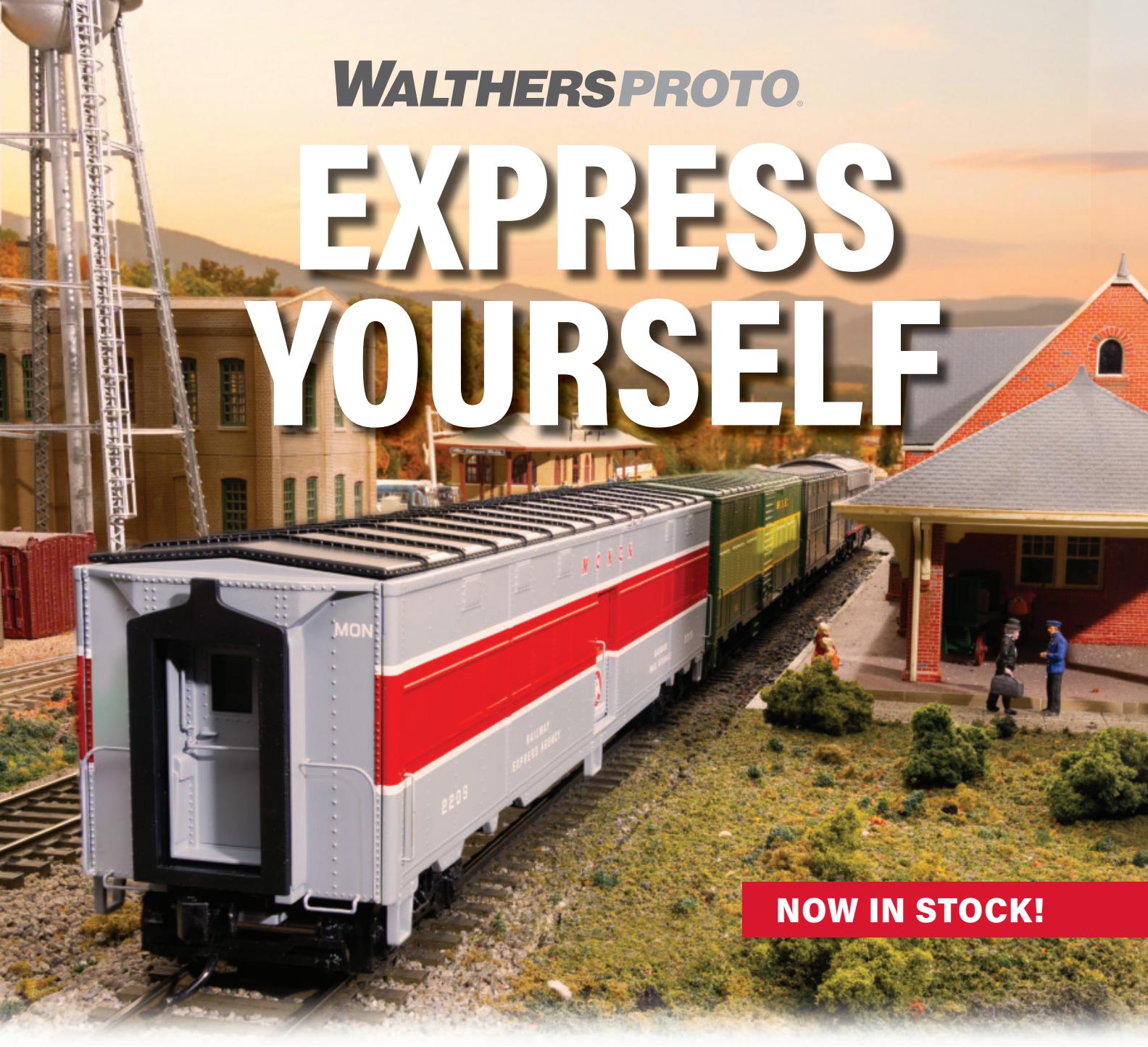


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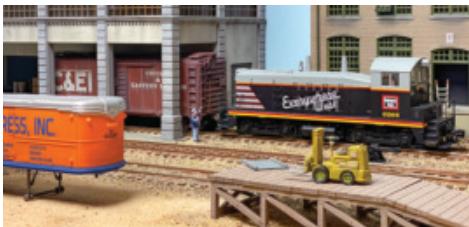


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Ideas from Lance Mindheim improve realism



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On the cover: Lance Mindheim's CSX Miami Downtown Spur is a hotspot of HO scale operation.
Lance Mindheim photo



Next issue

In April, we celebrate 50 years of Conrail on Dave Abeles' Onondaga Cutoff, add lights to passenger cars, visit two great layouts, work on layout scenery, and more!

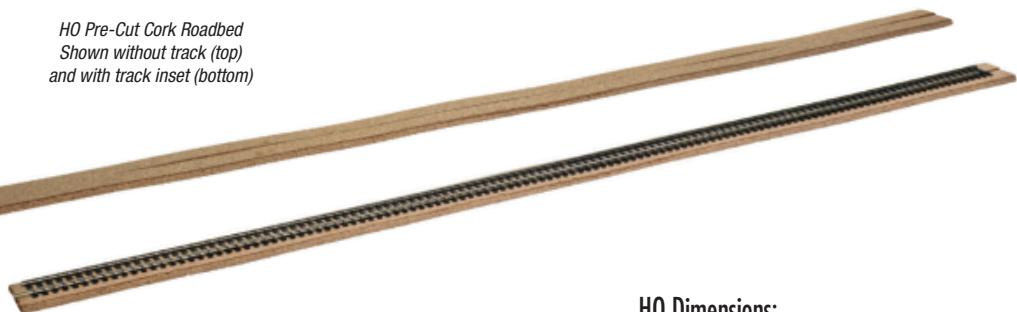
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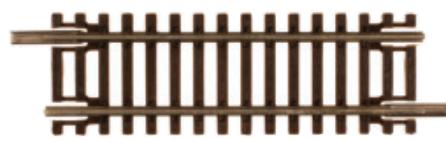
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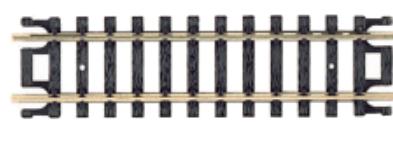
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Want to start a model railroad club?

Lucas Iverson digs into the how-tos of building a model railroad club from scratch. It takes a bit more than an enthusiastic group and a place to get together, and Lucas talked to a number of club leaders from around the country to get the lowdown on what's needed to not only start a club, but keep it vibrant and flourishing for years to come.

Ideas include developing a vision for the club, so everyone knows it's focus; identifying a strong leader to keep efforts organized; employing the best methods to reach out to potential members; and strategies for preparing for the future of the club after the founding members have moved on. Read *Starting a Model Railroad Club: Your 21st-Century Guide* on Trains.com.



Choosing the right batteries

Going dead rail, or power-on-board if you prefer, has been gaining popularity. Outdoor garden railroaders have been using battery-powered locomotives for years to avoid having to keep track clean for power distribution. As battery technology improves, the practice is moving indoors so more of us can put down the track-cleaning tools.

The big question is what sort of batteries are right for your project. Lucas Iverson takes a look at what's available in rechargeable battery options for dead-rail locomotives on Trains.com



Check out the Bachmann Trains interview

We recently met with Tyler Haney and Matt Stern of Bachmann Trains to talk about the company's new products, including the Amtrak Acela II and more. In addition, Tyler and Matt talk about their favorite products, some of the work that went into producing the Acela models, a bit of the history of Bachmann Industries, and more!

Watch the Trains.com Insider Interview on Trains.com Video!



Cody's Office

Every month, Senior Editor Cody Grivno shares what's new in the *Model Railroader* workshop. Each show has the latest products from top manufacturers and Firecrown, a modeling tip, and more.

Cody's Office is a great way to keep up with what's happening in the hobby and at the *Model Railroader* offices. Be sure to watch every month on Trains.com Video.



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Can you take it with you?

Layout size is a frequent topic of discussion. Though large model railroads are still admired, reality leaves many of us without the option of building the layout we thought we would when we first started reading *Model Railroader*.

A big reason for this is mobility. Lots of people, especially younger people, are moving to where the jobs are, then moving again when the market changes, then maybe a few more times before finally retiring and moving for (maybe) the last time.

Building a really large layout takes time and resources. If you don't have both, it probably isn't going to happen. And if you're moving often, even if you have time for personal pursuits, you might have to tear down several layouts built to the methods of our fathers and grandfathers.

It's one of the reasons given for the popularity of modular or sectional layouts. If it's meant to come apart, it

can be moved. Steve Holzheimer explained this idea in *Model Railroad Planning 2025*. He built his layout in sections, then figured out how to reuse those sections in his new home, over several moves, building new connection pieces to make the arrangement work.

His layout is sectional, that is, it's made in pieces that can come apart and be put back together, but they can't be reorganized in any fashion. Tab A more or less has to go into Slot B, unless you make a new section with a Slot B2, and a Tab A2.

Modular layouts, on the other hand, follow a standard that allows them to be assembled in multiple configurations, and combined with other people's work that uses the same modular standards.

There are several established designs out there, with the granddaddy of them all being NTrak (nraill.org). In addition there are T-Trak,

which was developed to use Kato Unitrack sectional track; FreemoN, which allows a variety of shapes as long as the end plates are uniform; and Free-mo, the U.S. standard for Freemo modules in HO scale.

This would seem to indicate that if you're expecting to move a few times over you should look into modular or sectional layout designs.

But what if you don't want a modular or sectional layout? What do you do then? Lots of people have built layouts to fit their particular space, then when they had to move, scavenged pieces of the layouts that could be used again, such as structures, loose detail items, rolling stock, and control systems.

They might have moved to a new home to build the next version of their model railroad — Gerry Leone is up to Version 5 of his Bona Vista model railroad — or they might make changes, either



big or small. In the 2026 edition of *Model Railroad Planning*, builder Daryl Kruse opted to trade his N scale equipment for HO, and move the location of his railroad while still modeling the Union Pacific.

Others have used a move as motivation to try something completely different. However you decide to tackle it, the building is where the fun is.

Model Railroader

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Feb 7-8 Hampton, VA - Hampton Roads Conv. Ctr.
Feb 7-8 Indianapolis, IN - Indiana State Fairgrounds
Feb 14-15 Xenia, OH - Greene County Expo Center
Feb 14-15 Costa Mesa, CA - OC Fair & Events Ctr.
Feb 21-22 Girard, OH - Metroplex Expo Center
Feb 21-22 Vallejo, CA - Solano County Fairgrounds
Feb 28 - Mar 1 Sacramento, CA - Cal Expo
Mar 1 Wheaton, IL - DuPage County Fair
Mar 14-15 Fort Wayne, IN - Allen County Coliseum
Mar 21-22 Wilmington, MA - Shriner's Auditorium
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HO scale



Electro-Motive Division SD38-2. This six-axle diesel locomotive from the ScaleTrains Rivet Counter line is decorated for General American Transportation Corp. (ex-Reserve Mining); Bessemer & Lake Erie; Burlington Northern; Chicago & Illinois Midland; Chicago & North Western; Duluth, Missabe & Iron Range; and McCloud River

RR. The HO scale SD38-2 features prototype-specific details; factory-installed wire grab irons, windshield wipers, and train line hoses; a detailed cab interior; and die-cast metal semi-scale Type E couplers. Direct-current models sell for **\$199.99**. Versions with an ESU LokSound V5 sound decoder are priced at **\$324.99**. ScaleTrains, 844-987-2467, scaletrains.com

HO scale locomotives



- Electro-Motive Division SD50 diesel locomotive.** Conrail, CSX, Lake State Railway, Missouri Pacific, Seaboard System, Reading & Northern, and Utah Ry. Four road numbers per scheme (two each in direct current and Digital Command Control); also available undecorated. Phase II body shell with molded drill starter points for grab irons (detail kit No. 910-256 sold separately), HT-C truck sideframes, see-through step treads, and Proto-Max metal couplers. Direct-current model, \$199.98; with ESU Sound & DCC, \$254.98. Walthers Mainline. Wm. K. Walthers Inc., 414-527-0770, walthers.com

(USNX, all silver) and NASA (NLAX, all silver). Previously announced schemes — ATMX (gray and silver) and MHAX (gray and silver). Also available painted gray and silver but unlettered. Detailed underbody and piping, stainless metal running board, and solid- or roller-bearing trucks as appropriate. Suggested minimum radius, 18". Single car, \$59.95; six-pack, \$359.70. Rapido Trains Inc., 905-474-3314, rapidotrails.com



- Hawker Siddeley van.** New run — Canadian National (as-delivered [red/orange steps], late [black steps], international service [red with orange steps and yellow sill stripes and end fascias], ex-Devco [green and black patchout], and faded [black steps]), Ottawa Central (ex-Devco, green and black patchout), painted but unlettered (red and yellow, both with black cupola, roof, and underbody), and undecorated (partially assembled). Operating marker lights, track light, step lights, cabin lights, and

separately controlled cupola light; see-through, etched-metal end platforms and steps; and factory-applied grab irons. Suggested minimum radius, 18". Standard schemes, \$129.95; faded, \$139.95. Rapido Trains Inc., 905-474-3314, rapidotrails.com



- Custom-decorated boxcars.** Pennsylvania RR (Brunswick Green and Tuscan Red) and Union Pacific (Route of the Big Boy). \$39.99. Produced by Lionel. Available exclusively from Trainworld, 800-541-7010, trainworld.com

HO scale passenger cars



- Budd Co. lightweight coach.** Amtrak; Atchison, Topeka & Santa Fe; Conrail; Long Island Rail Road;

HO scale freight cars



- American Car & Foundry helium car.** New paint schemes — U.S. Navy

Metro-North Commuter RR; New York Central; Norfolk Southern; Penn Central; Pennsylvania RR; Rock Island; Seaboard Coast Line; and Southern Ry. One to five car numbers per scheme. Revised, track-powered interior lighting compatible with direct current and Digital Command Control; separate, factory-applied metal grab irons and end gates; and MoPower capacitor. Suggested minimum radius, 22". \$124.95. Superior Stainless line. Rapido Trains Inc., 905-474-3314, rapidotrains.com



- **Southern Pacific 3/4 dome lounge.** Panama Canal Ry. (flat sides, *Rio Charges*), Southern Pacific (fluted sides in three schemes and flat sides in one scheme), Amtrak (flat sides in phase 1 scheme, two versions), and Canadian Pacific (flat sides, *Selkirk*). Two detailed interior configurations (*Shasta* and *Overland*); flicker-free, track-powered interior lighting; and metal couplers. Suggested minimum radius, 22". \$159.95. Rapido Trains Inc., 905-474-3314, rapidotrains.com

HO scale details and accessories



- **Parts set for Santa Fe Bx-34 Modified 1937 AAR boxcars.** Resin and etched-metal parts to replicate Duryea cushion underframe; decals for map (curved and straight), Ship and Travel, or 1959 Ship and Travel schemes; and unique details. \$30. Speedswitch Media, speedswitchmedia.com



- **Parts set to upgrade Bowser Manufacturing Co. Inc. Pennsylvania RR X32A automobile boxcars.** Resin and etched-metal parts to upgrade ends and underframe plus create all free-standing details. \$30 (\$35 with shadow keystone decals). Speedswitch Media, speedswitchmedia.com

N scale



Electro-Motive Division GP38-2. Rock Island, Alaska RR, Canadian Pacific, Chicago South Shore, Conrail, GATX Locomotive Group, Norfolk Southern, and Southern Pacific are the paint schemes offered on this newly tooled road unit from Atlas. The N scale EMD GP38-2 has a Scale Speed motor, plastic handrails and stanchions, and golden white light-emitting diode headlights. Direct current models with a factory-installed speaker are priced between \$124.95 and \$134.95. Models with an ESU LokSound V5 sound decoder sell for \$224.95 to \$234.95. Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com

N scale locomotives



- **Bachmann Siemens SCV-42 Charger diesel locomotive.** VIA Rail Canada. Dual-mode TCS WOWSound decoder, Keep-Alive capacitor, die-cast metal frame, prototype-specific details, light-emitting-diode lighting, interior corridor work lights, steady/alternate flashing ditch lights, and E-Z Mate Mark II couplers. \$516. Bachmann Trains, 215-533-1600, bachmanntrains.com

O scale rolling stock



- **Evans 53-foot double plug door boxcar.** Illinois Central Gulf, Evans Railcar Leasing Co. (USLX reporting marks — Cypress, Plywood Marketing Associates, Quinault Pacific, Tropicana, and Wickes Agriculture), and Virginia Central. Injection-molded plastic body;

die-cast metal floor; factory-applied ladders, brake wheel, door bars, and door handles; scale wheels; and Kadee-compatible scale couplers. \$94.95. Master Line. Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com

Z scale locomotives



- **Electro-Motive Division FP7 diesel locomotive.** Southern Ry. American Z Line 7mm motor, prototype-specific details, metal stirrup steps, and blackened metal wheels. Contact manufacturer for pricing information. American Z Line, 614-764-1703, americanzline.com

Z scale freight cars

- **General American Transportation Corp. 4180 Airlide covered hopper.** Chessie System with Chesapeake & Ohio reporting marks. Two-pack and four-pack. AutoLatch couplers and metal wheels. Contact manufacturer for pricing information. American Z Line, 614-764-1703, americanzline.com

Atlas N scale GE U33B



A General Electric U33B is the latest diesel locomotive to join the Master Line from Atlas Model Railroad Co. The newly tooled model features prototype-specific details, a Scale Speed motor, and body-mounted Accumate couplers.

General Electric produced the U33B from September 1967 until August 1970. During that time 137 locomotives were built. The four-axle unit was rated at 3,300 hp and was equipped with a FDL-16 diesel engine.

The sample we received is decorated as Rock Island No. 193, part of the railroads 190 through 199 series. This group of diesels was delivered to the railroad in May 1969. In addition to the 190-series, Rock Island had two other batches of U33B locomotives. Units 290 through 299 joined the railroad's diesel fleet between July and September 1968. Engines 285 through 289 came on the property in January 1969.

Construction of the N scale GE U33B follows other Atlas N scale diesels. The injection-molded plastic shell consists of the body, cab, and sill unit. Separate, factory-applied details on the Rock Island model include a snow plow, uncoupling levers, brake wheel, antenna, and air horn. The grab irons on the nose and cab are free-standing. Those on the back of the long hood are molded.

Four round depressions on the inside of the shell (two on each side) fit over raised nubs on the die-cast metal chassis. Gently rocking the shell while lifting up was all it took to separate it from the chassis.

The chassis on the U33B is divided horizontally. The motor and flywheels are centered in the bottom half of the chassis. The upper half of the chassis, attached with screws, spans the motor and flywheels. On top of that is the motherboard, secured with two screws.

Wires from JST plugs are soldered to wheel wipers. The plugs are connected to headers on the bottom of the motherboard. These wires transfer power from the rails to the board. A third set of wires runs from a JST plug on top of the board to the motor contacts.

The sample we received is decorated in Rock Island's maroon-and-yellow scheme. The paint is smooth and evenly applied, with crisp separation lines between colors. The herald on the front of the short hood is well executed, and the white printing is opaque. There are a few small voids in the road name, but those could easily be touched up.

The placement of the door latches on the long hood varied a bit from the full-size 193, but hardly what I'd consider a deal breaker. Details like Automatic Car Identification panels, cab sunshades, and windshield wipers were omitted. They'd be easy to add with decals and aftermarket parts as appropriate.

Prototype drawings of the GE U33B were published in the 1970 *Car and Locomotive Cyclopedias of American Practice* (Simmons-Boardman Publishing Corp.) The model's dimensions closely follow published data.

I tested the Atlas model at the workbench with an NCE Power Cab. At step 1, the

four-axle unit move at 1 scale mph. At step 28, the model achieved a top speed of 77 mph, within the prototype's speed range. Rock Island's U33B diesels had a 79:24 gear ratio and a maximum speed of 83 mph

For real-world testing, I had the U33B pull a freight train and switch the yard and gravel quarry on our Milwaukee, Racine & Troy State Line Route. The diesel had no problems navigating the 18" radius curves and No. 6 turnouts.

In addition to the GE U33B, Atlas offers a GE U36B decorated for Auto Train and Seaboard Coast Line. Head over to your favorite Atlas dealer to pick up one of these diesels for your model railroad. — *Cody Grivno, senior editor*

Facts & features

Price: Direct current model with speaker, \$159.95; with ESU LokSound V5 sound decoder, \$274.95

Manufacturer

Atlas Model Railroad Co.
378 Florence Ave.
Hillside, NJ 07205
shop.atlasrr.com

Era: 1967 to 1990s (varies based on paint scheme)

Paint schemes: Rock Island, Penn Central, and Reading & Northern. Two to three road numbers per paint scheme.

Features

- Body-mounted Accumate couplers, at correct height
- Metal wheel stubs on plastic drive axle gears, in gauge
- Weight: 2.6 ounces



Rapido HO Hawker Siddeley CN van



Though cabooses have all but disappeared from today's railroads, they're still front and center for hobby manufacturers. Rapido Trains recently released its latest premium-level model, the HO scale Canadian National Hawker Siddeley van. The model features a detailed interior and underbody, numerous operating lighting features, and metal semi-scale couplers.

Hawker Siddeley produced 150 steel vans, numbered 79200 through 79349, for the CN in 1967. The cabooses were built at the manufacturer's plants in Trenton, Nova Scotia, and Fort William, Ontario, Canada.

The vans, designed to replace the railroad's aging roster of wood cabooses, featured many amenities modern for the time. The axle-driven generator provided power for the hot plate, interior lighting, marker lights, refrigerator, and two-way radios, among other items. Two oil stoves, one appointed for cooking, kept the vans warm on cold Canadian nights.

Canadian National's fleet of Hawker Siddeley vans stayed in service into the 1990s. The full-size CN 79207 was spared the scrapper's torch and is on display in Minto, New Brunswick, Canada.

Rapido's CN Hawker Siddeley van features injection-molded plastic construction, complemented with formed-wire grab irons; a detailed, multi-color interior; and see-through, etched-metal steps and end platforms. Rooftop details include two smokejacks, assorted vents, and a Sinclair antenna on the cupola. The end cupola windows have windshield wipers; wind deflectors frame the windows on the side.

I was unable to remove the shell to see all of the interior details, but they are visible through the side and end windows. I carefully removed the cupola to see the seats and railings. Wires for the light are attached to the inside of the cupola, so lift it off gently.

A Rapido Lighter magnetic wand is included to control the various lighting features, which work in direct current and Digital Command Control. A sheet included with the van shows where to wave the wand to control the cupola light, end marker lights, and track inspection lights [The as-delivered model doesn't have inspection lights. — Ed.]

In typical Rapido style, the underbody has many details. The battery box, control valve (painted silver), and axle-driven generator can be seen in the image above. The van's cushioned underframe, along with the brake system appliances and various pipes, rods, and levers, are also depicted.

The sample we received is decorated in the as-delivered paint scheme. The paint is smooth and evenly applied, and the white graphics are opaque.

A prototype photo of CN 79207 from September 1967 is included in *Canadian National Color Guide to Freight and Passenger Equipment, Volume 2* by John Riddell (Morning Sun Books, 2001). At the time of the image, there were no grab irons flanking the cupola and the step edges weren't painted white.

The 1970 *Car and Locomotive Cyclopedic of American Practice* (Simmons-Boardman Publishing Corp.) contained drawings of the CN Hawker Siddeley van. The model matches or is within scale inches of published data.

To put the caboose through its paces, I placed it in a train on our Winston-Salem Southbound Tar Branch. The compact switching layout has commercial and handlaid track and turnouts (the latter as sharp as a No. 4) and a 30-degree crossing. The Rapido model had no issues when being pushed and pulled on the 2 x 8-foot model railroad.

If you model the CN in HO scale from 1967 through the 1990s, you'll definitely want to check out Rapido's CN Hawker Siddeley van. With details inside and out, prototype-specific lighting features, and metal wheels and couplers straight from the box, what more could you ask for? — *Cody Grivno, senior editor*

Facts & features

Price: \$129.95

Manufacturer:

Rapido Trains

382 High St.

Buffalo, NY 14204

rapidotrains.com

Era: 1967 to 1990s

Road names: Canadian National (as-delivered with red/orange steps, late with black steps, and international) and Devco Ry. One to eight road numbers per scheme; also available undecorated.

Features

- Body-mounted semi-scale couplers, at correct height
- Metal wheel stubs on plastic axles, in gauge
- Weight: 4.2 ounces, .4 ounce too heavy per National Model Railroad Association Recommended Practice 20.1

WalthersProto scale test car in HO



A scale test car was recently released by Wm. K. Walthers Inc. The HO scale model, part of the manufacturer's Proto range, features die-cast metal construction, prototype-specific details, and Proto-Max metal couplers.

Scale test cars are used in the calibration of track scales found at on-line customers. The WalthersProto model follows the lines of a prototype test car developed by American Car & Foundry and the Pennsylvania RR in the 1920s.

The heavy, short-wheelbase cars don't have air brake equipment, so they require special handling. In the caboose era, they were put between the caboose and last car of the train. Speeds are reduced to between 25 and 35 mph when a scale test car is present in a train. Some railroads put scale test cars on flatcars for transport between locations to avoid these speed restrictions.

The sample we received is decorated as Burlington Northern 979004. The full-size scale test car was built in February 1936. The 90-year-old car is still in service on BN successor BNSF Ry.

The WalthersProto scale test car shouldn't be confused with the injection-molded plastic kit that the manufacturer released back in the 1990s [A review of that model can be found on page 45 of the June 1994 *Model Railroader*. — Ed.] The new version has a die-cast metal body, which accounts for much of the car's 2.7 ounces of weight. It also has factory-installed wire grab irons and 33" metal wheels.

I appreciated that the WalthersProto model doesn't have one-size-fits all details. The car is offered with two different hand brakes, two different top

access doors, and three different side access doors. The BN car we received is equipped with a power hand brake, replacement top cover, and round side doors with a release latch bar.

As someone who owned the kit version of the scale test car back in the 1990s, I was thrilled that the BN car (and many of the road names offered in the initial release) has photo-etched brass placards. The lettering matches prototype photos from 2008 through 2010.

Underneath, the car has a pair of plastic wheel pedestals, both attached with three screws. Perpendicular to the pedestals are plastic brake beams with brake shoe detail. There's also a free-standing truck brake lever.

A double-sided 8½ x 11 sheet included with the model has a brief history of the car and exploded-view diagrams showing the various parts.

Our review sample is neatly decorated in BN's yellow and green paint scheme. The paint is smooth and evenly applied, which isn't always an easy task with light colors like yellow.

For the most part, the details match prototype photos. The power hand brake should be rotated 90 degrees clockwise so it's parallel to the side of the car. There should also be a pair of extra grab irons on the left side of the car. I didn't see the small green handle for the top access door in prototype images.

The model lacks uncoupling levers. Stencils on the car ends that read To Be HAULED ON REAR OF TRAIN should say To Be HAULED IN REAR OF TRAIN.

Drawings of the scale test car were published in the 1937 *Car Builders' Cyclopedia of American Practice* (Simmons-Boardman Publishing Corp.)

The model's major dimensions match published data.

To see how the car performed in an operating layout environment, I put it ahead of the caboose in a train on our Winston-Salem Southbound. The model performed without issue, navigating a No. 4 turnout and 30-degree crossing.

The WalthersProto scale test car is a huge leap forward from the kit offered more than 30 years ago. Die-cast metal construction, prototype-specific details, and metal wheels and couplers bring this car up to modern standards. Whether just ahead of a caboose on the local, loaded on a flatcar, or spotted at an industry with a track scale, this diminutive car will certainly be an attention getter. — *Cody Grivno, senior editor*

Facts & features

Price: \$56.98

Manufacturer:

Wm. K. Walthers Inc.

5601 W. Florist Ave.

Milwaukee, WI 53218

walthers.com

Era: 1920s to present (varies based on paint scheme)

Road names: Burlington Northern, Archer Daniels Midland, Canadian National, Chessie System, Conrail, data only, Rock Island, and Union Pacific.

Features

- 33" metal wheelsets, in gauge

- Body-mounted Proto-Max metal couplers, at correct height

- Weight: 2.7 ounces, .8 ounces too heavy per National Model Railroad Association Recommended Practice 20.1

Bachmann HO Airslide covered hopper



A newly tooled model has joined the Bachmann HO scale freight car lineup. The General American 4,180-cubic-foot capacity Airslide covered hopper, offered in four paint schemes, features injection-molded plastic construction, 36" metal wheelsets, and body-mounted E-Z Mate Mark II plastic couplers.

General American produced the 4180 Airslide from 1963 to 1980. The cars were designed to transport dry, granular, and powdered products. Some examples include clay, flour, starch, and sugar.

During the course of the 4180's lengthy production run, changes were made to the car, referred to by railfans as "phases." Details on the Bachmann model align with the phase TZL cars built between 1966 and 1969. Spotting features include a low brake wheel and four grab irons on each side corner.

The sample we received is decorated at GATX Capital 56131, part of the GACX 56112 through 56132 series. The prototype car was built by General American in November 1981. The full-size covered hopper, though similar in appearance to the 4180, was built to the larger 4566 Airslide specifications. These cars were produced between 1978 and 1985. Some full-size 4180s were also painted in the GATX two-tone blue scheme. Other road names offered by Bachmann are correctly numbered to match 4180 Airslide covered hoppers.

The ready-to-run model has a one-piece body. The roof features a factory-applied, see-through plastic running board casting with molded grab irons on the laterals and 10 hatch covers.

The grab irons, shaker brackets on the sides, and the stirrup steps are all

molded. The hand brake, brake wheel, and crossover platforms are factory-applied details. A pair of vertical stiffeners that run from the top of the sill to the bottom of the first horizontal post on the car ends were omitted.

The underbody is a separate plastic casting. Four tabs, two per side, lock into slots on the inside of the body shell. A steel weight is attached to the top of the underbody with a pair of screws.

Though the inner and outer trough plates are molded, most of the remaining underbody details are freestanding. The outlet piping fits into molded brackets. The gravity outlets are factory applied, as is the lateral underframe support brace.

The brake system, which is easy to see on the Airslide covered hopper, is nicely rendered. Molded plastic auxiliary and emergency reservoir pipes run from the air reservoir to the control valve. Similarly, a molded brake cylinder pipe connects its namesake with the control valve. Related rods, support brackets, and levers are also represented.

The draft-gear boxes are molded as part of the underbody. Screw-mounted plastic covers hold the couplers in place. A plastic air hose with angle cock and glad hand detail is attached to the side of the box on both ends.

Our review sample is neatly painted in GATX Capital's two-tone blue scheme. Graphic placement matches prototype images of GACX 56131 that I found online. The load limit and light weight are accurate for the road number.

Prototype drawings of the GATX 4180 Airslide were published in the 1966 *Car and Locomotive Cyclopedia of American Practice* (Simmons-Boardman Publishing Corp.) The truck centers are

correct. The model measures a scale 50'-2" over the end sills, compared to the prototype's 49'-9". The length over the running boards is a scale 6" too long.

I took the Airslide over to our Winston-Salem Southbound Tar Branch to test it in a train while dropping off and picking up freight cars at industries. The covered hopper had no troubles while being pushed and pulled.

Bachmann offers the General American 4,180-cubic-foot capacity Airslide covered hopper in a colorful assortment of paint schemes covering the mid-1960s through the 2000s. If your HO scale layout has rail-served customers that ship or receive dry, granular, or powdered products, this is a model worth checking out. — *Cody Grivno, senior editor*

Facts & features

Price: \$65

Manufacturer

Bachmann Trains

1400 East Erie Ave.

Philadelphia, PA 19124

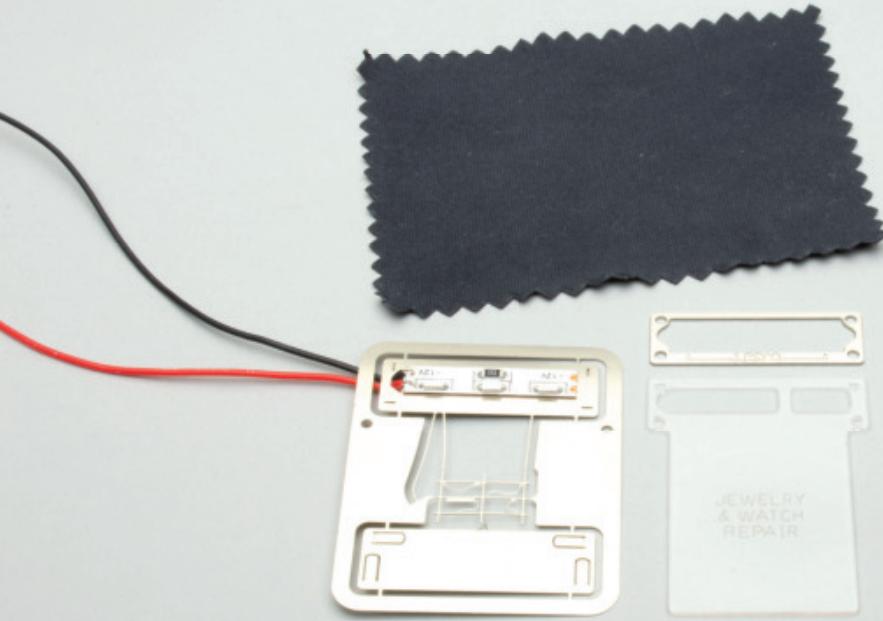
bachmanntrains.com

Era: 1965 to 2000s (varies based on paint scheme)

Road names: GATX Capital, Burlington Northern, CSX, and Union Pacific. Two road numbers per paint scheme.

Features

- 36" blackened metal wheels, in gauge
- Body-mounted E-Z Mate Mark II couplers, at correct height
- Weight: 3.8 ounces, .7 ounce too light per National Model Railroad Association Recommended Practice 20.1



DVL Design LLC HO scale neon sign kits



If you're looking for a fun, easy-to-build detail for your structures, check out the Ne Series of HO scale neon sign kits, part of the Noble Gas & Tungsten line from DVL Design LLC. As of press time, there are more than 200 sign designs; three etched-metal frame styles — grid, open, and panel; and six light-emitting-diode (LED) colors — amber, blue, green, red, white, and yellow.

We received kit B402, Jewelry & Watch Repair, for our review. The kit contents are carefully packed in a hinged plastic trading card-style box lined with two pieces of foam. Inside is a fret (think sprue, but for etched-metal parts) with the sign frame assembly and an assembly clip. The sign frame assembly contains the LEDs and 7½" lengths of red and black wire (28AWG). Also inside is a metal spacer, an etched-acrylic panel, and a microfiber cloth for cleaning the acrylic. Our sample features frame B21 and a 1"-wide acrylic panel.

Since I'd never built a kit like this before, I read through the written, illustrated 5-page instruction booklet a few times to familiarize myself with the assembly process, handling instructions, and required tools. The manufacturer recommends a No. 16 scoring or No. 17 chisel blade, fine flush side cutters, a hard work surface (glass, plastic sheet, or metal), and a straightedge.

I started working through the 11-step assembly process by using fine flush side cutters to remove the assembly clip from the fret. Then, using the etch mark at the

base, I bent the four tabs to a 90-degree angle on the side opposite the logo.

The sign frame assembly has power cord, chain, and sign frame detail. I painted the power cord with flat black enamel paint. The manufacturer notes that painting and weathering the chain and frame is optional.

Next, I placed the sign frame assembly on a piece of plate glass, allowing the wires to hang over the edge. Then I used a No. 17 chisel blade in a hobby knife to cut the power cord and sign frame from the fret.

After positioning the power cord behind the frame with tweezers, I used fine flush cutters to remove the upper (LED) section of the sign frame from the fret. Step 7 walks through the process of using the straightedge to slightly adjust the sign frame and power cord.

Steps 8 through 11 cover the final assembly process. These steps are where the clear acrylic panel is introduced, so I made sure the work surface was clean and I only handled the etched part by the edges.

After I'd placed the acrylic panel, spacer, and sign frame assembly on the assembly clip, I stripped a bit more insulation off the wires and inserted them in a 5.5mm x 2.1mm screw terminal female power connector (sold separately on the DVL Design LLC website). Then I plugged the connector into a 7.5VDC, 1A regulated power supply, also available through the manufacturer's website. Recommended DC power supplies are as follows: 7.5V (red, amber, and green), 9V

(blue and white), and 12V (yellow). Once I'd confirmed the LEDs worked and the acrylic was free of dust, I bent the sign clips down to hold everything together.

The final page of the instruction booklet covers installation. Templates for "A" and "B" size neon signs can be found on the DVL Design LLC website. The manufacturer recommends using 5-Minute Epoxy to attach the signs. The adhesive provides sufficient working time for final positioning. Black or silver paint can be applied to the edges of etched acrylic panel to reduce edge glow.

Assembling the sign kit was an enjoyable 30-minute project. Though the signs are marketed for HO scale, they could easily be used in S and O scale buildings.

— *Cody Grivno, senior editor*

Facts & features

Price: \$35.95 each

Manufacturer

DVL Design LLC
10943 Nighthawk Circle
Fountain Valley, CA 92708
dvldesign.com

Features

- More than 200 sign designs
- Six light-emitting-diode colors
- Three detailed etched-metal frame styles



Reliable couplers are important whether you're pulling a long freight or switching industries, such as REC Paper Products on *Model Railroader*'s former Wisconsin & Southern Troy Branch. We help a reader get caught up on the current HO scale coupler market. Bill Zuback photo

Which combinations of HO scale couplers work well together?

Q I'm getting back into model railroading after a 50 year hiatus. I'm having trouble with knuckle couplers that won't connect. I have new rolling stock from Athearn, Walthers, ScaleTrains, and Accurail. I also have several cars that I converted to Kadee. Couplers from different manufacturers don't seem to work together. Are there any combinations of couplers that work together reliably? I'm about ready to buy a bunch from Kadee and convert everything.

Bill Gingerich

A First, Bill, welcome back to the hobby. As you have probably noticed, a lot of things have changed in model railroading while you were away. The world of HO scale couplers is no exception.

For more than 65 years, Kadee's Magne-Matic automatic knuckle coupler has been the de facto hobby standard. Though Kadee has a robust lineup of dozens of coupler models, the most popular has long been the No. 5. It features cast zinc alloy construction, a bronze coil knuckle spring, and a $\frac{9}{32}$ " shank (the distance from the center of the mounting pin to the back of the knuckle head).

"Whisker" couplers are a fairly recent addition to Kadee's product lineup. The all-metal couplers have thin built-in centering springs on the shank, eliminating the need for the separate phosphor-bronze springs used on standard Kadee couplers. The No. 148 is the whisker equivalent of a No. 5 coupler. It's offered in bulk packs if you're trying to equip a large fleet.

When Kadee's original patents expired in the late 1990s, a new crop of knuckle couplers from several manufacturers appeared. Plastic knuckle couplers produced by Accurail (Accumate), Bachmann (E-Z Mate), and McHenry (Athearn) entered the market. They're made of tough engineering plastic with, depending on the manufacturer, a one- or two-piece design and plastic or coil metal knuckle springs.

In more recent years, metal couplers have been produced by Rapido Trains (MacDonald Cartier) and Wm. K. Walthers Inc. (Proto-Max). The couplers have coil metal knuckle springs, phosphor bronze centering springs, and metal trip pins.

ScaleTrains includes semi-scale Type E couplers on many of its locomotives and freight cars. Die-cast metal versions are used on products in the Museum Quality and Rivet Counter lines. Plastic couplers are found on Operator and Kit Classics models. The company uses die-cast metal Type SE double-shelf couplers on its Rivet Counter line Trinity 31,000-gallon tank car. The couplers on ScaleTrains models do not have trip pins.

The last sentence of your letter is certainly one way to deal with coupler compatibility issues. Some model railroaders adopt a specific brand of coupler as their "standard" and use it on all of their locomotives and rolling stock.

You can certainly mix-and-match brands. On our Milwaukee, Racine & Troy East Troy Industrial Park layout we have rolling stock with Kadee, WalthersProto, and Rapido metal couplers and they work together well.

Where you may start running into compatibility issues, though, is if your rolling stock fleet has a mix of standard, semi-scale, and scale couplers. Although standard couplers offered by various manufacturers look prototypical, they're actually slightly oversized to operate more reliably. Scale couplers, like those offered by Accurail, Kadee, and McHenry, are smaller in size and bring the distance between cars to a more prototypical distance. However, the size difference may make coupling and uncoupling cars with other couplers tricky.

My recommendation would be to settle on a common material (metal or plastic) and coupler style (standard, semi-scale, or scale) and adopt those as your standards. Hopefully that will make it easier to pick up and set out cars on your model railroad.

Q Is there a compilation of Arduino articles written for model railroads that is easily accessed?

Jim Bottomley

A We have a few different options that might be of interest to you, Jim. In the Digital Downloads collection on shop.trains.com, we offer "Three Projects Using Arduino Microcontrollers." The 38-page collection features three articles that previously appeared in the pages of *Model Railroader* magazine.

Last year, Firecrown Media released *Arduino Projects* by Paul and David Bradt. The 96-page book includes information on programming and using Arduino and Raspberry Pi microcontrollers; controlling assorted lighting effects, including grade crossing flashers and torches; and connecting Arduinos to software to aid in model railroad operations. The book, available online and at Firecrown retailers, is item No. 12850 and priced at \$23.99. Downloadable code files for the projects featured in the book are available on Trains.com.



Bruce Kingsley used an Arduino project board to add sound, motion, and programmed lighting effects to this HO scale house. You can learn more about his techniques in the Digital Downloads collection "Three Projects Using Arduino Microcontrollers" on shop.trains.com.

Bruce Kingsley photo

Paul and David Bradt also wrote *Arduino Model Railroad Signals and Other Projects*, which you can find on shop.trains.com. The book has several entry-level Arduino projects for model railroad layouts.

Q I've recently tried to purchase wood stains for a project and have been

unsuccessful finding commercial products that were previously available. I also have three concentrations of India ink washes, made with 70% denatured alcohol, but that limits the final color. I was considering diluting Minwax oil-based wood stain with mineral spirits to the desired concentration/intensity to create the effect I want. What do you think?

Dr. Tom Hiser

A Thinning oil-based Minwax would probably work. However, since it is oil-based, the wood stain will have a longer dry time compared to many of the commercial and homemade washes designed for hobby applications.

I asked around here and Trains.com Director David Popp has used products similar to Minwax's water-based interior stains. He said you should be able to dilute it with water or rubbing alcohol. David recommends experimenting on some scrap pieces of wood before going all in on a model. Good luck on your staining projects.

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Contributing Editor Lou Sassi added 1 teaspoon of India ink to a pint of 70% isopropyl alcohol to make stain for the blocking on a flatcar. A reader wants to know if oil-based wood stains can be diluted for hobby use. Lou Sassi photo

The last questions are about Broadway Limited Imports models. We asked Curtis Koch, Director of Marketing and Social Media for BLI, to answer them. — Ed.

Q I recently acquired an N scale Broadway Limited Imports Electro-Motive Division E7, an excellent-looking model with good sound quality. However, without traction tires, the locomotive struggles to move five

freight cars up a 1-in-50 gradient. Is there a quick fix for this problem, or do I just have to stick with short trains?

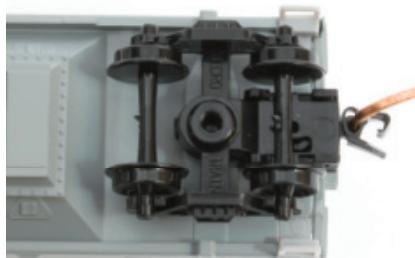
Maurice Murphy

A I would recommend first checking how freely the rolling stock moves. Lubricating the wheel axles where they sit in the trucks can greatly improve rolling performance. We perform extensive load testing on a 4% grade before production, and the locomotive should be capable of pulling more than five freight cars under normal conditions.

If the E7 still struggles to pull cars after the axles have been lubricated, our service team will be happy to assist. Contact techsupport@broadway-limited.com.

Q I saw in a recent issue of MR that Broadway Limited has smoke units in its N scale locomotives. Are these smoke generators "solid state"? I'm using smoke units on my layout with the wire element in them. They work, but I find their life isn't very long.

Ralph Symington



Have a locomotive that's struggling to pull cars up a grade? Your rolling stock may be the culprit. Inspect the trucks and wheelsets and add a drop of plastic-compatible lubricant to the wheel sockets as needed. Cody Grivno photo

A The N scale smoke unit uses a wire-wound resistor that heats up to create pressure, which then pushes the smoke out through the stack. The smoke duration is controlled by a built-in timer, and customers can adjust this by changing CV 218 to lengthen or shorten the run time.

Send questions on model, prototype, and toy trains to AskTrains@Trains.com.

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At first glance, the Soo Line Mukwonago, Wis., depot on the HO scale East Troy Industrial Park looks like a plastic or wood kit. However, it's actually a 3D-printed resin structure from Northwoods Models LLC (sooparts.tech). Senior Editor Cody Grivno shares his techniques for building the kit from start to finish. Photos by the author

Build a 3D-printed depot kit

It's no secret that 3D printing is a rapidly growing part of model railroading. Individuals and companies are offering locomotive shells, freight car kits, structures, vehicles, detail parts, and figures, among other items, in various scales using the technology. Model manufacturers are even taking advantage of 3D printing to produce test shots of models before they spend money having tooling produced. When looking for a depot for our HO scale East Troy Industrial Park layout, we decided to use a 3D-printed kit.

Prior to building the Soo Line Mukwonago, Wis., depot, produced by Northwoods Models LLC (owned by former *Model Railroader* DCC Corner columnist Mike Polsgrove), my experience with 3D-printed items was admittedly pretty limited. In the September 2021 *Model Railroader*, I shared how I added a 3D-printed air conditioner and ditch lights to an Atlas Trainman HO scale Electro-Motive Division GP38-2. In *Model Railroading: The Ultimate Guide 2023* I wrote about adding 3D-printed antenna arrays and an exhaust stack cover from MAC Rail Products to an Athearn HO scale General Electric Dash 9-44CW.

Small detail parts for diesel locomotives, especially those largely ready to use, are one thing. An entire structure kit is another. Some of the techniques required for plastic building kits still apply here, like sanding, cleaning, gluing, priming, and painting. When it came time to remove the windows, doors, and other detail parts from the support structures, I had to modify previously learned approaches. Read step 2 for more on that topic.

In the end, I was quite happy with how the 3D-printed Mukwonago Soo Line depot turned out. If you haven't worked with a 3D-printed model before, give it a try. I'm looking forward to trying my hand at a freight car kit next!

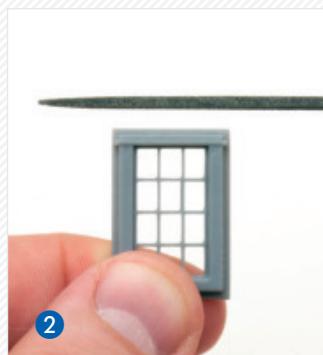
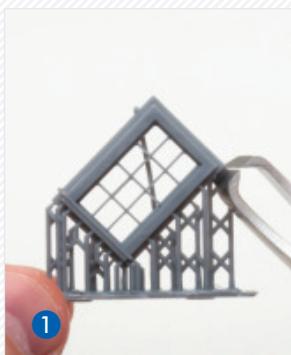
STEP 1 TAKING INVENTORY



Whenever I build a kit, the first thing I do is examine the contents. I do this for two reasons: To make sure all of the parts are included and to confirm nothing is damaged. Fortunately, the instructions had a section called "Kit Contents", so the inventory process didn't take much time at all. I'm happy to report that all of the parts were in good shape.

The instructions also included valuable information about working with 3D-printed parts, gluing techniques, and painting suggestions. I also learned the kit was produced using resin, not thermoplastic filament. Knowing this, I worked in a well-ventilated area and wore a respirator, goggles, and gloves when cutting and sanding the parts.

STEP 2 LEARNING THE ROPES



The depot and roof are one-piece parts with the support structure removed by the manufacturer. The doors, windows, roof brackets, station signs, and chimney were still attached to their respective support structures.

As noted in the December 2025 Ask MR column, care must be used when cutting 3D-printed parts from the support structure as the resin may be brittle. If using tweezers-style sprue cutters, make the cut where the wide part of the cone meets the support structure ①. If you cut too close to the part, it may cause compression damage.

Tim Kidwell, editor of our sister magazine *FineScale Modeler*, said that if space permits, a fine-tooth razor saw is a better option. Why? Because it cuts the material instead of crushing it.

After I'd removed most of the support structure, I used a combination of jeweler's files and sanding sticks to remove any remaining material ②. Check your work often

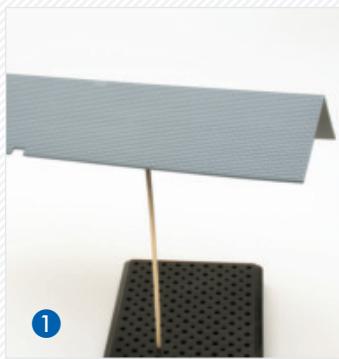
during this process so you don't remove too much material from the windows, doors, and other parts.

The bottom of the roof has soffit board detail, along with dozens of dimples from the support structure. To make the latter less noticeable, I gently sanded the roof with 800-grit paper, keeping my motion parallel to the boards ③. My goal was to minimize the dimples, not eliminate them, as most of the roof overhang isn't visible.

I also gently sanded the depot exterior to remove striations (horizontal lines from the 3D-printing process) and imperfections. Then I used a toothbrush and isopropyl alcohol to clean the depot, roof, and detail parts. Per the instructions, do not soak the parts in isopropyl alcohol for an extended period of time.

In preparation for the next steps, I installed the doors and all of the windows except for those in the operator's bay. I used cyanoacrylate adhesive (CA) to attach the parts.

STEP 3 TIME FOR PRIMER



To ensure the final colors would cover evenly, I sprayed the depot, roof, and smaller parts with primer. For the depot and roof, I used Rust-Oleum Painter's Touch 2X Gray Primer (334017) ①.

I sprayed the roof brackets, doors, windows, and station signs with light gray Tamiya Surface Primer (87042) ②. I switched brands to test how the Tamiya product worked on 3D-printed resin and to preserve the finer detail on these parts.

I returned to the Rust-Oleum Painter's Touch 2X line — this time Red Primer (334018) — for the chimney ③. After it had dried, I used a Microbrush to paint the chimney's interior flat black. Then I brush-painted the top three courses of bricks with full-strength Vallejo Model Air Portland Stone (71.288).

Finally, I made a wash out of Vallejo Model Air M495 Light Gray (71.298). I flowed it into the mortar lines, which helped the individual brick detail stand out.

STEP 4 READY FOR PAINT



I found a color prototype photo of a similar depot in Somerset, Wis., in *Soo Line In Color* by Robert J. Wise (Morning Sun Books Inc, 1997). I re-created the cream-and-maroon depot scheme by applying Vallejo Model Air Beige (71.074) and Brown RLM26 (71.105) with an airbrush ①.

Even with careful masking, some of the Brown bled under the blue painter's tape. I used a fine paintbrush and

some Beige paint to touch-up the color-separation line ②. This can be a tedious process, so pack your patience. If you get frustrated, take a break and come back later.

I switched to spray paint for other parts of the depot. Tamiya Rubber Black (TS-82) is my go-to color for dark asphalt shingles ③. I used the same company's Matte White (TS-27) for the station signs ④.

STEP 5 ADDING AGE



Even though the depot is meant to be preserved, it still needed some weathering. First, I used an airbrush to apply Vallejo Model Color Neutral Gray (70.992), thinned to a wash with the manufacturer's airbrush thinner ①.

Next, I turned my attention to the roof. I attached the chimney with CA and filled any gaps with white glue. Then I brushed Vallejo Model Air Black (71.057) where the base meets the roof to simulate sealant.

Later, I brush-painted random shingles Vallejo Model Color German Gray (70.995) to suggest repairs had been made over the years. I also drybrushed vertical streaks of Neutral Gray in a few spots ②. A little of this goes a long way, so use these weathering techniques sparingly.

The kit includes paper station signs, which are photos of the prototype. The weathered signs looked odd in a bright white frame, so I used a sanding stick to remove

STEP 5 ADDING AGE (CONT'D)



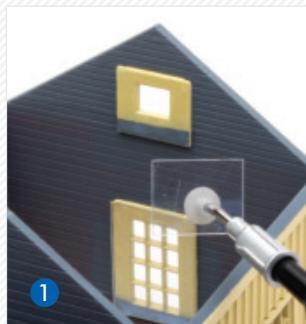
some of the white paint, revealing the primer underneath **3**. It's not a perfect solution, but definitely less jarring.

I applied fresh Beige and Brown RLM26 to a few spots on the depot **4**. This suggests some repairs had been

made to the building. I also put fresh paint on one of the panels in the four-panel door, as shown below in step 6.

Finally, I used an airbrush to apply Vallejo Matte Varnish to the depot. This gave the structure a uniform, flat finish.

STEP 6 FINISHING TOUCHES



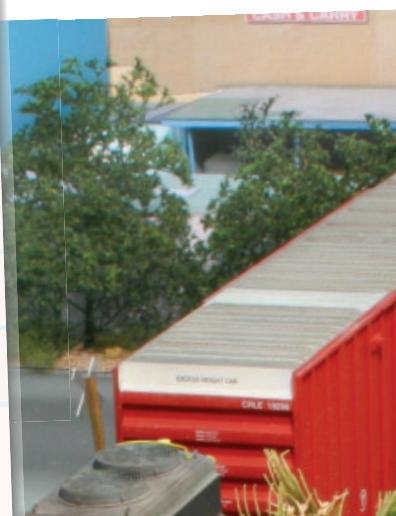
The window glazing, Evergreen .010" clear styrene (9006), is not included with the kit. After cutting the styrene to size for each location, I coated the backs of the windows with Micro-Mark Liquid PSA (84775). Then I picked up the styrene pieces with a hobby suction tool and set them into place **1**.

Next, I attached the roof to the building with CA. After it had cured, I applied the same adhesive to the back of the roof brackets with a toothpick and carefully set them in place **2**. Note that there are three styles of brackets: left end, right end, and side.

To wrap up the project, I added the Mukwonago station signs to both ends of the depot. I also attached signs David Popp made from prototype photos he took (not included with the kit) to the sides and ends of the building. The East Troy Electric Railroad heralds, arrival/departure board, and National Register of Historic Places sign reinforce the structure's use in a museum setting.

Oh, and if you're wondering, the East Troy Railroad history sign mounted on a section of rail to the right of our HO scale depot is prototypical. You can find the real sign in front of the East Troy Depot. **MR**

Workin' the switchback



Notes from an
'interested uncle'
offer tips on
adding realism
to operations

By Lance Mindheim
Photos by the author

When I picked up the May 1976 issue of *Model Railroader*, I was a few months shy of my 16th birthday. Inside was an article by John Olson that so captivated me that I credit it with drawing me into the hobby I enjoy just as much now as when I read John's piece nearly 50 years ago. John's article "A Day At Mule Shoe Meadows" also had contributions from what must have been at the time an extremely youthful Paul Scoles.

The following photo story is a shameless takeoff on the Muleshoe Meadows article and a thank-you to those pioneers who brought so many of us into this wonderful hobby. What follows is a fictional letter from a railroad conductor to his young model railroader nephew explaining a typical day on Miami's Downtown Spur switchback, featured in the December 2013 issue of *Model Railroader*, with accompanying photos with captions on the back. While the story and characters are entirely fabricated, the location and operating practices are very accurate.



TOP: The yard job out of Hialeah Yard eases across 11th Avenue as it navigates the switchback on the Downtown Spur in Miami. Clearances are tight and vehicle traffic heavy, making working this spur a challenge for even the most veteran of operators.

We keep this map of the switchback in the crew lounge. I thought it might give you the lay of the land.

Dear Brian,

I got your letter yesterday asking about all the things your Uncle Ray does at work for the railroad. Maybe the easiest way to explain things is just to tell you what my average week is like. A friend of mine, who is sort of a rail photography buff, took some pictures of us going about our business last week. I put notes on the pictures so you can follow along and have also included a map to help you get oriented. One thing is for sure, our job is much different than most people would guess.

Remember a few years back you took me to that train club of yours? I can't remember, I think they called it an operating session or something. The guys were nice enough but pretty much had everything wrong. They did everything way too fast and skipped half of the steps we actually do at work. Oh, and I guess their miniature brakeman have wings and can fly at light speed from spot to spot.

Working in 90 degree tropical weather I wish I had wings like that. I guess without having been on the job on a railroad it's hard for them to know how long the simplest things take, like just getting across the street. No kidding, just getting a locomotive and boxcar across a busy city street is a big job. When you consider that the machinery involved is bigger than a house and the aggressiveness of the drivers on the roads around here, you get the picture.

Some of our street crossings are totally blind. The track squeezes between warehouses on both sides like being in a canyon and you can't even see the street until you are right on top of it. That's what I mean about the guys in your club, they shoot across a model train street like slot cars when in the real world it might take us a half hour to set up for the crossing, and get back and forth across it.

I work out of Hialeah Yard here in Miami. When you've been around as long as I have, you have a lot more say in which jobs you want to work. Some guys like the over-the-road hauls where you stay in the cab, crack the throttle, and run from A to B without stopping. For me, I'm to the point where I like to sleep in the same bed every night, so I prefer to work the many local industrial switch jobs we run every day. I usually run the day shift which is nice because the hours are normal and can be home in time to watch my *Soprano's* re-runs on cable every night. The downside of working days is that there is a lot more vehicle traffic on the roads than during graveyard shift. That makes things very tricky at times.

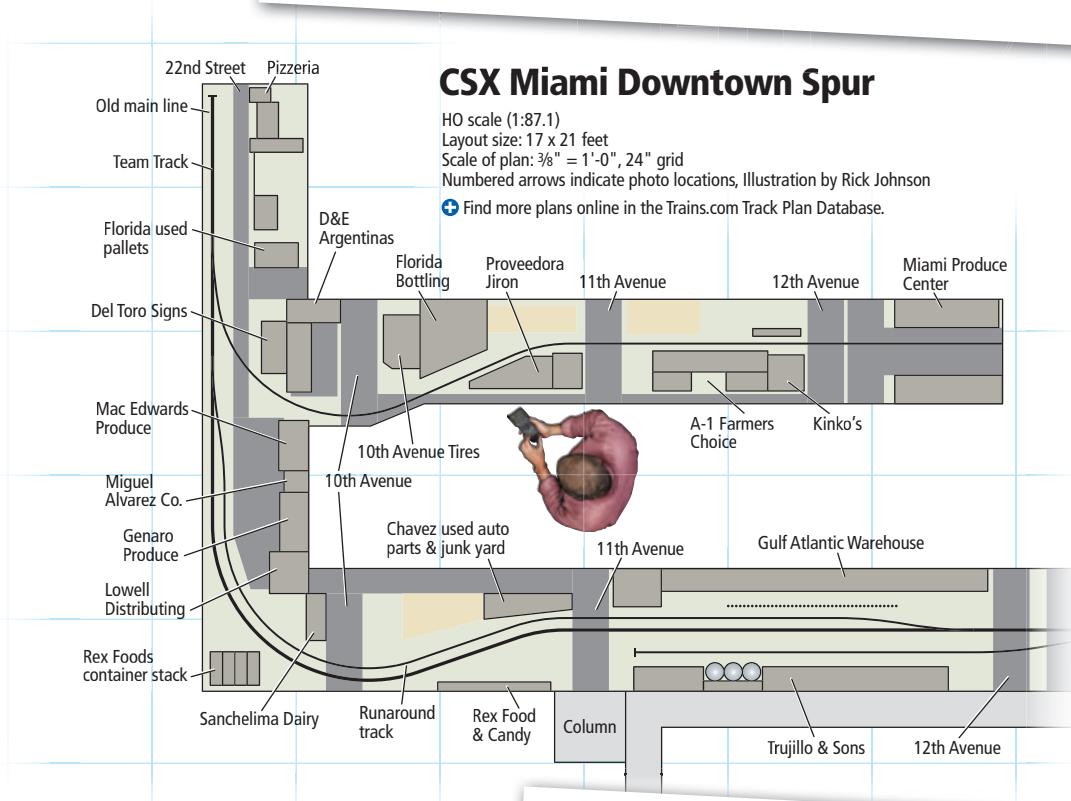
Lately I've been working the tail end of a small branch called the Downtown Spur. The total branch is about a 4-mile-long stretch of track running east/west from near the river towards downtown Miami. At the end of the branch, a small spur about a quarter mile long splits off and doubles back.



CSX Miami Downtown Spur

HO scale (1:87.1)
 Layout size: 17 x 21 feet
 Scale of plan: $\frac{3}{8}$ " = 1'-0", 24" grid
 Numbered arrows indicate photo locations, Illustration by Rick Johnson

Find more plans online in the [Trains.com Track Plan Database](#).



Here's a shot of the switcher we use on the switchback — a GP38-2. Its 16, 9-inch bore cylinders, aided by a roots supercharger, crank out 2,000 horses. Despite newer locomotives you see today, it's still a great machine. That's why so many were made and are still on the rails. Remember how you were complaining that when you traded in your MG sports car for the SUV it didn't have the same feel? Well it's the same here. You have a much better feel for the throttle with old girls like this than new engines. I never get tired of the "thump-in-the-chest" sounds it makes.





TOP: On Tuesday, we'd barely gotten started when something in the switcher stopped working and we were dead in the water. Fortunately, we were clear of everything. That's another nice thing about working the local switch job, the yard with all of its mechanics is close by. We didn't have to wait more than 45 minutes before help arrived.

MIDDLE: I always like to get the hardest job done early in the day if possible. On the switchback, that means getting across 12th Avenue to service the Miami Produce Center. The first thing I like to do is walk down to check things out. Sure enough the boxcar we were told to pick up was still there.

BOTTOM: Now for the fun part, getting a 125-ton locomotive across four lanes of heavy traffic while keeping the cars and engine separated. On top of that, this crossing is totally unprotected, no flashers, no gates, nothing. Unbelievable. I call this area the west canyon — you feel like you are in a canyon because you have buildings tight against the track.

When a spur doubles back like this it's called a switchback and is really dicey to work. The businesses we switch out there are produce warehouses mostly. It used to be that the graveyard shift could easily handle everything on that branch, but in the past year or so, business has really increased, and they haven't been able to get everything done at night.

Graveyard hasn't had time lately to work the switchback so that's what I've been doing the past few weeks, finishing up what they couldn't get done. It looks simple on a map but there are a lot of dangerous road crossings that are difficult to see. It's never boring, that's for sure. This part of town is, to be diplomatic, "colorful." You never know what you'll find on the tracks.

In the past two decades there's been a big uptick in the number of voodoo sacrifices we see on the rails. As I understand it, some locals believe that positive things will happen (or bad things won't happen) if they put a live chicken in a bag with some money, place it on the rails, and sacrifice the contents. I must see 50 bags of sacrificed chickens scattered along the branch on a typical day. Of course nobody picks it up so you add in the Miami tropical heat and humidity and things can get a bit ripe.

One thing about this job is there's a lot of walking. I hated it at first but they say walking is the best exercise. Anyway that's what probably accounts for my trim physique (I say in jest). Just look at my brother, your Uncle Frank, working for HQ in Jacksonville. Look at the tire around his middle. If he spent less time typing memos and more time out here with me like he should be, he'd be in a lot better shape. Getting back to the walking ...

The switchback track is a bit shaky and overgrown with weeds. It's only about a thousand feet long, so we usually like to walk it first before running down it with the switcher just to make sure there aren't any problems with the rail, old tires or trash on the tracks, etc.

Since we work during the day I always like to talk to the customers when I can just to make sure we know where they want the cars spotted. We park the switcher out in the clear and I just walk in and talk to the shipping manager. Beyond that there's just a lot of footwork involved in walking back and forth lining switches, hooking up air hoses, and things like that.

On a side note, I really think our local sales department is out of control and it's time for Jacksonville to step in. You used to be able to handle the entire Downtown Spur, including the switchback, easily in one shift five days a week. The salesmen have been so focused on padding their pockets with commissions that they've signed up every corner grocery in the area for rail shipments.

Now there's so much business on the spur that graveyard can't get it all done. We have to do mop-up during business hours and fight all of the vehicle traffic at the grade crossings. Up north



they're more sensible and don't waste their time with all these one- or two-load businesses. Hmm. A lot of the guys up there got laid off and I'm still employed. Scratch that thought!

I hope these pictures help out with some ideas you can use for your operating session. Off the top of my head some things you could probably copy in one of your sessions would be: stop the locomotive at most of your grade crossings, then lay on the horn and inch across.

At busy crossings, allow time for the brakeman to walk into the street and set up flares or flag vehicle traffic. Allow for a break at lunch hour. At lunch we usually split the train at the street crossings so traffic can pass and then hook it back together after we've eaten.

Allow time for your miniature brakeman to line the switches. After all we do have to walk to them (not fly) and many have to be unlocked with a key before they can be thrown.

Give the crew time to walk into the customer's office to discuss car placement. Leave a few minutes for us to walk some of the track to check for problems. The main thing is to tell your guys at the club to slow down and allow time for all of the parts of the job we actually do.

I never did get that part of your club. It's a hobby, so you'd think the idea would be to intentionally slow things down so the enjoyment lasts longer.

Finally, you asked for my thoughts on you leaving the accounting firm to come work for the railroad. I need to think on that. In many ways it's a hard life, but looking back on it, I'd do it again. For now better off not mentioning anything to your Mom about that. Sis has always been sort of high strung and she might not take it too well. Let's talk about it more when you come to visit.

Signing off for now.

Uncle Ray



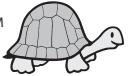
TOP: You really take your life in your hands with this move. As I said before (twice), there are no flashers or gates, so I have to light a flare on both sides of the track and play traffic cop for extra measure. Once a 15-foot wall of steel starts moving across the street people pay more attention and the cars usually stop. Beyond that you just lay on the horn and pray.

MIDDLE: Well, we grabbed the car and scooted out of there as quickly as possible. I went over to the south side of 12th Avenue just to make sure no thrill seekers were coming from that side to try to beat the crossing.

BOTTOM: Twenty minutes later we had made it safely across 12th Avenue and back. I had to walk back to remove the flares we put in the street.

ABOVE: A few days later we had another pull from A-1 Produce, which was easier because we didn't have to go all of the way across 12th. Crossing 11th avenue isn't so bad since there is hardly any traffic. We don't even bother with flares.

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Crossing the Cascades in HO and N



Union Pacific SD70ACe 1996, the Southern Pacific heritage unit, leads train ZLCBR over Salt Creek Trestle at Heather, Ore., on Feb. 22, 2007. Bob Sprague designed HO and N scale track plans for the Cascade Line. Kyle Weismann-Yee photo

Two track plans for the modern-day Union Pacific in Oregon

By **Bob Sprague**

In model railroad track planning, we generally try to have the main line pass through each scene only once. This is what the late John Armstrong, the dean of North American track planning, dubbed a "sincere" plan. It's a way to replicate the appearance and operation of full-size railroads as they attempt to get where they're going in the shortest, most direct fashion possible. What it means for modelers is that the layout's main line doesn't double back upon itself, and trains don't appear twice in one location.

Or does it?

One of the most famous mountain crossings in North America is Southern Pacific's (now Union Pacific's) grade over the Cascade Mountains in Oregon. Beginning near Oakridge, the line climbs 3,000 feet in about 26 miles. The track proceeds in a southeasterly direction, then reverses course, climbs towards the northwest, then loops back toward the southeast again. The length of the route is tripled, but the ruling grade is kept to a manageable 1.8 percent. Here's a real-life

situation where the main line crosses the same scene not only twice but three times, and it's prototypical.

The Cascade Line was the playground of Southern Pacific's famous 4-8-8-2 Cab-Forward steam locomotives. Placing the engineer and fireman ahead of the boiler and exhaust helped reduce the chances they would be asphyxiated in one of the 21 tunnels between Oakridge and Cascade Summit. Unique locomotives, spectacular scenery, tunnels, snowsheds, and mountain operations

makes this prototype irresistible as a modeling subject.

No wonder I was asked simultaneously, but coincidentally, by two different modelers to design track plans for the Cascade Line, one in HO and one in N.

Double duty

Both of the aspiring Cascade Line modelers had nice rectangular spare rooms for their layouts. The HO modeler's available space, at 11'-6" x 16'-6", was slightly smaller than that available to



Amtrak trains add variety to the assorted Union Pacific freights on the Cascade Subdivision. Here the northbound *Coast Starlight* navigates an S-curve at Lookout, Ore., on Oct. 10, 2007. Kyle Weismann-Yee photo

the N scale modeler, who had 11'-8" x 19'-6" to work with.

N scale is a great choice for a layout like this. Though the trains are smaller, the scenery can be about the same size as what would be possible in a larger scale. Big mountains and trees look really big! Small couplers and light-weight cars that sometimes make heavy switching a challenge work just fine on long freight drags moving steadily up and down the hill.

The HO version would have to be a bit less ambitious, but one advantage of modeling a long mountain grade is that speeds should remain low. Even today on the Cascade Line, 20 mph is about the maximum. Slow speeds make a mainline run seem much longer than it is.

My research was made relatively easy when I stumbled

upon a website titled Joel's Southern Pacific in the Cascades (<http://spcascades.railfan.net/home.html>). I don't know Joel, but the assembly of data, photos, and historical information was clearly a labor of love. After I spent some time tracing the Cascade Line on Google Maps, I felt like I'd been there.

The prototype begins east of downtown Eugene at Springfield Junction. It follows the Willamette River over relatively flat terrain through Jasper and Dexter; this portion of the line was relocated in the early '50s to make way for the Lookout Point Reservoir. Passing through Westfir and Tunnel No. 22, the line emerges at Oakridge, the bottom of the grade and a bustling helper terminal during the steam era.

After negotiating a pair of horseshoe curves, the route parallels Salt Creek through heavy forests. Distinctive rock outcroppings, including Baby Rock and Rooster Rock, overhang the tracks. Looking up it's possible to glimpse at trains high above, working



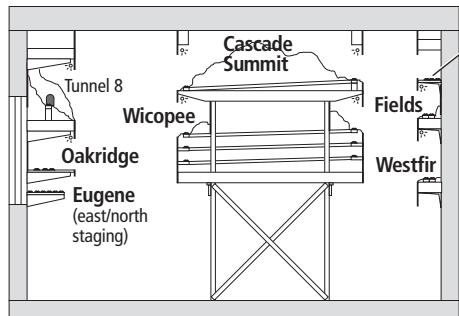
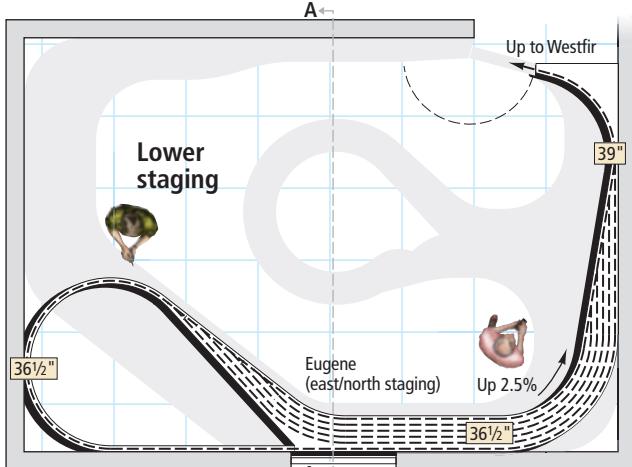
Eugene, Ore., is a large part of the lower level on Bob's N scale version of the Cascade Subdivision. Tyler J. Dzierzek photographed this Union Pacific business train from the Chambers overpass in Eugene. Tyler J. Dzierzek photo

their way back and forth up the mountain. After the siding at Heather, the track crosses Salt Creek, turns 180 degrees to the northwest, and begins to climb a stiff 1.7% grade.

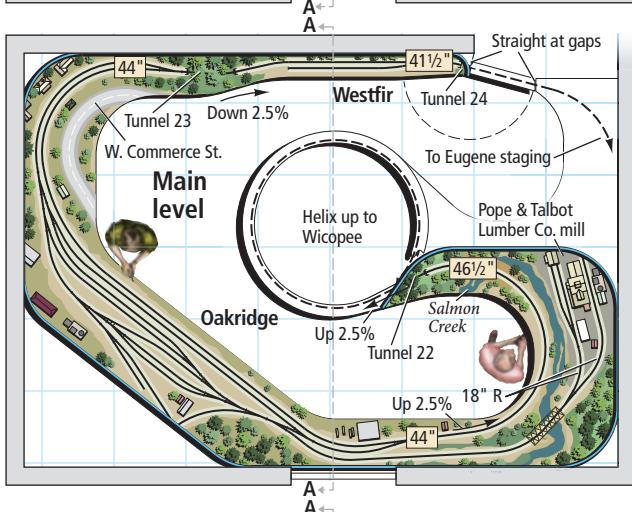
After another six torturous miles backtracking, the route reverses again in the semicircular Tunnel No. 16 and resumes its southeasterly direction, still climbing toward Cascade Summit. There, on the shore of Odell Lake, the grade finally crests.

In the steam days there was a wye at the summit to turn helper locomotives. The tail track of the wye had to be built as a tunnel into the side of the mountain, and would only accommodate one Mallet or Cab-Forward at a time.

I was fortunate to ride Amtrak's *Coast Starlight* from Seattle to Oakland a few years ago, which traverses this grade. I was probably the only one of the passengers who was excitedly counting the



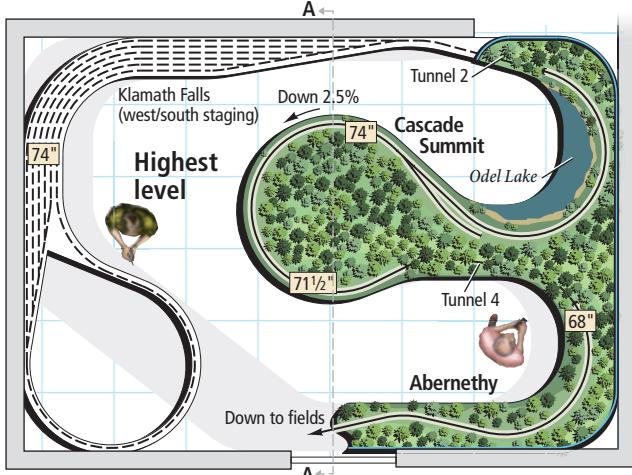
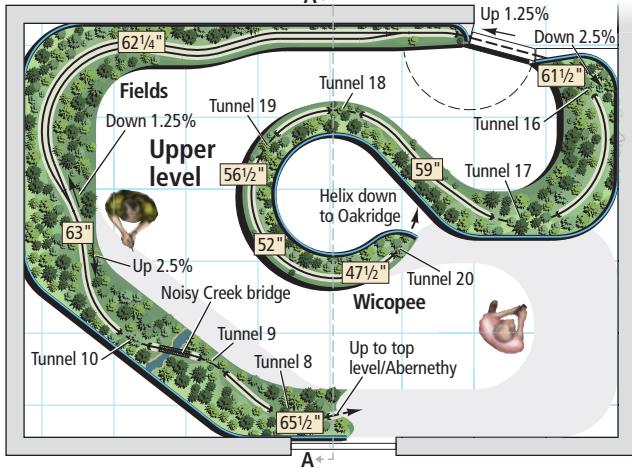
Cross section A-A



UP in the Cascades

HO scale (1:87.1)
Room size: 11'-6" x 16'-6", Scale of plan: 3/16" = 1'-0", 24" grid
Illustration by Robert Sprague

⊕ Find more plans online in the Trains.com Track Plan Database.



The track plan at a glance

Name: Union Pacific in the Cascades

Scale: HO (1:87.1)

Size: 11'-6" x 16'-6"

Prototype: Union Pacific

Locale: Oregon

Mainline run: 125 feet (visible)

Minimum radius: 28" (main), 18" (industrial)

Minimum turnout: No. 6

Maximum grade: 2.5%

tunnels and noticing that the angle of the sun had moved from one side of the train to the other, and back again.

HO scale first

I would have to be judicious to represent the Cascade Line in HO scale in a relatively modest room. Fortunately, the builder was game for a complex, multi-deck treatment. The mountainous location, multiple curves, and steep grade of the prototype fits multi-deck geometry much better than the typical Eastern or Midwestern setting.

Nevertheless, I selected a 28" minimum radius. A 30" minimum would have been better, but the extra inches provided precious extra width for the aisles. Since the builder wanted a version of the prototype set after the 1996 merger between SP and UP, there wasn't a need to accommodate or turn SP's huge articulated steam locomotives.

The lowest level is a staging loop representing Eugene and destinations north of the big grade. The turnouts are arranged to be close to the aisle for accessibility. The longest staging track, at more than 16 feet in length, can accommodate an HO scale freight worthy of the big steam or diesel power required to get it over the hill.

Trains entering the visible portion of the railroad from the Eugene staging emerge traveling right-to-left. Geographically trains at this location on the prototype are proceeding in a southeast direction. However, on the Southern Pacific anything moving in the direction of San Francisco was considered a "westward" train.

It feels proper that a west-bound train is seen moving to the left, since that's the orientation of most maps, and that's always the point-of-view of an operator in the aisle. After crossing the doorway to the

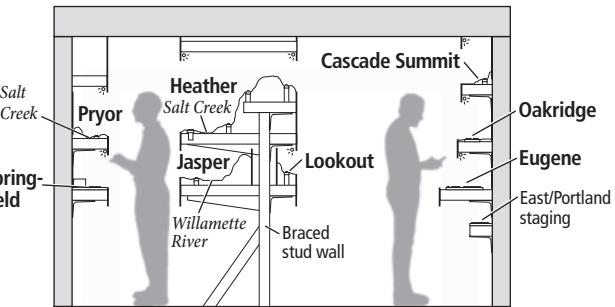
The track plan at a glance

Name: Union Pacific in the Cascades
Scale: N (1:160)
Size: 11'-8" x 19'-6"
Prototype: Union Pacific
Locale: Oregon
Mainline run: 202 feet (visible)
Minimum radius: 15"
Minimum turnout: No. 6
Maximum grade: 2%

Union Pacific in the Cascades

N scale (1:160)
Room size: 11'-8" x 19'-6"
Scale of plan: $\frac{3}{16}$ " = 1'-0", 24" grid
Illustration by Robert Sprague

Find more plans online in the Trains.com Track Plan Database.



Cross section A-A

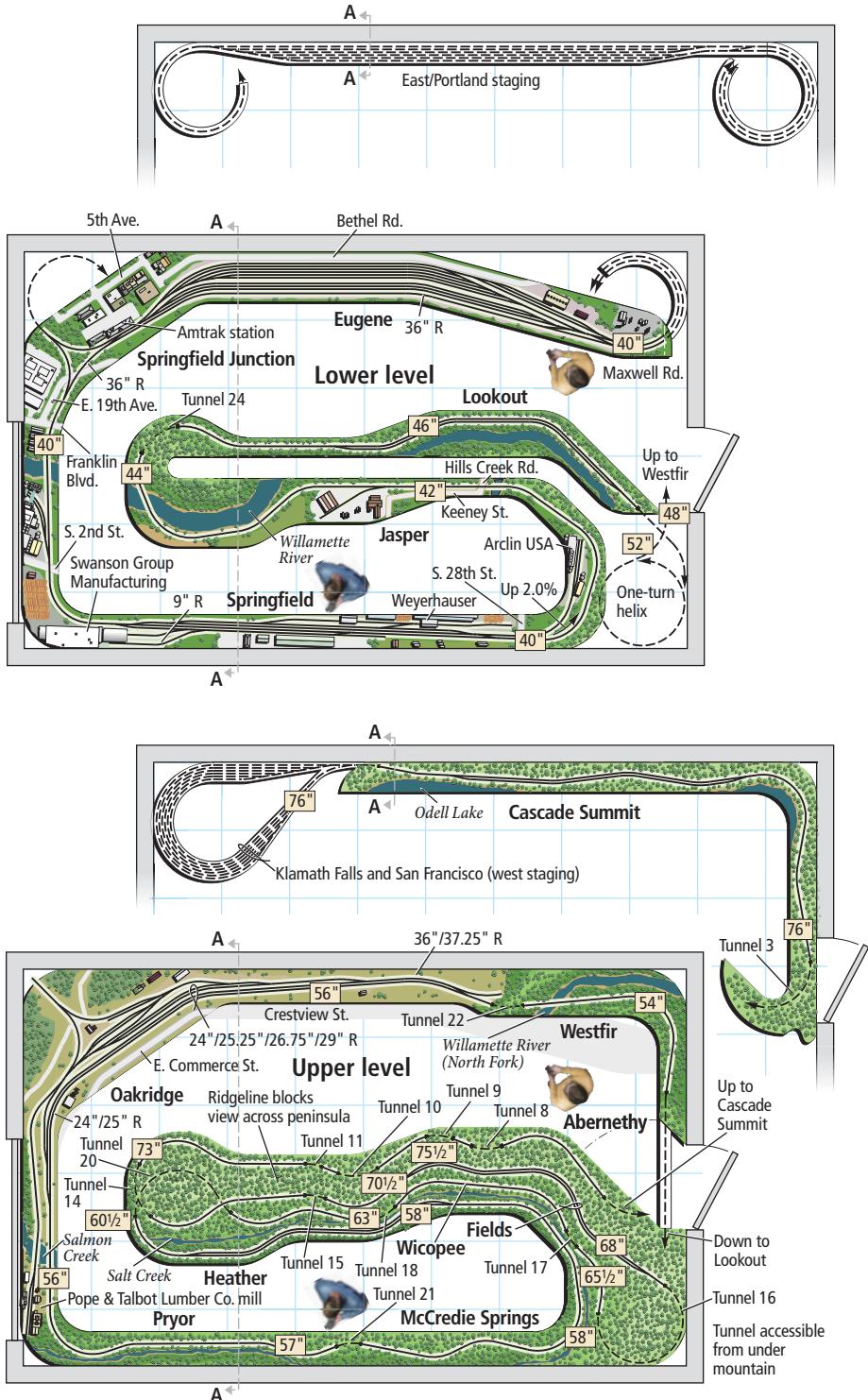
room on a swing or lift gate, the tracks enter Westfir, which is on a narrow shelf.

Past Tunnel No. 22 is Oakridge, Ore., which serves as the only yard on this version of the Cascade Line. Operations are limited, but it will be possible to simulate the adding or subtracting of helpers in the diesel era. In Oakridge I was able to shoehorn in the Pope & Talbot Lumber Co. mill accessed, as on the prototype, via a truss bridge over Salmon Creek.

The main line departs Oakridge and enters a helix. Only two turns are necessary to achieve a sufficient separation between decks, because a 2.5% grade has brought the grade level up nearly 20" by the time trains negotiate Tunnels No. 20, 19, 18, 17, and 16 and cross the doorway on a second swing or lift gate.

Now fully on the third level, the passing siding at Fields allows west-and-east-bound trains to meet. After experimenting, the builder and I decided that there just wasn't room to represent the back-and-forth grade of the prototype in this room. The multiple levels, tunnels, and bridges will still provide a spectacular setting. By the time the main line reaches Cascade Summit and crosses the doorway for a third time, it's 74" above the floor. With minimum-depth benchwork over the door, a fixed shelf should clear all but the tallest visitors and obviate the need for a third gate.

There trains enter Tunnel No. 2 and disappear into





Amtrak's *Coast Starlight* twists through the Cascade Loops near Wicopee, Ore., on June 16, 2021. Densely wooded scenes like this, along with numerous tunnels, are some of the signature features of the UP Cascade Subdivision. Bob Johnston photo



Two Union Pacific road units bring Southern Pacific water cars under a signal bridge at Oakridge, Ore., in 2009. The water cars are distributed to points between Hampton and Crescent Lake to help with fire suppression. Kyle Weismann-Yee photo

another staging loop that represents Klamath Falls and destinations to the south (timetable west). The longest track matches the capacity of the Eugene loop, and stages a substantial freight for a return journey. This staging loop will be well over head-height, so careful construction and provision for access will be critical. For this reason, it's recommended that the area at the lower left of the plan be kept open for access to all levels.

On to N scale

The room available for the N scale version of the Cascade Line is only a little bigger than what I had to work with in HO. What a difference it makes, however, in trying to represent a

prototype as impressive as the UP in Oregon. I chose a 15" minimum radius, and even so I was able to open some of the aisleways to a comfortable 4 feet.

There was room, as well, to represent considerably more of the prototype route. Once again, the lowest level is a staging yard representing Portland and other destinations to the north (timetable east). The builder possessed a double-track prefab helix, so I made use of it to separate the staging yard from the shelf above by a comfortable 10 inches. On the top is a substantial version of the yards in Eugene and a bonus — a wye that represents Springfield Junction while also permitting the restaging of eastbound trains.

In contrast to the minimalist HO scale version, there

is the opportunity to include a number of the prototype industries that line the tracks through Springfield, Ore. An operator could be kept quite busy running a turn out of Eugene to service and switch these customers, while main-line freight (and passenger) trains pass by on their way toward the Cascade Range.

Crossing the Willamette River (wil-LAM-et, for those in the know) the main line traverses Tunnel No. 24 and the passing siding at Lookout before disappearing into a slightly distorted one-turn helix representing Tunnel No. 23. This helix provides a little more altitude while orienting the track to cross the doorway on a straightaway — always good for reliability. The second level begins at Westfir, and, past Tunnel No. 22, includes a fuller version of Oakridge with a complete wye for turning helpers.

Thanks to N scale I was able to work in the back-and-forth grade in all its glory, with considerable fidelity to the tunnels, curves, bridges, and passing sidings of the real thing. Viewers in the aisle will be able to follow trains as they climb from 58" at Heather to over 73" as they enter Tunnel No. 14. Even the semicircular Tunnel No. 16 is present. Still climbing, the tracks cross the doorway at a spectacular 76" elevation

before reaching Cascade Summit on the shores of Odell Lake. Finally they disappear into a capacious return loop high above Oakridge and Eugene.

The builder of the N scale version, like the HO version, plans a contemporary Union Pacific version of the Cascade crossing. The broader curves of N scale, along with the wye at Oakridge, would make a steam-era version practical.

Although there isn't room for a wye to turn helpers at Cascade Summit, a little finagling would allow the helpers to be turned on the staging loop and return to Oakridge pilot-first. Southern Pacific 2-8-8-2 Mallets have been made in N scale, and Inter Mountain Railway Co. is taking reservations for a future run of 4-8-8-2 Cab-Forwards in multiple classes.

The reward

Between stops and starts, mergers and anti-trust actions, it took nearly 35 years to get the line over the Cascades completed. It might not take quite that long to build either the HO or N scale version of the Cascade Line, but it won't be quick either. With multi-deck construction, multiple helixes, multi-level doorway crossings and other complexities, either design calls for careful planning and construction.

The reward, in either scale, would be a spectacular rendition of one of railroading's engineering marvels. Massive locomotives wrestling long trains up and over the hill will be quite a sight for operators and visitors alike — and provide great satisfaction to a tired builder! **MR**

Bob Sprague is a frequent contributor to Model Railroader magazine. His track plan article "MoPac in an attic," based on the railroad's Joppa Subdivision in southern Illinois, appeared in the January 2024 issue.

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The CB&Q Aurora Branch

Industrial switching is the name of the game on this 15 x 72-inch HO scale shelf layout

By Ron Stallman

Photos by Rich Hall

On a warm spring day in 1954, two teenage boys straddled their old Schwinn bicycles as they watched the local Chicago, Burlington & Quincy wayfreight switch boxcars at the *Beacon-News* building in downtown Aurora, Ill.

I was one of those boys, and railfanning was a favorite hobby of mine. It's now more than 70 years later and I wanted to transform those memories into reality on my HO scale CB&Q Aurora Branch shelf layout.

Aurora was a great place for a teenager to be a railfan in the mid-1950s. Passenger trains, including Great Northern's *Empire Builder*, Northern Pacific's *North Coast Limited*, and the Q's *Burlington Zephyr*; speedy through-freights; and lumbering locals could all be seen. But it was the switching duties of the locals that captured my attention and created memories that I hold close to this day.

My fascination with industrial switching, combined with the possibility of having to downsize, led me to think seriously about giving up my current Santa Fe Shortline (SFS) switching layout in favor of something smaller and simpler. You can read more about my 7 x 8-foot HO scale SFS layout in the October 2021 *Model Railroader*.

Enter the CB&Q Aurora Branch. Wanting switching experiences that

1 Train 154, led by Electro-Motive Division SW7 No. 9265, leads a train into downtown Aurora, Ill., on Ron Stallman's HO scale Chicago, Burlington & Quincy Aurora Branch. The 15" x 72" shelf layout is set in the 1950s.





3 During Ron's college years, he had a summer job working at All-Steel Equipment loading boxcars with steel filing cabinets and other office equipment. His father also worked there as a tool-and-die maker.

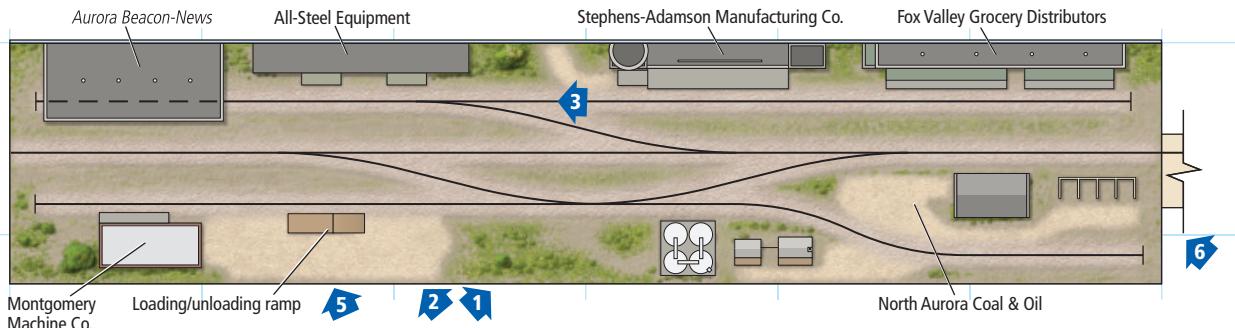
2 When Ron was a teenager, he and a friend would ride their bikes to watch the Chicago, Burlington & Quincy switch industries in downtown Aurora. That memory is re-created here, as an EMD SW7 (WalthersMainline) spots a boxcar at All-Steel Equipment.

would involve a minimum amount of space and, at the same time, offer challenging operations, I designed and built the small shelf layout shown here. Operating crews often have to use creative puzzle-solving switching techniques as they spot cars.

Benchwork and track

Re-creating the train-watching experiences of my teenage years was the goal for the CB&Q Aurora Branch. I designed and built the shelf layout as three detachable pieces so it could easily be moved from room to room or place to place.

The first piece consists of a sheet of $\frac{1}{4}$ " plywood 15" wide and 72" long on a frame of 1 x 3 boards. All of the wiring connections are contained here.



Chicago, Burlington & Quincy Aurora Branch

HO scale (1:87.1)

Layout size: 15" x 72" with 36" extension, Scale of plan: 1" = 1'-0", 12" grid

Numbered arrows indicate photo locations, Illustration by Kellie Jaeger

⊕ Find more plans online in the Trains.com Track Plan Database.

The layout sits on top of the second piece, a 36" wide x 36" high x 12" deep bookshelf. It provides storage space for rolling stock not currently in use, as well as magazines, books, and other supplies.

The third piece is a 36" 1 x 5 board with a folding 1 x 3 leg that holds two tracks, one for incoming cars and one for outgoing. The staging section plugs into one end of the layout via wood pegs. It can easily be removed when the layout is not in operation.

The track plan is based on a switching layout that appeared in *Model Railroader* years ago. I felt it offered a maximum amount of switching possibilities in a minimum amount of space.

Once the benchwork was completed, I installed Atlas code 83 sectional track and No. 4 turnouts. The turnouts are manually operated with Caboose Industries ground throws, all mounted directly on the plywood base.

Then I painted the rails rust brown and weathered the ties with a gray-brown wash. I ballasted the track with sifted sand in various shades of tan and brown.

A Walthers 2 amp direct current power pack turned out to be the perfect unit for my simple needs.

Scenery and structures

Scenery on the Aurora Branch is simple and reminiscent of the area where I watched wayfreights operating along the edge of downtown years ago. After I ballasted the track, I added coal, ground foam, bushes, and trees from Woodland Scenics. I also installed a backdrop made from $\frac{1}{8}$ " tempered hardboard, painted sky blue. Some photo accents near the horizon help extend the scene a bit.

The layout at a glance

Name: Chicago, Burlington & Quincy Aurora Branch
Scale: HO (1:87.1)
Size: 15" x 72" with 36" extension
Prototype: Chicago, Burlington & Quincy
Locale: downtown Aurora, Ill.
Era: early 1950s
Style: shelf
Mainline run: 6 feet
Minimum radius: none
Minimum turnout: No. 4

Maximum grade: none
Benchwork: $\frac{1}{4}$ " plywood base with frame (1 x 3 boards) on bookcase
Height: 36"
Roadbed: none
Track: Atlas code 83 sectional
Scenery: sand and ground cover mixture
Backdrop: $\frac{1}{8}$ " tempered hardboard painted sky blue
Control: Walthers 2 amp direct-current power pack



④ The shelf layout fits neatly on top of a bookcase. The plug-in staging section with foldable leg is visible at far right. It lacks ballast or scenery because it's removable and used only during operating sessions.



The industrial structures are primarily Walthers Cornerstone injection-molded plastic kits that I built, painted, and weathered. A couple of kits from the DPM Landmark Structures line produced by Woodland Scenics help complete the downtown scene.

The *Beacon-News* (newspaper), All-Steel Equipment (office equipment, including filing cabinets, desks, and desk chairs, among other items), and Stephens-Adamson Manufacturing Co. (railroad car pullers and loaders, winches, and SealMaster ball bearings)

are based on prototype businesses located in Aurora during my modeling era. Montgomery Machine and Fox Valley Grocery Distributors are businesses that I created; North Aurora Coal & Oil is fashioned after a coal yard that was served by the Elgin, Joliet & Eastern railroad in Aurora in the '50s.

All-Steel Equipment was a must-have industry for my CB&Q Aurora Branch shelf layout. My father worked there as a tool-and-die maker. While I was in college, I spent my summers there loading boxcars with office equipment.

5 Ron and his railfanning friend enjoyed watching crews work the Aurora *Beacon-News* because they could get close enough to talk with the crews. The Chicago & Eastern Illinois boxcar spotted at the covered dock is loaded with newsprint.

My favorite scene shows my buddy and me with our bicycles standing track-side watching the Burlington Route crew switch cars just a stone's throw away [See a photo of the scene on page 38. — Ed.] In those days we weren't chased off railroad property.



Motive power and rolling stock

A WalthersMainline CB&Q Electro-Motive Division SW7 handles switching duties on the Aurora Branch. The end-cab unit is smooth running at low speeds, essential for realistic operation.

My rolling stock fleet includes kits and ready-to-run cars from Accurail, Athearn, Branchline, Model Die Casting (Roundhouse), and Wm. K. Walthers Inc. I built most of the cars from kits. The rolling stock is lettered for CB&Q and other Midwestern railroads.



6 Here's a close-up view of the removable staging section. The $\frac{1}{4}$ "-diameter pegs on the 36"-long board fit into corresponding holes drilled into a block attached to the end of the layout. Ron reports that the hinged $35\frac{1}{2}$ " leg at the other end of the board makes the staging section surprisingly stable.

I sprayed all of the freight cars, as well as the structures, with Testor's Dullcote to give them "tooth." After the clear flat coat had dried, I weathered the cars and structures with PanPastel products.

Running trains

A typical operating session begins with the day's consist entering Aurora from staging. Switch lists, which I prepare before each session, dictate the set-out and pickup of cars at the various industries. Outgoing cars are returned to the staging section at the conclusion of each session.

Operating crews are small, usually consisting of an engineer and a switchman (or sometimes just me). The short passing siding, which holds an SW7 and two cars, necessitates careful planning on the part of operating crews. It can take a crew anywhere from 30 to 60 thought-provoking, conversation-filled, and thoroughly enjoyable minutes to complete its work.

Turning back time

In the world of model railroading, my shelf layout is very small and rather simple in structure and operation. Though it doesn't occupy much space, it fills the minds and hearts of operators with intriguing switching puzzles begging to

be solved. And for many of us, the nostalgia of remembering simpler days gone by plays an important role in our modeling experience.

Some may say, "You can't relive the past." But each time we operate a local freight on the CB&Q Aurora Branch, my friends and I are transported back to railroading in the 1950s and the memories always resurface. To me, that's what model railroading is all about — having fun and re-creating memories. **MR**



Meet Ron Stallman

Ron and his wife, Mary Lou, live in Elkhart, Ind. Though he's been interested in railroading since he was 7, Ron didn't build his first model railroad, the HO scale Santa Fe Shortline, until 2007. That layout was featured in the October 2021 *Model Railroader*.



This cutaway view of the East Troy Industrial Park layout shows most everything needed for an operating model railroad, including roadbed, track, and train and turnout control.

EAST TROY INDUSTRIAL PARK

TRACK AND TRAIN CONTROL

PART 3: Adding roadbed, track, wiring, DCC, and turnout control to our HO scale project railroad

By **David Popp** // Photos by the MR staff

There's nothing quite like that feeling of running a "first train" on a new model railroad. Although the scenery is still bare benchwork, the look and sound of those first wheels rolling under their own power along nickel-silver rails produces a thrill that never gets old. By the time we finish with this month's installment of the East Troy Industrial Park HO project railroad, we will be able to do just that — run some trains!

In case you missed the previous two installments in this series, our East Troy layout is an extension of the Milwaukee, Racine & Troy RR built by the *Model Railroader* staff. It depicts a modern

railroad operating over a stretch former interurban track now owned by the East Troy Railroad Museum to reach several customers grouped into an industrial park. The industries are rail-served, and they represent real-life counterparts found in Southeastern Wisconsin and along the SMS Rail Lines Purelands development in New Jersey.

To lay the track and power the rails, we used tried-and-true products, such as flextrack and cork roadbed. However, we also experimented with some new materials as well, including Walthers foam roadbed. For control, we installed an NCE Digital Command Control system on the railroad, as well as Walthers

switch machines. Both of these feature plug-and-play components, making them easy for modelers of all skill levels to install. For Trains.com members, you can watch video episodes of our East Troy series explaining every step of the projects shown here in greater detail at trains.com/vid.

Before we get started, however, many readers have asked if we plan to string overhead wire on the layout. While we hope to install it one day to better represent the trolley museum, because of its delicate nature, we're saving it as a future project after the layout is finished.

Until then, let's get started laying track on the East Troy!

ROADBED

Roadbed is that stuff the track sits on. On a real railroad, it's made up of graded ground and several layers of crushed rock that not only serves to lock the track in place, but gives it some flexibility for expansion and contraction and allows for adequate drainage.

On a model railroad, roadbed provides a level surface for laying track, as well as a realistic profile for the right-of-way. It also provides some sound-dampening qualities that help eliminate the noise of the train's operation so you can better hear its sound system.

There are several roadbed options for modelers. We used cork strips, which are the most common. Our cork came from Midwest Products, and to save time cutting and fitting roadbed at turnouts, we also used a number of left- and right-hand cork turnout pads.

Cork roadbed is easy to use. Simply split the strips along the perforation down the middle, then position the two pieces along your track's center line (marked on the subroadbed) with the beveled edges facing out.

You can use white glue or wood glue to attach the cork to the layout's surface. We used pushpins, carefully tapped into the plywood with a hammer, to hold the strips in position on curves until the glue dried. When laying cork on foam surfaces, use an adhesive caulk, such as DAP Alex Plus. It produces a more elastic bond than wood glue can provide when securing the cork to the polystyrene's surface.

One last step is to sand the cork's beveled edge after the glue has dried. The edges will have leftover cork bits attached from the cutting process. It's best to remove them with a coarse-grit sanding block before laying the track.



Whether using strips or pads for turnouts, be sure to include a tab to support the headblock ties.



In this view, many of the cork strips for the Mukwonago end of the layout have been placed and tacked with pushpins until the glue dries completely.

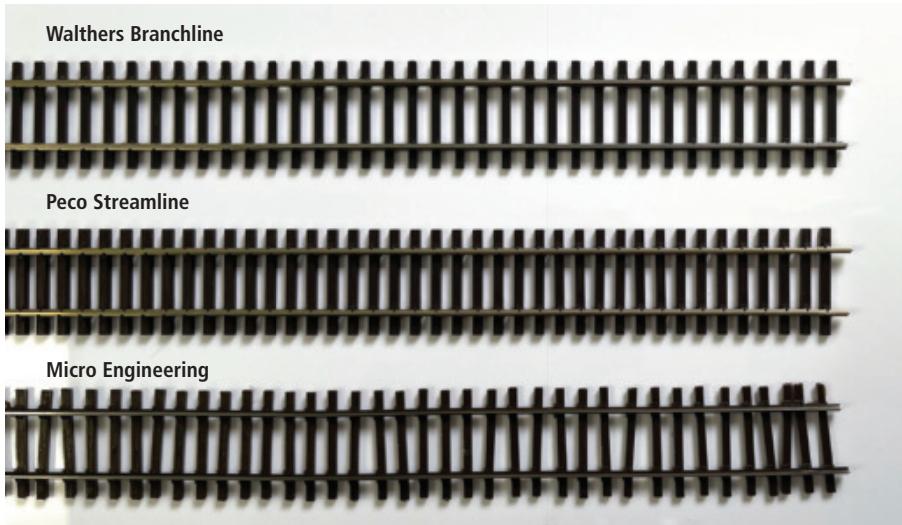


We used both Midwest Products cork turnout pads (top) and roadbed strips (middle) on much of the layout, but we also got a sample box of Walthers foam roadbed (bottom) to test before it was available for retail sale.

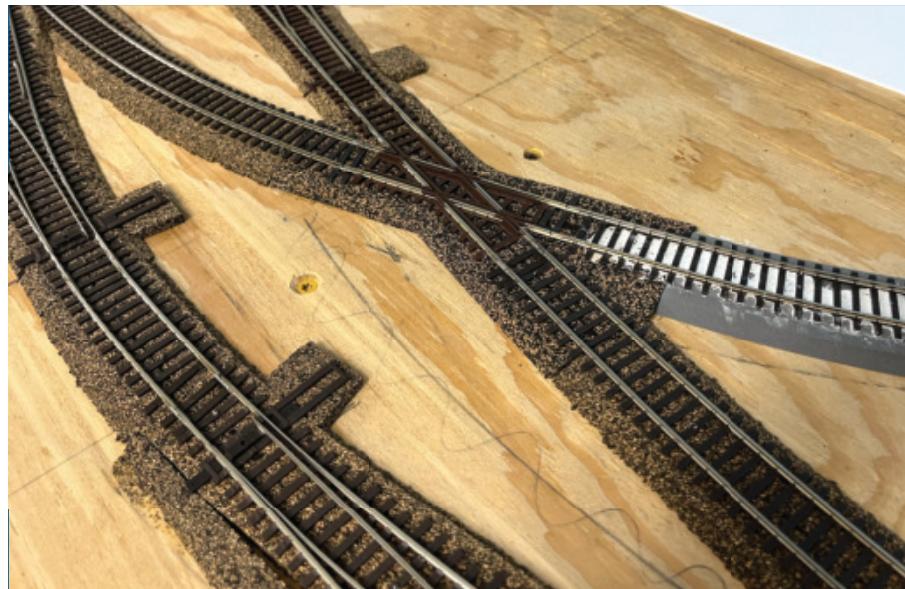


At Trent Tube, David laid the track on N scale cork, which is thinner. This allows the flextrack's ties to sit below the surrounding HO sheet cork. The area will eventually be paved, exposing just the tops of the rails.

TRACK



The staff used three different brands of code 83 flextrack. The unique tie spacings create specific looks for branch lines (top), mains (middle), and spurs (bottom).



On this part of the layout, with its many turnouts and shorter connecting sections of track, the staff used Atlas track nails to hold the components to the layout. The nails make it easier to reposition the track sections as needed.



In a couple of places where the track needs to curve all the way through the turnout, the staff used Atlas Snap-Switches, which have continuous-radius frogs. This type of turnout is ideal for locations with complicated trackwork.

We used a combination of track components from several manufacturers for the East Troy Industrial Park layout. For most of the MR&T and trolley museum portions of the layout we used Walthers code 83 Branchline track. This has a wider-spaced tie pattern, often found on lighter trackwork. For the Canadian National main line at Mukwonago we use Peco Streamline code 83 track. Its denser tie spacing mirrors what is found on Class I railroads. We also used a few pieces of Micro Engineering code 83 track on the plastics industrial spur, representing less-well maintained track.

Most of the turnouts on the layout are Walthers code 83 No. 5s, with the exception of a No. 4 at the lead to the transloading yard and a curved left-hand turnout entering the siding at East Troy. There are also two Atlas 18" radius Snap-Switches. These have continuous radius frogs, and are useful where tight trackwork is needed. We used one Atlas code 83 30-degree crossing in East Troy as well.

Much of the flextrack is affixed to the layout with adhesive caulk, particularly over the foam roadbed sections from Wm. K. Walthers Inc. We used Atlas track nails on the turnouts to keep the moving parts free of caulk. Nails allow you to reposition turnouts if needed, as well.

Since our layout splits into three separate sections, we used short Atlas code 83 "set track" fitter pieces at the joints. The ties on these pieces were thicker than the other track components we used, so we had to sand the ties to the correct height to match.



Where the layout sections join, the staff used small Atlas fitter track sections after sanding the ties thinner.

WIRING

Although this is a mid-sized model railroad, the East Troy layout will likely be operated by just one crew at a time. Therefore, we wired the layout as a single electrical block.

Every third section of track received 22AWG feeder wires. The feeders were soldered to the web of the rails. If you are concerned about how this will look when the layout is finished, don't be. After the track is painted and ballasted, you will be hard-pressed to spot the feeders without actively looking for them. Although we didn't power the turnout frogs right away, we did attach feeders to those as well. The Walthers turnouts have a metal tab attached to the frog, making it easy to loop a wire through it and secure it with solder.

Under the layout, we ran a two-wire power bus, using 16AWG wire. We attached the feeders to the bus using Scotchlok insulation displacement



After stripping $\frac{1}{4}$ " of the insulation from the feeder, the staff soldered it to the web of the rail, as shown here.

connectors (IDCs). Installing these is as easy as inserting the wires into the IDC, crimping the connection with a slip-jaw pliers, and snapping the plastic lid shut. IDCs are fast to install and eliminate the



Under the layout, the feeders are attached to the 16AWG bus line using insulation displacement connectors.

dangerous task of soldering wires over your head while you are under the layout. Associate Editor Bryson Sleppy and I had all 33 feet of the layout wired in a single afternoon.

DIGITAL COMMAND CONTROL

Digital Command Control (DCC) is the best way to power and operate a brand-new model railroad. The biggest advantage of DCC is that you can easily run multiple trains on the same track without complicated wiring to create individual electrical blocks. Most manufacturers offer their newest locomotives DCC equipped, many with sound. To get the most out of those features, you will need a DCC system.

There are a lot of DCC systems available from manufacturers such as Bachmann, Digitrax, ESU, NCE, MRC, TCS, and others. You can usually find a system to fit your budget. While many of the components (other than locomotive decoders) are not interchangeable between brands, they all work approximately the same way.

The base station is essentially a computer that runs the system. The power supply and one or more boosters provide electricity and digital signals to the locomotives via the track. Cabs are the control points, which are typically handheld remotes, allowing you and your friends to run trains, program decoders, and operate other DCC-activated components. Smaller starter systems are easy to use but have fewer features. Those planning larger layouts should consider things like number of operators and power requirements when running multiple trains. And



For our East Troy layout, we chose an NCE PH5-R wireless Power Pro Digital Command Control system. This set is easily expandable as your layout gets bigger.



We used a piece of plywood to make a shelf under the layout to hold the DCC system and power supply.



We mounted Universal Throttle Pockets from PPW-Aline.com on the fascia next to the plug ports to hold the cabs.



We installed NCE's utility throttle panels (UTP-CAT5) at 7-foot intervals, which daisy chain together with CAT5 cables.

some systems allow for the use of smartphone throttle apps, meaning that your friends can come run trains just by using their cellphones as cabs.

The best part is that once you select a manufacturer, DCC is pretty much plug and play. Start with a base set, such as the NCE wireless system we used, then add components to it as your railroad grows.

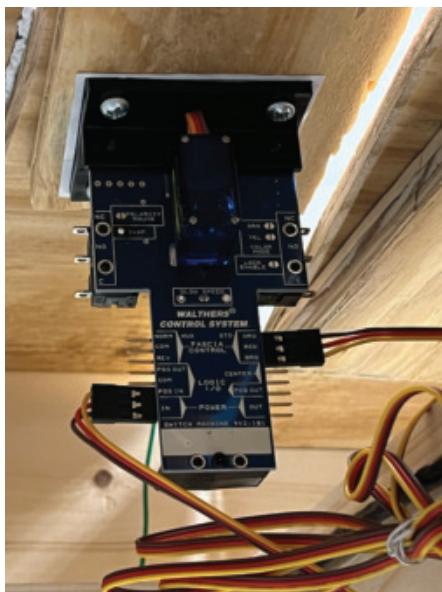
We installed a small shelf under the layout to house the power supply and command station. The track bus connects to the command station with screw terminals.

Our set also came with a radio receiver, allowing us to operate the

railroad without tethered cabs. We placed the receiver on top of the backdrop for good signal reception.

Not all of our NCE cabs are radio equipped, however, so we also installed a series of plug ports along the front of the fascia at 7-foot intervals. The first port connects to the command station. The rest then daisy chain together using data cables. These port panels mount to the fascia with screws.

Regardless of which DCC system you choose, like locomotive decoders, cabs can also have addresses. Be sure to follow the address instructions for your DCC system when adding additional cabs to your layout.



Walther's Controls switch machines are easy to install and offer a variety of additional features, such as powering frogs or lighting signals.

TURNOUT CONTROL

Although the Walther's turnouts come with toggle springs to hold the points in position, we didn't want operators having to reach into the scenery to align them. Instead, we installed Walther's 942-101 servo-activated switch machines. These mount under the model railroad, and require you to drill holes through the subroadbed under the turnout's points, something best done before laying the track!

Walther's supplies the basic materials needed to install the switch machine. For detailed instructions, download the manual from the manufacturer's website, walthers.com.

There are also a number of other components you will need, including a 12V 2A power supply, power distribution block, extension cables, and push buttons. I highly recommend getting the installation drill bit kit as well.

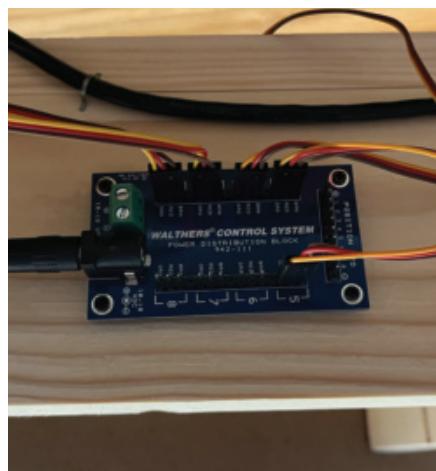
Much like the DCC system, the components for the switch machines are plug-and-play. Install the unit under the layout using the included template and screws. Drill holes in the fascia to mount the push-button controller. Connect the three-wire cable between the motor and the push buttons. Finally, connect the motor to the power distribution block and plug in the transformer. A single block supplies 8 machines, and blocks can be linked together to share one power supply.

These were easy to install, but there was a learning curve to get the position for normal route to match the LED on the push-button control. You will need the detailed instruction PDF from the Walther's website for this. Also, there's a solder pad called "swap" to reverse the servo's operation if needed.

The switch machines were a fun addition, and their glowing LEDs add a "cool factor" to the model railroad.



To use Walther's turnouts with its switch machines, you must first remove the toggle spring, attached between the left headblock tie and the switch rod.



With the addition of a 12V 2A power supply, this distribution block will operate up to eight Walther's switch machines. Blocks can be linked.

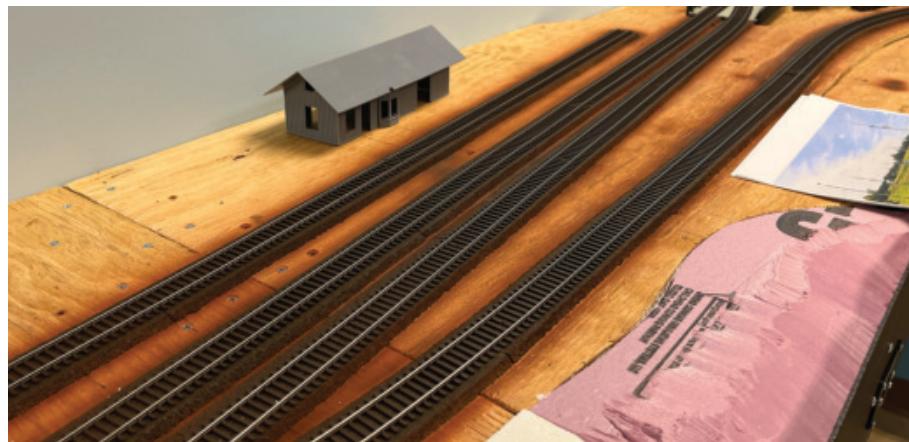


The push buttons used with the switch machines (separate sale) have LED lights, indicating normal (green) or reverse (yellow) positions.

PAINTING TRACK

While you can leave the track as it comes from the manufacturer, the plastic ties and shiny rails will look more realistic with a coat of paint. Senior Editor Cody Grivno used Vallejo Model Air 71.040 Burnt Umber for much of the layout. However, when that ran out, in a pinch he switched to Tamiya Acrylic XF-9 Hull Red, which was close enough to the original color.

Cody applied the paint to the rails and ties with an airbrush. Take extra precautions when airbrushing track or scenery on your model railroad. Make sure the room is well-ventilated. We had fans to move the air and particulate through the shop and out of the building. Also be sure to wear a respirator with filters made specifically for paint work, as well as full goggles to protect your eyes. Particulates can stay suspended in the air for some time, so be sure to let the room completely clear before removing your protective gear.



The track looks a lot more realistic once it is painted. Be sure to clean the top of the rails once the paint has had an hour to dry but before it cures completely.

Before painting the track, Cody and I masked the switch points to keep paint from sticking them together. We also covered the finished backdrop and fascia with plastic tarps.

The Vallejo paint takes a couple of days to cure fully, but don't wait that long to clean the top of the rails. After

the paint had an hour to dry, we cleaned the rail tops using wood craft sticks. You can use track cleaning blocks as well, but the paint will gum them up quickly. The craft sticks are disposable, so when one was loaded up with paint, we simply discarded it and got another one and continued the process.

BALLAST

We typically don't ballast the track until after the scenery work is completed, but I've included it here as a fitting end to the track installment. Cody is our "Master of Ballast" and has the patience and steady hands the rest of the staff lacks, so the job usually falls to him — the lucky guy!

We used Smith & Son Gray Limestone No. 50 ballast for much of the MR&T and East Troy Railroad Museum track. This is a good, neutral-tone material with a fine grain that represents the East Troy Railroad's own ballast well.

Cody applied the material in several steps, starting with the gauge of the rails. He was careful to remove it from the tops of the ties and keep it out of the moving parts of the turnouts.

Next, Cody soaked the ballast with 70% isopropyl alcohol, followed after a few minutes by Woodland Scenics' Scenic Cement. The alcohol acts as a wetting agent, allowing the scenery glue to penetrate the granules without beading up.

Cody then applied ballast to the shoulders of the right-of-way in two applications. For the first, he painted on full-strength white glue up to the ties, then sprinkled a light coat of ballast into it. Once the glue dried, he applied more ballast to the shoulders and shaped it with a foam brush. He



This top-down photo shows the two different colors of ballast used on the layout, as well as some of the airbrush weathering Cody applied to it once the surrounding scenery work was completed.

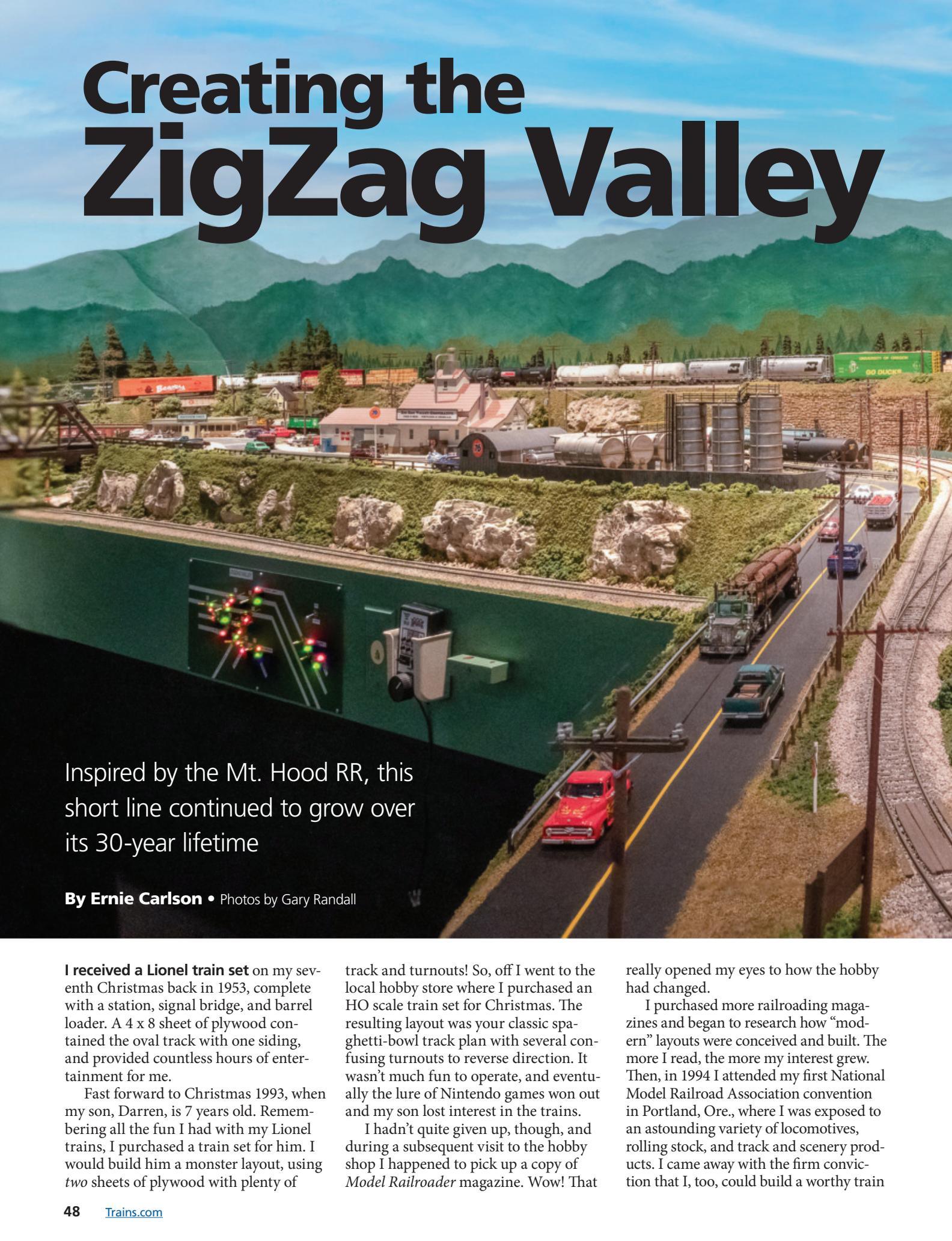
used the same wetting and gluing techniques as before.

For the CN main line, we used Arizona Rock & Mineral Copper Range Green Granite No. 1342. Ballast color depends upon the railroad and the region where it sources its materials. The color is similar to that used on the CN in Mukwonago.

As a final step, again after the surrounding scenery was complete, Cody

weathered the ballast with an airbrush, using two different colors. He applied Vallejo Model Air 71.054 Dark Gray Blue between the rails to represent the grease and grime from passing trains. He used Vallejo 71.122 U.S. Desert Armour 686 where the ballast meets the scenery to eliminate the hard, perfect separation line between the two. He thinned both colors to a wash and built up the effects in light layers. **MR**

Creating the ZigZag Valley



Inspired by the Mt. Hood RR, this short line continued to grow over its 30-year lifetime

By Ernie Carlson • Photos by Gary Randall

I received a Lionel train set on my seventh Christmas back in 1953, complete with a station, signal bridge, and barrel loader. A 4 x 8 sheet of plywood contained the oval track with one siding, and provided countless hours of entertainment for me.

Fast forward to Christmas 1993, when my son, Darren, is 7 years old. Remembering all the fun I had with my Lionel trains, I purchased a train set for him. I would build him a monster layout, using two sheets of plywood with plenty of

track and turnouts! So, off I went to the local hobby store where I purchased an HO scale train set for Christmas. The resulting layout was your classic spaghetti-bowl track plan with several confusing turnouts to reverse direction. It wasn't much fun to operate, and eventually the lure of Nintendo games won out and my son lost interest in the trains.

I hadn't quite given up, though, and during a subsequent visit to the hobby shop I happened to pick up a copy of *Model Railroader* magazine. Wow! That

really opened my eyes to how the hobby had changed.

I purchased more railroading magazines and began to research how "modern" layouts were conceived and built. The more I read, the more my interest grew. Then, in 1994 I attended my first National Model Railroad Association convention in Portland, Ore., where I was exposed to an astounding variety of locomotives, rolling stock, and track and scenery products. I came away with the firm conviction that I, too, could build a worthy train



layout! A subsequent trip on the Mt. Hood RR's "Fruit Blossom Special" provided the inspiration for my new railroad.

The Mt. Hood RR serves the fruit orchards and logging industries on the north slope of Mt. Hood and the Hood River valley. Completed in 1906, it delivered fruit and lumber to the Union Pacific at its Hood River, Ore., terminus. I borrowed the paint scheme and move operations to the Zigzag Valley on the west slope of Mt. Hood, and so the ZigZag Valley Railroad (ZZVR) was born.

Starting construction

My first priority was to find a suitable space for my layout. After salivating over the layouts featured in *Great Model Railroads* magazine, I knew it had to be BIG. The only choice I really had, then, was to convert some space in my 24 x 24-foot garage. But, that space was occupied with vehicles — so good-bye to my 914 Porsche, Geo Metro, and Toyota 4WD pickup, and hello to my Subaru wagon.

① A mixed freight climbs the grade out of the Zigzag Valley on Ernie Carlson's HO scale ZigZag Valley RR.

Now, with only one vehicle to park in the garage, there was ample room for my empire! After several weeks of dreaming and doodling, I decided the best use of space would be a track plan in the form of a G, and that I would use "studwall" construction to support the benchwork. Since I had built my home myself, this choice of construction technique was a natural and I had lots of wood (Douglas



2 ZigZag Valley RR switcher 703 heads for the BNSF-ZZVR interchange yard. The colorful switcher and caboose were custom painted by Mike Busch of Everett, Wash.



3 A BNSF Ry. double-stack passes through Vancouver, Wash., as construction equipment is unloaded at the team track.

fir 2 x 4s) and the right tools available. Most of 1994 and '95 was devoted to building the benchwork.

The garage interior walls and ceiling were already insulated and covered with drywall, so the construction of the benchwork proceeded rapidly. First I built a wall to partition the layout from the remaining garage space. Then I built a series of walls to support multiple 1 x 4

girders that form a base for the subroadbed. I covered the girders with $\frac{1}{2}$ " plywood, and occasional pieces of $\frac{3}{4}$ " plywood where a town or yard is located, to provide a scenery base and subroadbed for the track. I used the cookie cutter technique to effect smooth track elevation changes. Later additions to the layout used cantilever benchwork with a maximum depth of 24".

The layout at a glance

Name: ZigZag Valley RR (ZZVR)

Scale: HO (1:87.1)

Size: 23'-6" x 44'-5"

Prototype: BNSF Ry. and Mt. Hood RR

Locale: Pacific Northwest

Era: June 1998

Style: around-the-walls

Mainline run: 460 feet

Minimum radius: 24"

Minimum turnout: No. 6 main line, No. 5 yards

Maximum grade: 2%

Benchwork: a combination of studwall, L-girder, cookie cutter, and cantilever

Height: 44" to 52"

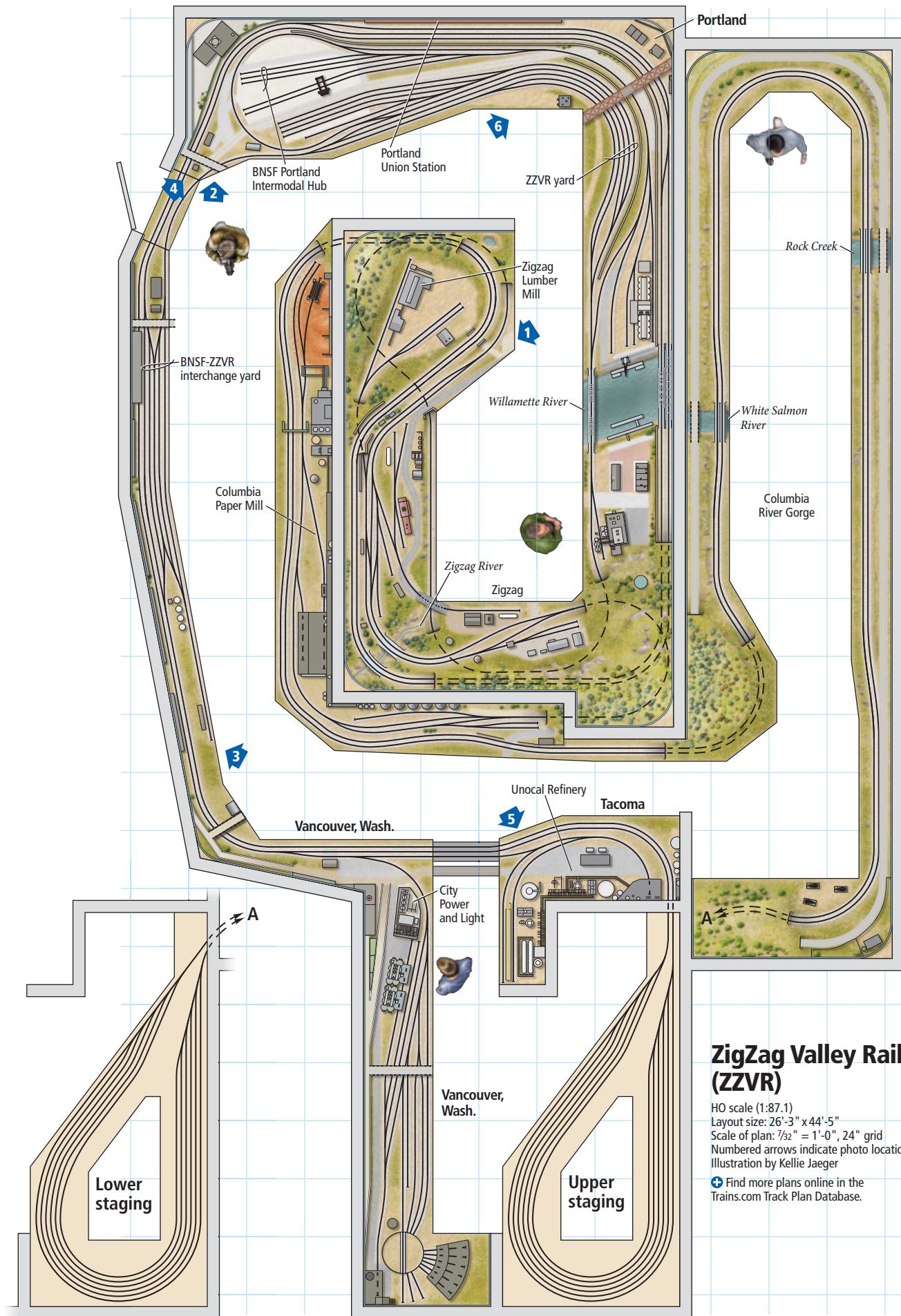
Roadbed: cork

Track: Shinohara code 83

Scenery: plaster cloth over cardboard strips

Backdrop: hand-painted and photo mural

Control: Digitrax DCC



ZigZag Valley Railroad (ZZVR)

HO scale (1:87.1)
 Layout size: 26'3" x 44'5"
 Scale of plan: $\frac{7}{32}$ " = 1'-0", 24" grid
 Numbered arrows indicate photo locations
 Illustration by Kellie Jaeger



4 This is the view when entering the layout room. The BNSF Ry. Portland Intermodal Hub can be seen at left, Highway 30 is in the foreground, and the ZZVR yard is at right.

Laying track

My first step was to install the roadbed. I used cork since it's easily obtainable, economical, and flexible — it makes beautiful curves! Using yellow glue and pushpins, I proceeded to lay out roadbed for my track plan.

I generally installed (glued) about 6 feet of cork at one time. As the glue cured, I used a Surform rasp to smooth the top and sides of the cork. When all the cork roadbed was complete, I began to install the track.

I used Walthers Shinohara code 83 track and turnouts. I generally worked with three sections of track at a time, soldering them together on my workbench and then installing them using white glue and pushpins. Although I had a general track plan, I had not yet determined where sidings and spurs would be. I opted to install turnouts in locations where I was reasonably sure they would be needed, assuming I could change their location or create a plan



5 The Unocal Refinery in Tacoma, Wash., sees a lot of unit trains. This refinery was inspired by an article in MR by Stephen Priest on how to disguise the entry/exit to staging tracks. The ZZVR switches the refinery from the interchange yard.

to fit them. I did not solder the turnouts in place (yet) to facilitate moving them if needed.

Scenery

Where I needed landforms I used cardboard strips and plaster cloth to

build hills and valleys. I sealed the plaster with an earth-colored latex paint, then applied ground foam and coarse foam, clumps of foam for bushes, and rocks and dirt. I used Woodland Scenics products exclusively to provide a consistent palette. I also began to build structures to support the logging industry in

the Zigzag Valley. I found Walthers Cornerstone kits to be the perfect choice, and they account for 90% of the structures on my layout.

Adding a Class I

Even though my 12 x 22-foot layout space seemed large, I wanted to see more railroad traffic than my single-track plan could deliver. The then-recent merger of the Burlington Northern and the Santa Fe railroads gave me the opportunity to add BNSF Ry. traffic, so I refined my track plan to incorporate a double-track loop. This would allow me to run continuous through-freights as well as ZZVR branchline operations. I had a workable plan, but it was obvious I needed a little more real estate for BNSF staging. On a positive note, though, it helped solidify my location (Spokane to Portland to Seattle), time frame (June 1998), and theme (ZZVR branchline operations with BNSF unit trains). I just needed a little more space!

To get that space was a 2-year process. First I constructed a carport attached to my garage for my remaining vehicle. Then I removed the garage door and built a wall to close off the original garage. Finally I built a wall to partition the remaining space into an expanded layout room (now 18 x 22 feet) and a laundry room. This added real estate served my needs quite well, as I continued to add track, scenery, and industries to my layout, and began to accumulate diesel locomotives and freight cars decorated for BNSF Ry.

Opportunity presents itself

For the next five years I continued working on the layout, adding, embellishing, and refining until it was mature. Most of my work was done during the winter months, and I noticed that my carport didn't block the rain and snow too well. So, the next summer I set about to enclose the carport. In doing so I realized that I had created some additional layout space, as only half of the carport was occupied.

Next thing you know I had partitioned off that unused space which gave me room to move and expand my staging yard, as well as add a turntable, roundhouse, and fueling tracks. I also became more interested in creating large industrial scenes, culminating with a paper mill that stretches 24 feet and provides numerous switching possibilities. This project required 2 years to complete.



6 A ZigZag Valley switcher waits for the morning orders by the railroad's Portland Yard office. The brick structure is a Walthers industry office kit (933-4020).

Scratching the final itch

By 2010 my layout was reasonably complete. I spent more time running trains and less time building structures and adding scenic details. Most of my unit trains are 20 cars long, and I wanted space to see them snake along the rails. So, the Columbia River Gorge addition was born. The only way to get more space was to build an 8 x 30 addition to the house adjacent to the garage, which kept me occupied for the next couple of years. It wasn't too difficult to modify the track plan to extend the double-track main into the addition, gaining another 60 feet of running room.

There is a minimum of scenery, but a benchwork-to-ceiling photo mural provides a dramatic backdrop. The track plan modification also required changing the approach to the staging, so I added an oil industry to disguise the entrance. The Unocal Refinery took me another two years to build, and occupies a 4 x 6 corner with a photo backdrop. It's the best, and last, structure I've built. By 2016 all construction on the layout was complete, including scenery.

What's next?

As my wife and I age, we are experiencing the challenges of aching knees and hips. The railroad occupies prime real estate in our home, as it is on the main level, while our master suite is upstairs. All those stairs are taking their

toll, so we decided to repurpose the train room into a bedroom and bath. I dismantled the layout in 2025, sharing items with a nephew and a neighbor. I saved a few pieces for a smaller version of the ZZVR in an outbuilding. I've thoroughly enjoyed the creative process of building the ZigZag Valley RR these past 30 years. **MR**



Meet Ernie Carlson

Ernie is a retired IT professional who lives in Zigzag, Ore., with his wife, Mary. His first trains were a Lionel set he received for Christmas 1953 when he was 7 years old. Attending the 1994 National Model Railroad convention in Portland, Ore., rekindled his interest in model railroading, and he began building the ZigZag Valley RR that year. When not working on his layout, Ernie also enjoys collecting glass and porcelain telephone and telegraph insulators and railroad equipment.



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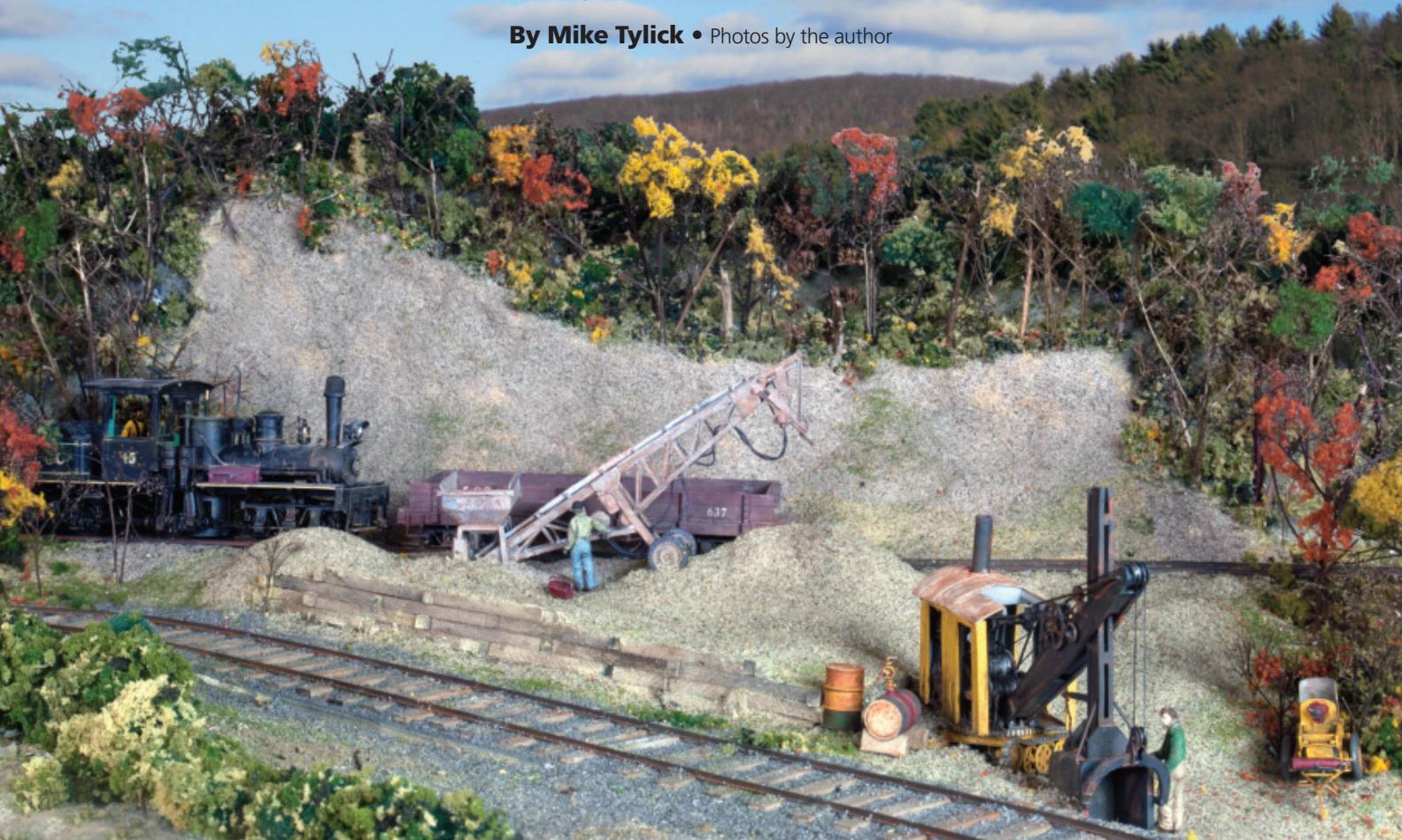
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Building Scituate Sand and Gravel

Part 2: Three projects combine to make one scene

By Mike Tylick • Photos by the author



Mike Tylick has been fascinated by the sandpits that dot the New England landscape. Follow along as he completes the project with a steam shovel and scenery construction on his On30 Marshfield & Old Colony RR.

Sandpits are all over New England and they make great scenes for a model railroad, offering interesting modeling opportunities as well as added operation on the layout. In February, I described my interest in sandpits and the way they break up the typically green New England landscape.

During my early layout planning, I set aside what seemed to be an ample area for this industry. Naming it was easy. The Scituate (concrete) Precast Co. has a complex not far from my home. Precast construction predates my

Depression-era layout, so the commonly seen commercial products wouldn't fit on my layout. However, Scituate Sand could be either a precursor or subsidiary of the present-day business.

In February, I introduced the project and explained how I built a moderately sized conveyor to get the product from the ground into the low-side gondolas and modified flatcars that would carry the loads from the quarry.

Now it's time to complete the scene. In addition to a conveyor, the project needed something to pick up the sand.

Given the era of my railroad, a steam shovel seemed like the ideal machine. Similar to the conveyor, I couldn't find the perfect model either as a kit or pre-built, so that meant I got to do some more scratchbuilding. I did take one shortcut to create the drive system for the machine.

The scenery methods are tried and true. I used a plaster and paper towel hardshell laid over a web of woven corrugated cardboard strips. This afforded me plenty of control to get the landforms just the way I wanted them.

A steam shovel for Scituate Sand



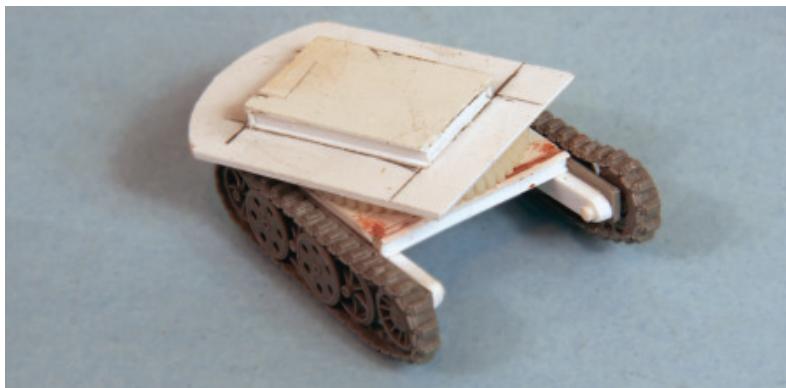
After I had built my conveyor, it seemed like something was missing. I needed more satisfying equipment than wheelbarrows and shovels to move the aggregate into piles for loading, so some sort of excavator seemed necessary. But again, nothing very suitable was available in O scale. Thinking there was no need to reinvent the wheel, I checked my *Model Railroader* 75 Years DVD to see if anything had been written on the subject. To my delight I discovered "Build a Steam Shovel" (what else?) by Al Boos. The article appeared in the February 1985 *Model Railroader*. Although Al's model was built more than 40 years ago, the prototype was much older than that. Although I departed in many ways from Al's example, I am most grateful for the work he did to ease my path.

I found a Tamiya 1:48 kit for a German Kettenkraftrad, a nifty utility halftrack. The wheelbase was about 8 feet long — small but enough for a small steam shovel. Extra details such as oil drums, tool boxes, and mobile generator were obviously usable. The military figures were dressed in work clothes with no insignia or weapons, so a little sanding and filing of their hats made them perfect for my On30 layout.

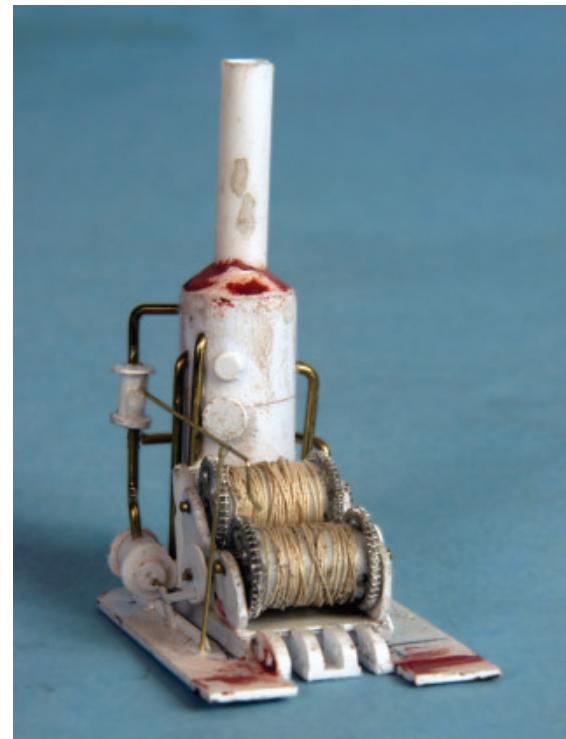
Making tracks



The first step was to separate the drive frame from the vehicle side. The caterpillar drive was assembled per the kit instructions, but a wider base was built from styrene. The large gear was saved from an old clock. I had a number of them but this was the only one that proved useful for this project. The protruding pin was used as the shovel floor pivot.



The shovel floor and boiler platform were next. Since I had no idea exactly where the shovel would be installed, the drive frame and floor were never permanently fastened together. This provided the additional benefit of simplifying the handling of the parts during construction.



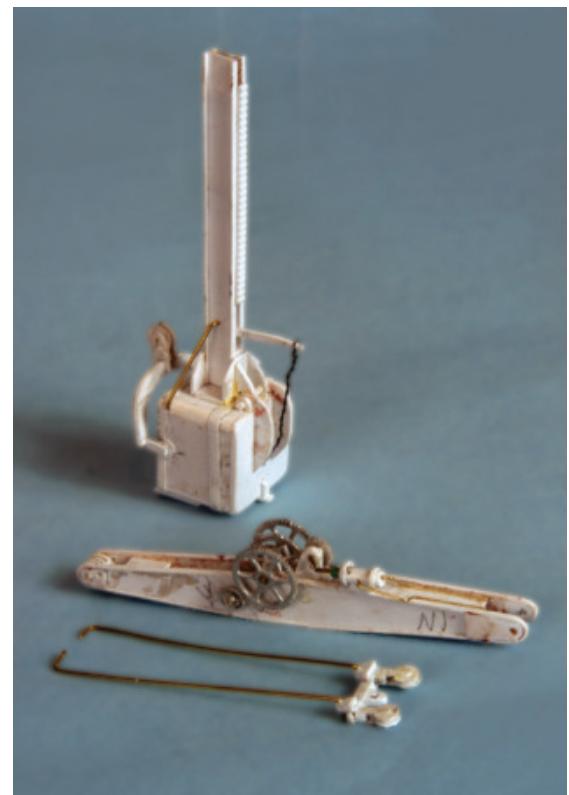
I built my steam boiler and winch mechanisms from a combination of styrene sheet, strip, and tubing, and various diameters of brass wire. Gears from the Durango Press HO gear assortment (DP-94) were the only commercial parts. Ideas from Al's article helped me make sense of and plan my model. There are too many parts to attempt a step by step description, but the photographs and Al's story should help as a guide. Much of this detail will be hidden by dark paint and the cab, so pretty much anything that comes close will look good.

Building the boom



The main boom is built up from .020" styrene with an .020" x .060" flange. The two sides are cut out from two pieces sandwiched together so they are identical. Spacers are used for separation.

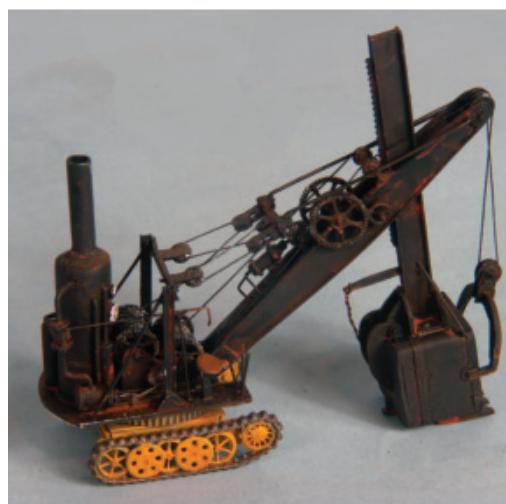
I couldn't find any useful drawings of the main boom, bucket boom, and idler pulleys, so I took measurements from various photos. Though shovels came in many sizes and shapes, my bucket is on the large side. Paint and scenicking will hopefully hide that. No suitable pulleys were available, so I simulated them with paper punch disks of various diameters. Al's article helped explain the complicated gear mechanisms and many parts needed for this assembly.



Before the assembled boom could be attached to the main deck, I had to add a sheave assembly to get the cables from the drums up to the boom connections. The boiler and mechanism parts are painted with a dark gray paint, in this case, Delta Ceramcoat Charcoal. With the rust washes, the color helps to keep more detail visible than if a pure black had been used.

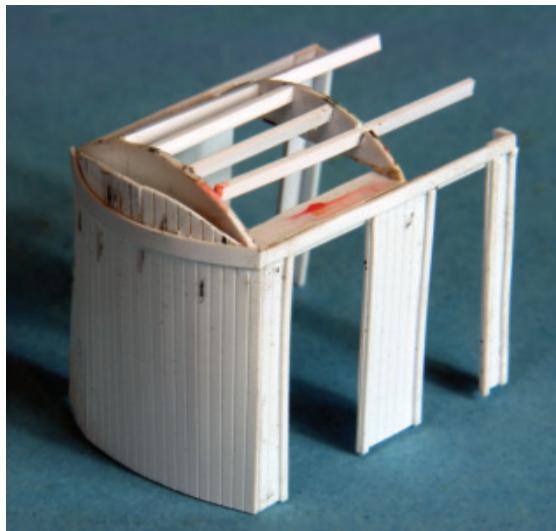


The model is nonoperational, so after the boom was fitted, I flowed styrene cement into the joints and let it dry thoroughly. The main pulley is a double pulley and just fits in between the boom sides. I never did discover my error, but I found it necessary to add spacer pulleys to the boom to allow the control lines to clear.

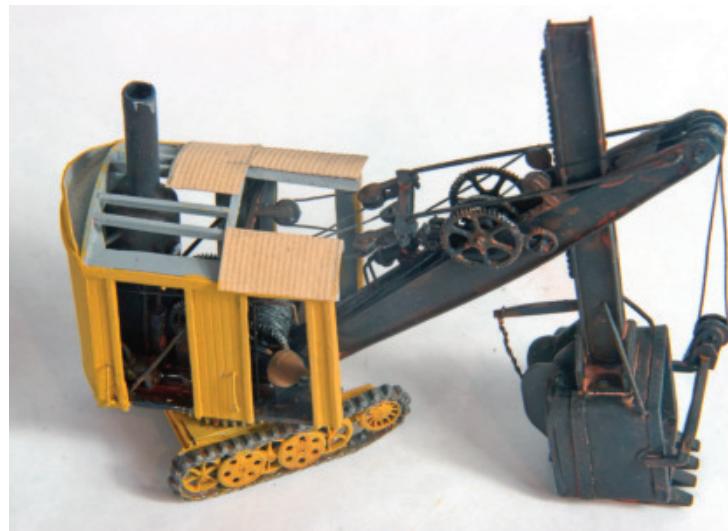


Using Al's article as a guide, I installed and painted the idler pulley assembly and rigged the lines, as seen above. I used $1/8"$ scale large ship rigging line available from Micro-Mark. A little thinned white glue at each pulley helps to hold the line in place.

A cab for protection



The cab is built from .020" scribed styrene. Although many are steel, I preferred the older look of a wood model. More likely a small, older shovel like mine would use wood. The bottom will straighten out once it is glued to the main deck. Note the roof supports.



I painted the cab yellow with a light gray interior. There are many possibilities for roofing, but a metal roof seemed to be the best choice for durability and fire resistance. Cardstock is easier to curve than styrene, so the paper Northeastern Lumber HO corrugated siding seemed the best choice. Aleene's Tacky Glue easily bonded paper to styrene. Because of the complex pattern, it seemed best to apply the roofing in individual pieces that were pre-painted and pre-weathered.

Building the pit



Since much of the project involves scenery construction, I thought it best to start from the ground up. I have always preferred plaster and paper towel hardshell laid over woven corrugated strips or crumpled newspaper for building terrain. With space at a premium, I selected the more precise cardboard strip method here. A hot glue gun makes short work of building the landform, which is more flexible and changeable than one might think.

Note the hidden staging track in the rear. Since this will be hidden by the sandpit, a leftover piece of HO flextrack works fine. The rail is all code 83, but look at the difference in the ties between HO standard gauge and On30. To further confuse matters, the middle track in the foreground is for a standard gauge O scale trolley line.

Basic landforms



Here's the completed woven strip terrain. Also note the single-pole double-throw rocker switch used to select the frog polarity. It's actuated by the hand throw and will be hidden. The one shown here is by a future transfer platform between the M&OC and the South Shore Electric trolley line.



Next, I worked on the plaster and paper towel hardshell. Ceiling plaster and contractor's paper towels available from Lowe's work well for this. Blue painter's tape was used to cover the track. The tape adheres well for months yet removes easily and leaves no residue.



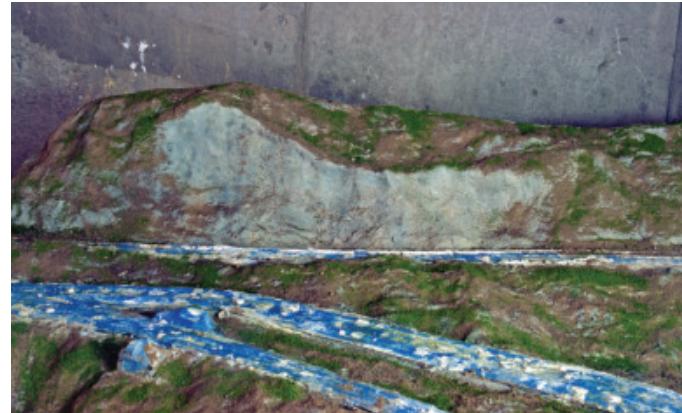
I then smoothed the hardshell with extra coats of plaster and towels. By stippling a thin mix of plaster over the surface with an old, splayed brush, I was able to model the rocklike texture on the base.

A thinned coat of earth colored latex wall paint helped to bring out the texture.

Making the sand pit



An overhanging "lip" is usually formed as the sand is excavated from the face. I added this feature after painting, once the landforms became more apparent. In the image above it looks quite contrived and exaggerated. After the plaster dried, I blended in the lip with additional washes of earth tone paint.



I painted the hillside with neutral colors mixed with black and burnt umber tints. Successive coats of these colors were sprayed on with a plant mister with the color gradually getting lighter. Allow each to dry before moving to the next color. Thin, dark washes at the end brought out the texture.

Next, I dribbled thinned glue onto the surface. With the glue still wet, I applied fine grass ground cover and dirt. Overspraying with water allowed rock surfaces and erosion lines to appear in the classic Lynn Westcott method.

Adjusting the scene



Is there ever enough room? The conveyor would not fit behind its siding, and the space between the tracks sloped too much to be usable as part of the sand pit. A retaining wall could solve the sloping problem. Walls built from railroad ties appear less permanent than stone or concrete, so this was a good choice for my site. Today precast blocks or metal walls would be used.

I started by cutting the wall's contour from cardstock, painting it black to hide any gaps, and gluing individual ties to the cardstock. Stub ends of ties simulate the sleepers that would extend into the hill, bracing the wall.



I built the top row of ties to full depth. Then I backfilled the wall with a putty made of sawdust, white glue, and water. Unlike plaster, this mixture can be applied without creating messy white splotches. It also adheres very well to the "finished" scenery. Although it dries rock hard — it is in effect a variant of particle board — it can be softened with water if additional work is necessary.



Everything was going well until I placed my conveyor in the scene. All of a sudden the pit seemed hopelessly small. I had spent too much time on the conveyor to want to send it to the scrap box, so I enlarged the sand area as much as I thought I could and still retain the other elements I wanted to add to the layout. The new ground cover is sand from a local beach.

Applying foliage



I added bare tree skeletons to the hillside. Since the plaster would dull drill bits, I used a motor tool with a finish nail to make the holes. I inadvertently drilled a hole into the sand bank. Rather than fill the hole, I decided to add a leaning tree that somehow survived.



You will notice from this point on the sand is a different color. As time wore on, I liked my painted sand less and less. A friend preferred the look of my sandy beaches, which were made with local sand. Thinking he had a good point, I brushed thinned white glue onto the hillside and threw sand over it. Some of the old color bled through in places, which made for a nice effect. The sand is coarse, but then that reflects the appearance of the local beaches. I think the new effect is much better. Assorted Woodland Scenics foliage completes the background scenery.

Final placements

I always think I have plenty of room, and I'm always wrong. But I did fit the conveyor and steam shovel in where they look plausible, even if more open space would have been nice. I spent too long on the models to just discard them. The shovel bucket is a little too large. Placing it in the foreground gives a suggestion of forced perspective, and burying part of the bucket makes it appear to be a little smaller. **MR**



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Switching is the name of the game on Ed Biegas' Granson HO scale railroad. The structures are commercial kits that Ed built, and he weathered the Grand Trunk Western boxcar in the background. Dan Lewis shot the photo.



At Cornwall Bridge, Conn., New York, Westchester & Boston B-3 switcher No. 1125 has just removed the two rear cars from the *Grand Isle Limited*, southbound from Montreal on Dick Karnes' S scale model railroad. No. 1125 was assembled from parts from a PRR GG1. The two passenger cars are from American Models. Dick photographed the scene.

Send us your photos

Trackside Photos is a showcase for the work of *Model Railroader* readers. Send your photos (digital images 5 megapixels or larger) on a flash drive to: *Model Railroader*, Trackside Photos, 18650 W. Corporate Dr., Suite 103, Brookfield, WI 53045; or email them to us at editor@modelrailroader.com.

Rod Stewart's Naffah Warehouse on his HO scale Grand Street & Three Rivers City model railroad is a tribute to Stacey Walthers Naffah. "I was surprised, delighted, and deeply moved to receive an email with photos of the incredible structure Sir Rod created with our Walthers Cornerstone kits and dedicated to me!" Stacey said.

Warren Cady photo



Nickel Plate S-1 Berkshire No. 725 charges the Neoga Tower and crossing of the Illinois Central's double track Chicago to New Orleans main line. The action is seen on the Clover Leaf 4th Subdivision in Townsville, Australia. The locomotive is a modified Bachmann model. Arthur Shale photo



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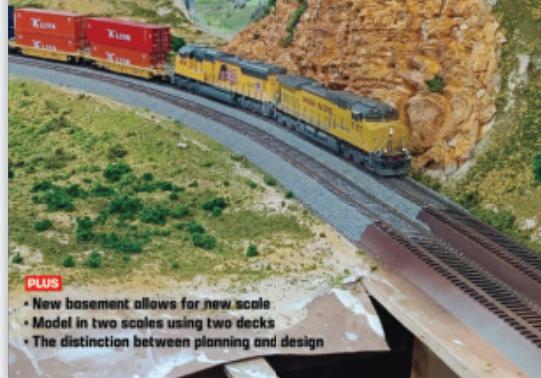


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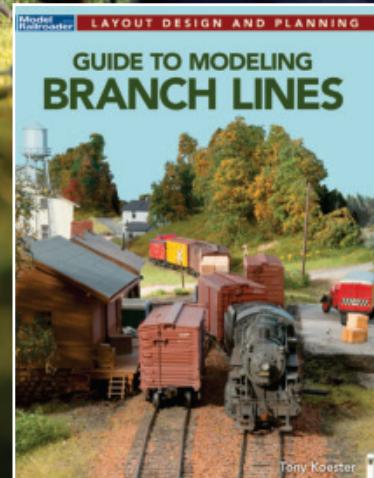
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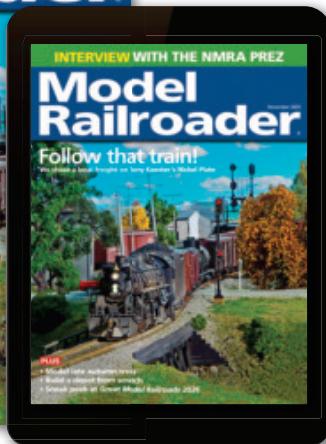
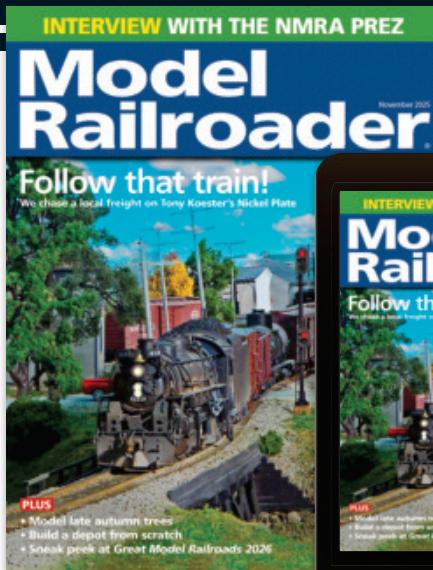
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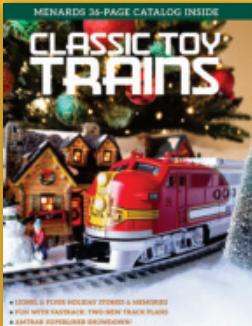
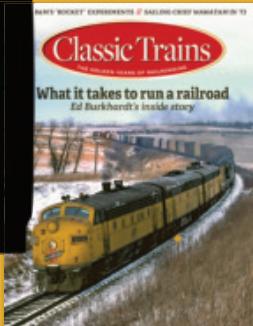
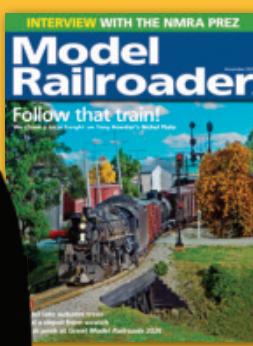


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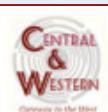
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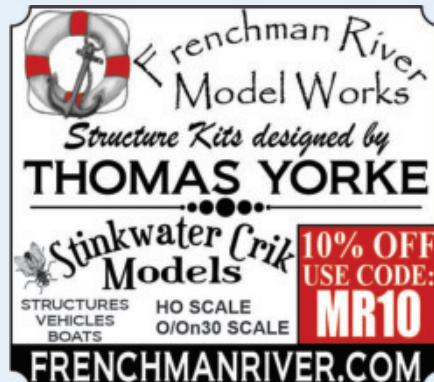
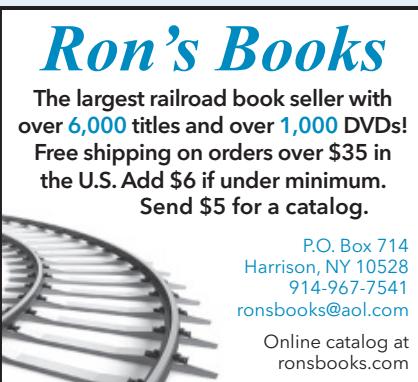
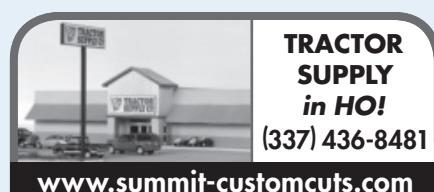
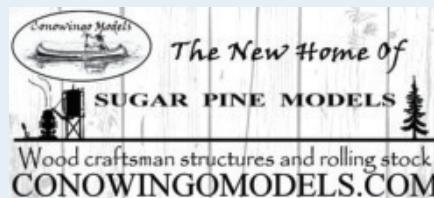
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Schedule of Events

AL, MOBILE: Model Train Show sponsored by South West Alabama Railroad Modelers (SWARM). Via Health, Fitness and Enrichment Center, 1717 Dauphin Street, March 7-8, 2026. Saturday 9:00am-5:00pm; Sunday 11:00am-4:00pm. Admission \$8.00, family \$15.00, under 10 free. Operating layouts, demonstrations, and dealers. Contact Charlie Boyer, 251-454-0572 (before 9pm CST), email: charlieboy66@att.net or Glenn Samuel, 205-914-0693, email: gasamuel@aol.com

CO, COLORADO SPRINGS: Train Expo Colorado (TECO) model train show is February 28–March 1, 2026. Saturday 9am-5pm and Sunday 10am-3pm at our NEW LOCATION the Norris Penrose Event Center, 1045 Lower Gold Camp Road, Colorado Springs, CO 80905. Admission: \$10/person; \$5/youth 13-18; Children 12 and under are free. Visit our Facebook page or website www.tecoshow.org

CO, DENVER: Rocky Mountain Train Show, April 11-12, 2026. National Western Complex, 4655 Humboldt St., Denver, CO 80216. Saturday, 9:00am-5:00pm, Sunday 9:00am-4:00pm. 3 acres of model trains, all scales, 3D layouts, 900 sales tables, clinics and more. Admission \$16.00, under 12/scouts in uniform FREE. Discounted tickets available for military/first responders through VetTix.org. Free Parking. 303-364-0274, www.RockyMountainTrainShow.com

FL, LARGO: Regal Railways presents a Toy Train, Collectible and Hobby Show/Sale. St. Jerome Catholic Church, 10895 Hamlin Blvd., Largo, FL 33774. Saturday, March 21, 2026. 9:00am-2:00pm. Admission: \$6.00 adults, children under 12 free. Vendors and model train layout. Lunch available. Contact: Joe at 727-244-1341 or visit: www.regalrailways.com for more information.

FL, OCALA: Lions Bi-Annual Train Show. First Christian Church, 1908 E. Fort King St., Ocala, FL 34471. Saturday, March 14, 2026. 9:00am-2:00pm. Model trains, accessories, detail parts and toys. Admission \$5.00, children 12 and under free w/paid adult. Bring two canned goods and receive \$1.00 off admission. Food/snacks available. Information: Bob 352-694-6381 or cell 352-547-0938

GA, SAVANNAH: Coastal Rail Buffs 37th Annual Model Railroad and Train Show at Pooler Recreation Center, 900 S. Rogers St., Pooler, GA 31322. April 11-12, 2026. Saturday 10:00am-5:00pm, Sunday 10:00am-4:00pm. Adults 2-day admission \$10.00; Students/Seniors \$7.00, Active-Duty Military \$5.00, under 12 FREE. Dealer tables, operating layouts in O, HO, N, G, Z. Visit: www.coastalrailbuffs.com

IL, COLLINSVILLE: 19th Annual St. Louis Railroad Prototype Modelers Meet. Gateway Convention Center, 1 Gateway Dr., Collinsville, IL 62234. July 23-25, 2026. Friday 9:00am-9:00pm and Saturday 9:00am-5:00pm. Admission: \$35.00 for both days; \$25.00 for Saturday only. Thursday & Friday, 6:00pm-10:00pm layout tours, operating sessions and social gatherings. For information, www.slrpm.com or Contact: Lonnie Bathurst, bathurst@litchfieldil.com or 217-556-0314

IL, SPRINGFIELD: Springfield Railroad Society Annual Train Fair. Orr Building on the Illinois State Fairgrounds. Sunday, March 15, 2026. 10:00AM-4:00PM. Early bird shopping starts at 9:00AM for \$10.00. Admission fee \$5.00 from 10:00AM to 4:00PM. Free parking. Largest show in downstate Illinois! Info for call Mike at 217-899-3100 or Ray at 217-544-4295 or visit www.springfieldtrainfair.com

IN, LA PORTE: La Porte County Train Show and Swap Meet. La Porte County Fairgrounds Community Building, 2581 In-2, La Porte, IN 46350. Sunday, February 22, 2026, 9:30am-2:00pm (Chicago time). Adults \$5.00, youths 6-12 \$1.00, 5 and under free. Contact: Dave Novak at trains86@yahoo.com or 219-778-3195.

KS, LAWRENCE: Lawrence Model Railroad Club Annual Train Show and Swap Meet. February 28-March 1, 2026. Crown Toyota, 3400 S. Iowa St., Lawrence, KS 66046. Saturday 9am-5pm; Sunday 9am-3pm. Admission: Adults \$10.00, children 12 & under free w/paid adult. Bring a canned food donation, receive \$2.00 off admission. Contact: Jim Turner, 785-393-6207, bike2turner@gmail.com, or visit: www.lawrencemodelrailroadclub.org

MI, LINCOLN PARK: Lincoln Park Train Club Train Show (Buy & Swap). Saturday, March 28, 2026, 11am-3pm. JFK Memorial Bldg., 3240 Ferris Ave., Lincoln Park, MI 48146. Admission is \$5.00, under 12 FREE. Early Bird \$10.00. Tables \$20.00. For more info: Bob @ 734-675-5712 or Henry @ 313-623-8581 or John @ 734-676-8645.

MN, ST. CLOUD: Granite City Train Show and Sale. River's Edge Convention Center, 10 4th Ave S, St. Cloud, MN 56301. Saturday, February 28, 2026, 9:00am-3:00pm. \$6.00, kids 10 and under FREE! Buy/sell model/toy trains, books, videos, railroad collectibles. Operating model & toy train displays. Win a LIONEL train set! 612-558-6484; GraniteCityTrainShow@gmail.com or visit: www.GraniteCityTrainShow.com

NC, HICKORY: 24th Annual Hickory Train Show. Hickory Metro Convention Center, Interstate 40 at Exit 125 (Lenoir-Rhyne Boulevard). Friday, March 27, 2026, 12:00pm-7:00pm and Saturday, March 28, 2026, 9:00am-3:00pm. Admission \$9.00, children under 12 free with a paid adult. Sponsored by the Newton Depot Authority and Alexander Chapter - NRHS. Info: 828-874-5958. HickoryTrainShow@gmail.com

NJ, BRICK: ECTP and Collectibles LLC presents The Brick Train Show. Elks Lodge, 2491 Hooper Avenue, Brick, NJ 08723. Sunday, March 1, 2026, 9:00am-2:00pm. Admission: \$7.00; under 12 free with adult. John LaLima 732-845-5966. Go to www.eastcoasttrainparts.com and click on the Brick Show.

NJ, CLARK: Jersey Central Train Show & Sale. Mother Seton Regional High School, 1 Valley Road, Clark, NJ 07066. Sunday, March 1, 2026, 9:00am-3:30pm. Admission: \$7 adults, children under 12 free, \$14 family. Model trains, railroadiana, photos, slides, books and videos. Refreshments available. For information: Heinz Ricken, ricken@gmail.com, 908-272-3910, or Mitchell Dakelman, dakelmann@aol.com, 908-208-2559

PA, ALLENTOWN: ATMA Spring Thaw Train Meet. Allentown Fairgrounds Agri-Plex, 1925 W. Chew Street, Allentown, PA 18104. February 21-22, 2026. Saturday 9am-4pm, Sunday 9am-3pm. Admission: \$10. Advance tickets \$15, admitted at 8am. 12 and under FREE with adult ticket purchase. For more information visit www.allentowntrainmeet.com or call 610-442-2859

UT, OGDEN: 36th Annual Hostlers Model Railroad Festival. Ogden Union Station, Historic 25th St. & Wall Ave. March 6-8, 2026, Friday 3:00pm-8:00pm; Saturday 9:00am-6:00pm; Sunday 9:30am-2:30pm. Admission: adults \$10, weekend pass \$15. 12 and under FREE. Layouts - all scales, vendors, LEGO layout. Food trucks/ATM available. Biggest train show in the Intermountain West. Information: Robert Cannon 801-589-7928, www.hostlers.info

VT, ST. ALBANS: Vermont Rails Show. Collins Perley Sports & Fitness Center, 890 Fairfax Rd., St. Albans City, VT 05478. (Interstate 89, Exit 19). Saturday, March 14, 2026, 10:00am-4:00pm. Adults \$8.00, children 6-12 \$2.00, children under 6 free. Sponsor: NWV Model Railroad Association. Contact: Chris Weinberg, 339-832-9178, or visit: www.nwvrrailroad.org

WA, CHEHALIS: 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 98532. April 11 & 12, 2026. Saturday 10:00am-4:00pm and Sunday 10:00am-2:00pm. Admission \$5.00. Free parking. Contact information: Ted, 360-985-7788, or email: TedsTrains@LewisCounty.com

WA, SPOKANE: River City Modelers Spring Model Train Show. Spokane Fairgrounds, 404 N. Havana. Sunday, March 8, 2026, 9:30am-3:30pm. Admission: adults \$8, 12 & under free. 200+ tables of railroad-related items for sale, operating layouts, Free-MO, Operation Lifesaver & more. Free Parking. For table rental or general info, contact: Shirley Sample, 509-991-2317 or shirley@busnws.com

WI, LA CROSSE / ONALASKA: La Crosse & Three Rivers Railroad Club's 45th Annual Model Railroad Show. Omni Center, 255 Riders Club Road, Onalaska, WI 54650. March 14-15, 2026. Saturday 9:00am-5:00pm, Sunday 10:00am-3:00pm. Adults \$8.00, \$7.50 with a non-perishable food item, 2-day pass \$12.00, children 11 and under free w/adult. Info: Belva Thompson, 608-780-7364

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Next Issue

The pull of Chicago

John Brennan built the HO scale Chicago, Peoria & Western twice, once in the Chicago area, then again in Florida between 2000 and his passing in 2023. John's friends helped Lou Sassi document the layout after John's passing.

Roads and basic terrain

David Popp continues our East Troy Industrial Park project layout with the beginning steps for scenery creation.

Plus more:

- Dave Abeles celebrates 50 years of Conrail with locomotive considerations for his Onondaga Cutoff.
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Too much tech talk?



Can you look at a turnout and explain what part of it is the switch? Switch rod? Lead? Closure rails? Do you know how a No. 6 frog is defined? Some of these terms have confused modelers for eons. Tony Koester photo

I was chatting with my daughter about one of my crew's interesting background. Sue is a college professor who has written several text books about her medical field, so she's used to "tech talk." But her response was to the effect that she didn't have a clue about what my friend was talking about. It was all railroad-speak.

That reminded me of my first weeks, maybe months, at Bell Labs when I discovered everyone spoke in acronyms. The internet was just becoming a household term, and together with telephone-company-speak (a problem was a "trouble," so a trouble report was a TR), it was hard to fit an everyday noun in edgewise.

That got me to thinking about the budding model railroader — you, perhaps — who is trying to come to grips with both railroad-speak and model-railroad-speak. For example, can you clearly explain the difference between a switch and a turnout and why professional railroaders speak of a turnout as a switch? Do you know how a

No. 6 frog differs from a No. 4, or even what a frog is? A head-block? Switch rod? Lead?

Fortunately, only a few of these terms matter unless you're handlaying turnouts (and the movable parts thereof, which are called the switch). And just to make this whole thing more fun, I believe our U.K. friends call the whole thing "points." Then there's double-slips and stub switches, some of the latter three-way.

Other examples of the lengthy lexicon of railroad nomenclature we ask newcomers to cope with include steam locomotive names and wheel arrangements: American 4-4-0, Consolidation 2-8-0, Mikado 2-8-2, Pacific 4-6-2, Hudson 4-6-4. But venture into 4-8-4 country with your note pad handy. What is generally called a Northern may be known as a Greenbrier on the Chesapeake & Ohio; Niagara on New York Central; Wyoming on Lehigh Valley; Dixie on the Nashville, Chattanooga & St. Louis; Heavy Mountains on Santa Fe; Potomacs on Western Maryland; and more.

Many railroad names that have passed into history — fallen flags — have lived on well beyond the corporate entity. I model one of four subdivisions of the Clover Leaf District of the Nickel Plate Road, which recalls a colorful nickname given to an NKP predecessor. Same for the NKP's Wheeling [& Lake Erie] District. Knowing some history adds depth to your modeling enjoyment. It takes time, but that's what a hobby is for: filling your leisure moments with interesting and fulfilling endeavors.

Some topics like realistic "operation" (the movement of trains and the individual cars in them) are complex enough to require more than occasional conversations. Jerry Dziedzic's former On Operation column in *Model Railroader* has covered some of the myriad aspects of operation as it was practiced during various eras, but I

know from regular conversations with him that there are many more.

Trains of Thought is intended to be equal parts information and entertainment, and on occasion I venture into the understanding of the pervasive jargon that we must wade through to communicate. If more is needed, let me know.

So what I want to explore here is whether those of us who choose what you read in MR are doing enough to explain what we and our contributors are talking about. Or do we occasionally, or even often, talk over your heads? If so, let us know, but provide us with specific examples, please.

I can remember being confounded why anyone would bang on a freshly drilled hole, but that's what the author said to do — tap it. AWG (American Wire Gauge) wire sizes were less puzzling, but I wasn't sure when to use what size wire and whether solid or stranded was best for a given application.

Some of you are new entrants to our fascinating and broad-shouldered hobby. As with any new venture, at first you can expect to be

puzzled about a lot of terms and concepts — staging and fiddle yards, for example. If after a reasonable amount of time, however, you still don't understand terms that repeatedly appear in these pages, let us know. We can't try to fix something unless we know a problem exists. **MR**



AS WITH ANY NEW VENTURE, AT FIRST YOU CAN EXPECT TO BE PUZZLED ABOUT A LOT OF TERMS AND CONCEPTS.
— TONY



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