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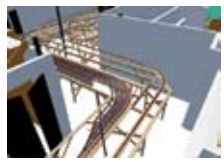

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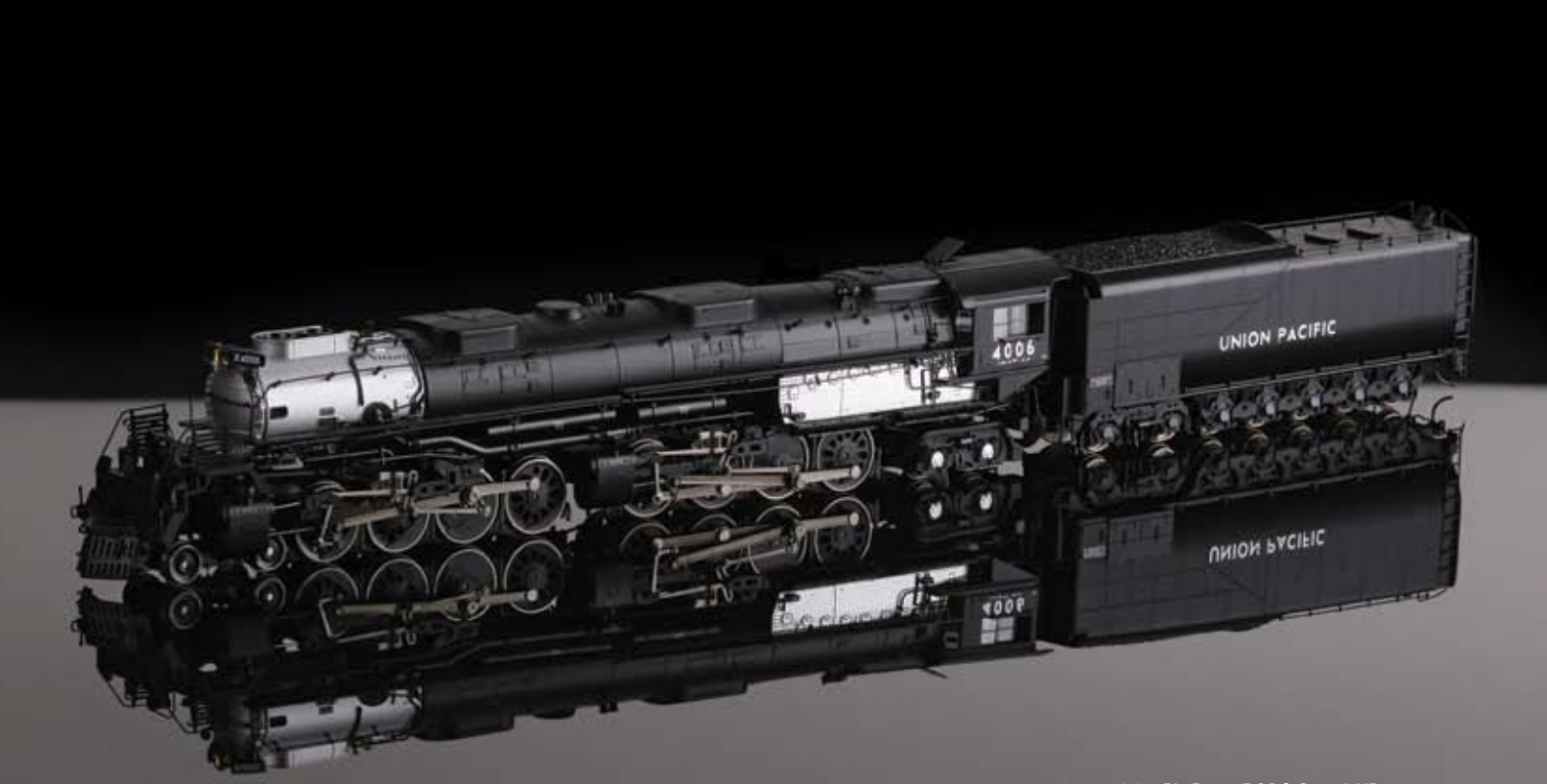

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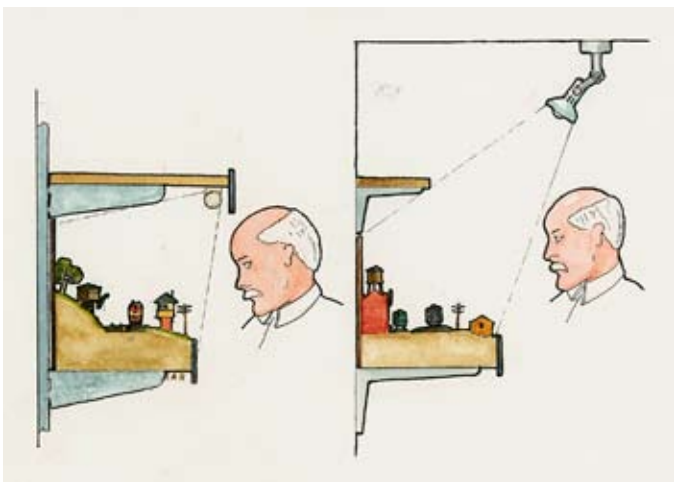
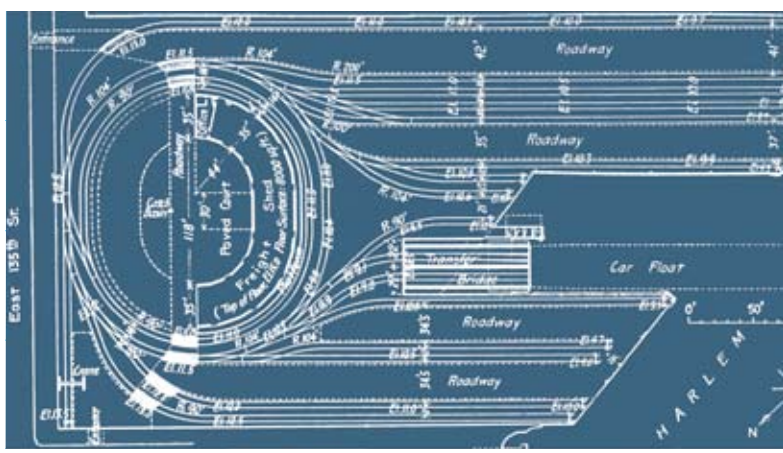
Page 20: Appalachian coal hauler in N scale



Page 14: Options for building shelf layouts



Page 42: Don't draw a track plan – use the blueprint

On the cover: The *Model Railroader* club layout illustrates layout height questions addressed by *Model Railroad Planning* editor Tony Koester on page 8. Bill Zuback photo

Photos and art, clockwise from top: Phil Brooks, Paul Dolkos, Dave Clemens, Harold Mikwitz, Harlem Transfer Co., Iain Rice

Page 54: Accurate measurements for layout designers

Page 82: Planning for growth from a small start

Page 60: A freelanced subsidiary in a favorite locale

Model Railroad Planning 2007

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//Editorial

Doin' what comes naturally

I swiped a sketch that Dave Clemens prepared for his article on modeling the area around Spokane, Wash. (see page 60) for use here. It's printed a bit too small to make out much detail, but that doesn't matter a bit. You can see what I want to point out: Layout design can be as simple as connecting the dots or, more to the point, the LDEs.

I admit bias here; I introduced the concept of Layout Design Elements in the very first issue of MRP back in 1995. I'd watched well-intentioned track planners struggling with plans for their new empires, large or small. I'd also noticed that those who model parts of specific prototype (full-size) railroads tended to come out better in the end. Why?

Well, they cheat. Crib. Plagiarize with a capital "P"! More power to them, I decided. Everyone, especially freelancers, could benefit from this approach. Prototype modelers using LDEs link the towns, cities, industries, yards, and signature scenes from their one favorite railroad end to end, leaving out the unusable bits.

Freelancers have the broader option of choosing interesting sections from Railroad A, Railroad B, and maybe Railroad C, and linking them together in a logical but entirely new way. As long as those two or three railroads lived in the same neighborhood and did more or less the same thing for a living, the result ought to be a plausible track plan.

And since each of these elements worked for the full-size railroads, we aspiring layout planners could press on even when we don't know all we'd like to know about them. If they worked on the full-size railroad, then they'll probably work for us too.

So it was that Layout Design Elements – visually and operationally recognizable segments of actual railroads adapted for use on a model railroad – came to be. Dave's sketch shows how simple it is to design a layout after you choose a few LDE candidates.

If you take nothing away from this issue except a sense of how Dave used LDEs (highlighted in color) to design his model railroad, you'll have your money's worth.

Vanilla! No, chocolate!

Not long ago I had the opportunity to visit Tommy Holt and his inspiring Western Pacific layout, which he describes beginning on page 34. He's been a friend for a long time and is one of MRP's and *Model Railroader's* go-to photographers when a contributor can't shoot the photos we need.

Tommy is a professional photographer and an early adopter of the new art of digital photography. Argue with him about some aspect of this combination of technology and art at your own peril; he knows his stuff!

Yet there's no way around the fact that so much of art, hence of photography, is subjective. You love it; I can't see it at all. That's especially true of lighting.

As he reports in this issue, Tommy is quite pleased with the lighting he achieves by using GE Chroma 50 fluorescent tubes. And he can tell you why they're the way to go with an army of facts and figures about what replicates "daylight."

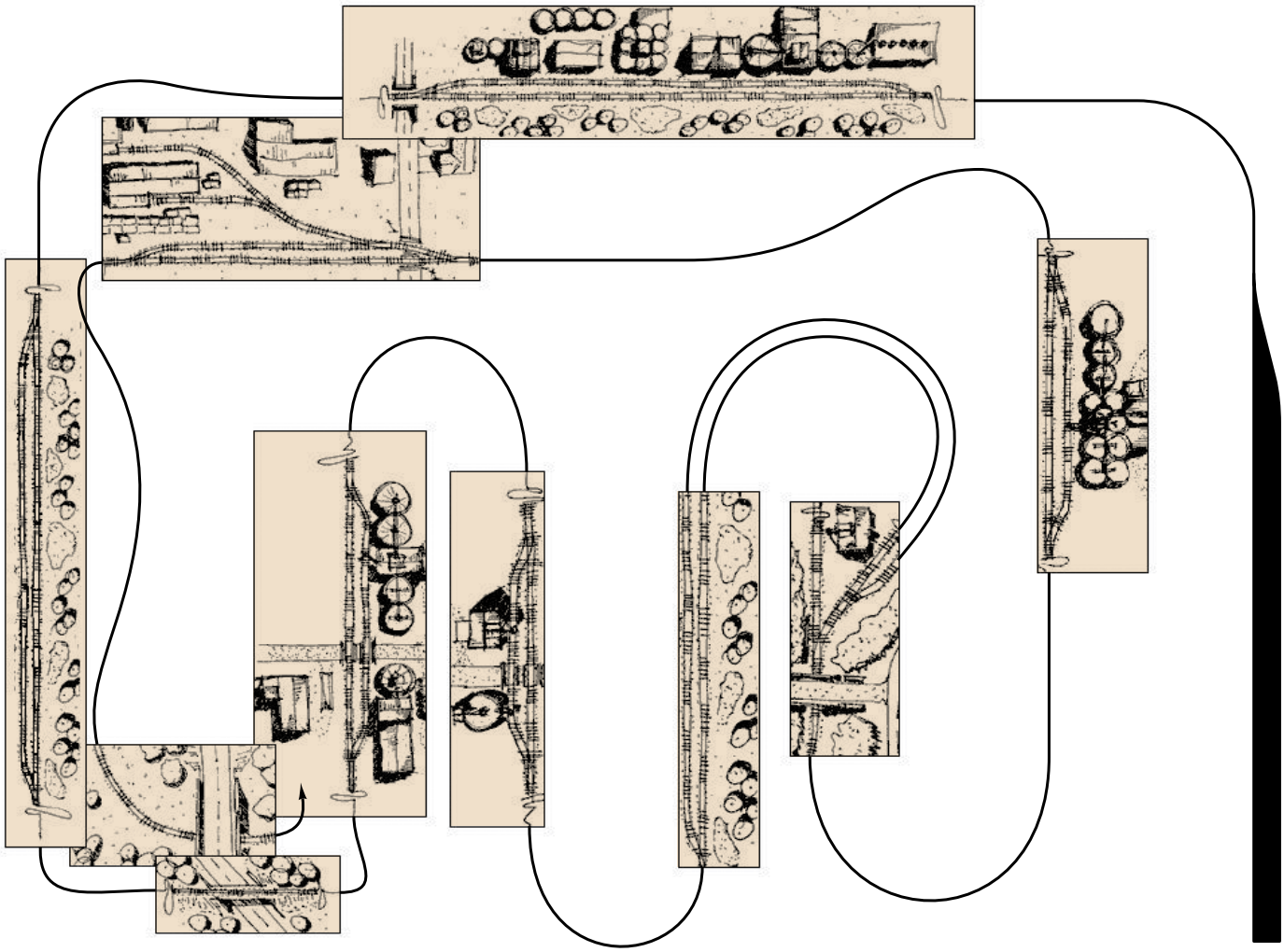
Yet when I tried installing two 40-watt Chroma 50 tubes end-to-end next to a pair of 40-watt cool-white tubes, I thought the 50s were too cold. I then called my take-no-prisoners wife downstairs and, later, my modeling buddy, Perry Squier. Without knowing what they were looking at, they both agreed that the cool whites were just fine but the Chroma 50s were too cold.

Bottom line: You have to check out this stuff for yourself. And one day in the not too distant future we'll be using LEDs anyway, as they're twice as efficient as fluorescent tubes, which are already five times more efficient than incandescent bulbs.

Good models or good operation?

Model railroading has for a long time been divided into two camps: the model builders vs. the operators. I like finding that the camps are merging into one happy family, as in the case of Phil Brooks – author of an article on his superbly crafted N scale Clinch River RR that begins on page 20 – in his Rear Platform commentary on page 98.

Of course, there have always been hobbyists who combine these interests.



Clearly, Dave Clemens' track plan for his new HO railroad is simply a series of interesting towns connected by the "twisty bits." Dave Clemens illustration

Allen McClelland of Virginian & Ohio fame is perhaps better known for his "beyond the basement" writing about operation, but he has a number of blue ribbons to attest to his model building skills. Phil's Gold Award-winning N scale coal dock thus stands as a reminder that we can indeed have our cake and eat it too.

Contributor etiquette

As photography continues to evolve into the 0s and 1s of the digital world, we've begun to take some shortcuts that turn out not to be a shorter path from here to there after all.

Many photographers now send in digital files of photographic images on a CD. Assuming each image is 6 megapixels or larger, that's fine, but MRP also requires that you send hard-copy color prints with the CD. Why? I can peruse a pile of hardcopy prints in a few seconds, much faster than I can load a CD and click through a series of images. It's also much faster to sort the hard copies into the desired order and refer to them when writing captions.

So CDs are most welcome, but hardcopy prints must accompany them. And please do some culling before you send them in; we want to see only your best efforts, not every image that can be crammed onto a CD.

Last, be sure your name, address, phone number, and e-mail address are on everything you send. The mailing envelope can become separated from its contents, and we then have an interesting letter, and maybe even a nice track plan and some great photos, but no way to contact the contributor.

Thanks!

Definitions

As I was writing about my new HO layout (page 8), which climbs on its way from east to west around the basement, I was describing it as "multi-level." But then it dawned on me that my old layout, the Allegheny Midland, wasn't all on one level, yet it had but one deck.

In MRP, we will therefore now refer to model railroads with one or more decks atop another as multi-deck, not multi-level, layouts.

I also don't care for the term "real railroad" when referring to the prototype. My HO railroad is every bit as real as a 12"-scale railroad. So when we're referring to the big guys that inspire out models, we'll call 'em full-size or prototype railroads.

While we're on that topic, it's interesting to note how model railroaders use the term "prototype." In other venues, prototype usually means the first of something, as a prototype aircraft, not a model thereof. But long, long ago, someone decided that we'd refer to the full-size railroads as prototypes. I can live with that.

Tony Koester, editor

Tony's new Nickel Plate Road layout is a continuous spiral around the basement walls and a central peninsula. The elevations at this point near the end of the peninsula are 63" on the top deck and 47 3/16" on the lower deck.
Bob Sobol photo

Layout height: shoulder high or bird's-eye?

There's no one-size-fits-all when planning your layout

By Tony Koester//Photos by the author, except where noted

Choosing a height above the floor for your model railroad inevitably requires compromise. A good viewing level for you will likely be a bit too high or low for others. And a good height for realistic viewing – perhaps close to eye level – may be somewhat high or low for ease of construction, maintenance, or operation.

If you're building a multi-deck layout, you have at least two compromises to make: one for the height of each deck. And if the multi-deck layout is a continuous spiral rather than two level decks connected by a helix, like Bill Darnaby's HO Maumee Route and my HO Nickel Plate Road (NKP) layout, there's both good news and bad: Everyone will find one spot where the height seems ideal, but everywhere else will seem a little, or a lot, too high or too low.

A way around the multi-deck problem is the so-called mushroom design, which approximates a single-deck layout by adjusting the floor height to match both sides of a peninsula. But now you're simply back to square one: trying to choose a single elevation above the floor that's ideal for you, your guests, and your operating crew. And mushrooms require high ceilings.

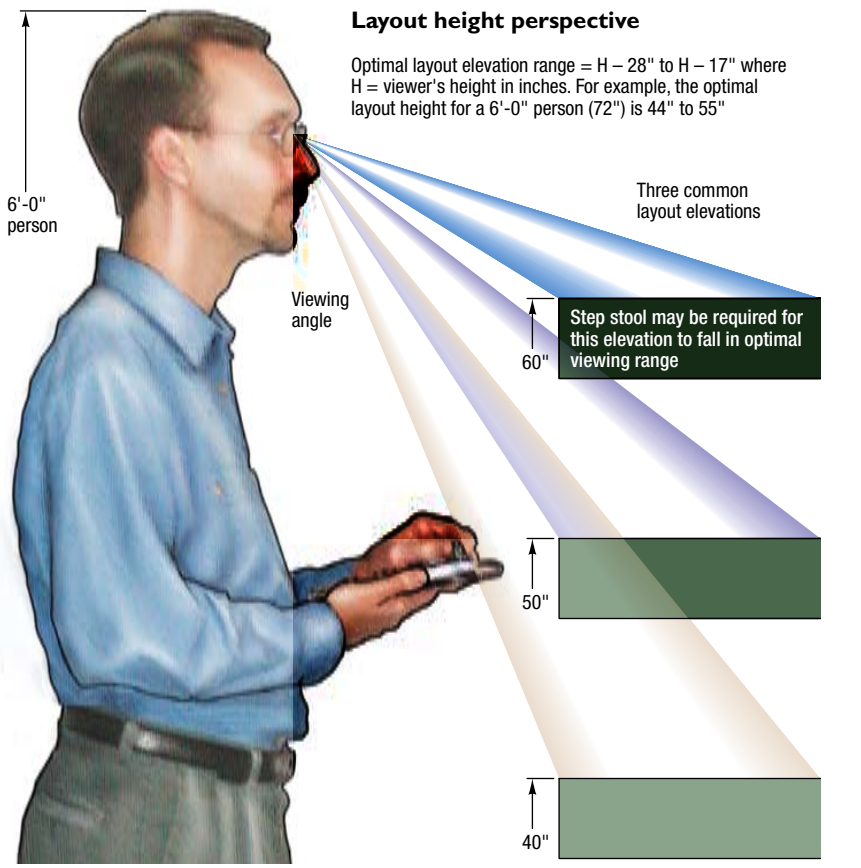


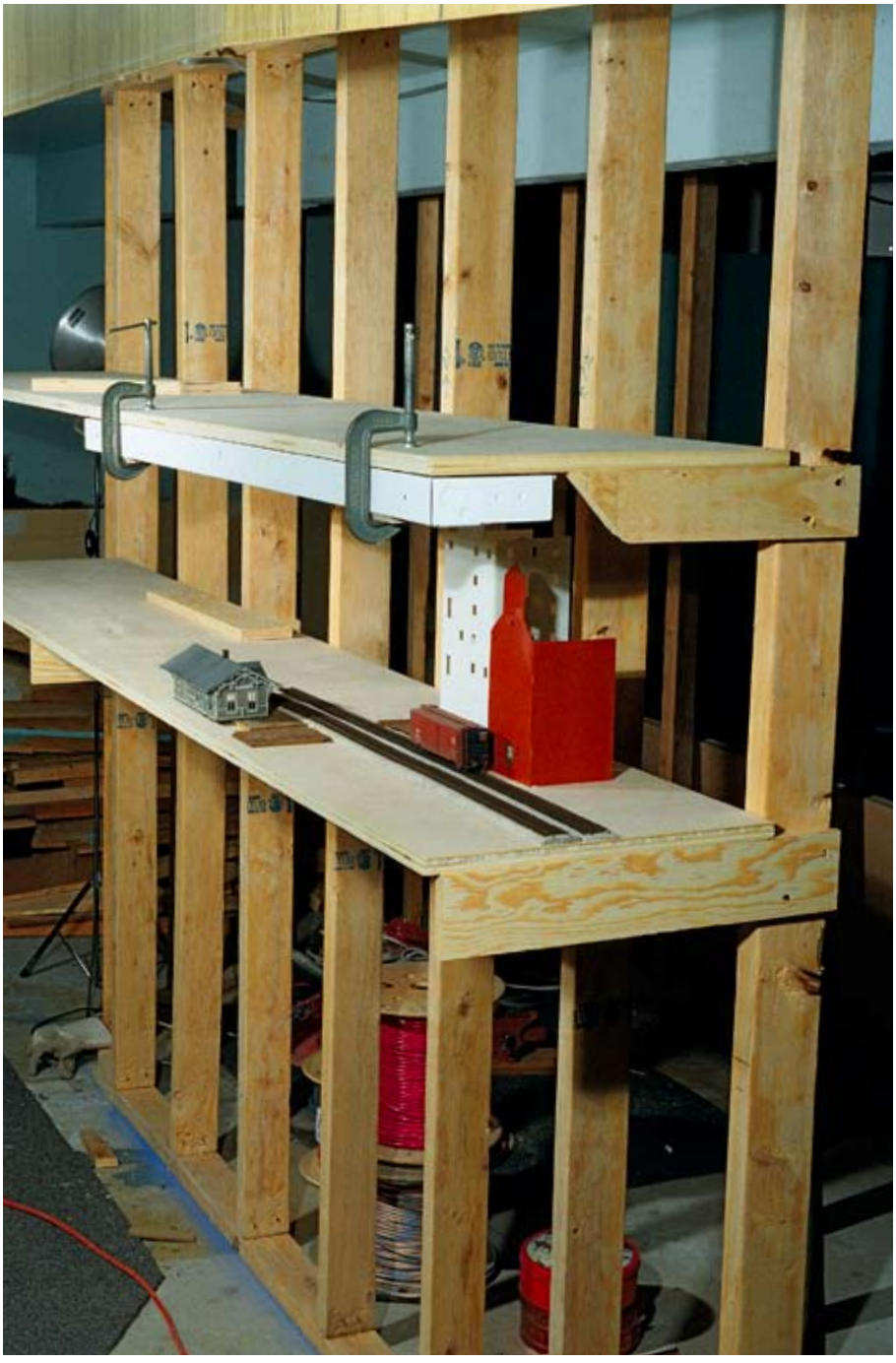
Illustration by Rick Johnson

An acceptable range

Layout-design veteran Don Mitchell coaches us to build our railroads above elbow height but below the level of our armpits. In my case (I'm 6'-3", or used to be), that would be between 46" and 53". I agree with Don; I usually recommend that single-deck layouts should be within a few inches either way of 50" above the floor.

But the single-deck Allegheny Midland's classification yards were 43" high, and the Coal Fork Extension was 58" high (see photos on page 11). My new multi-deck HO railroad starts at 43" and winds up at 68½". Did I fail to heed my own, and Don's, advice?

Consider the design goals. On the AM, a coal road set in the Appalachians, I wanted long helper grades. Tests showed that reasonably long (25-car) trains on 2.5 percent grades usually required pushers. Of equal importance, most model locomotives produced in the 1980s could handle those trains going downgrade without the all-too-common bucking motion caused by slack in the gearboxes.



Tony tested proposed deck separation and layout heights with mock-ups. This photo shows decks set about 16" apart; the top of the grain elevator is hidden by the under-cabinet light fixture, but the view of the railroad is unobstructed.

The elevation at the base of the grade – the classification yard at Sunrise, Va., and (on the other side of the state-line ridge) the coal marshalling yard at Midland, W. Va., both at 43" – was established after I participated in operating sessions on Allen McClelland's original Virginian & Ohio. Afton yard was 40" off the floor, and I wanted mine to be a little higher than that.

Checking reach-in distances

After making a small-scale drawing of the proposed track plan for the AM, I redrew the plan full-size on rolls of kraft paper. I then checked reach-in distances (generally regarded as 30" maximum) as best I could with the plan (and me) lying on the basement floor. I built the open-grid benchwork to match the as-drawn aisles with its top at 40".

Reach-in distance is a function of layout height – lower allows you to reach farther – so I re-checked reach-in access and viewing angles after laying the kraft-paper plan atop the single-level benchwork. Switching a coal prep plant in one corner on a 58"-high branch line would obviously be a challenge; in practice it worked out okay, if just barely.

The ¾" plywood subroadbed plus ½" Homasote roadbed put the minimum top-of-rail height at about 41½". I wanted to be able to fine-tune the subroadbed height to ensure it was level while allowing for switch-motor-to-joist clearance, so I elevated the yards on risers to 43".

A quarter century of operation showed 43" to be a good height for a yard having more than a half-dozen or so tracks to reach. Manually uncoupling cars or aligning couplers seemed well within the reach of yardmasters.

I then measured the length of the planned helper grades on my track plan, minus track in towns, which was kept flat. I multiplied the lengths times .025 (2.5 percent). That set the summit at Altapass around 54", which mock-ups showed to be almost ideal – for me. Another 2.5 percent climb up a coal branch put the highest elevation on the AM at 58". I liked this even better and built the entire Coal Fork Extension around three sides of the crew lounge (former family room) at this height. A few crew members found this to be a bit too high, so I kept step stools handy.

All things considered, 43" was a good choice for the base elevation.

New goal, different approach

I'm now modeling part of the former NKP, as I described in the September and October 2000 issue of *Model Railroader*. This Midwestern bridge line had to race the likes of the Wabash and New York Central between St. Louis, Peoria, and Chicago to the west and Buffalo and Atlantic ports (via connections) to the east. The NKP was relatively level, with its most severe grades where it had to climb out of river valleys.

The most challenging climb on the Third Subdivision of NKP's St. Louis line was in my 1950s hometown, Cayuga, Ind. The serpentine 1.29 percent westbound grade out of the Wabash Valley could be a killer for Mikados (2-8-2s) and even the "Super Power" Berkshires (2-8-4s) when trains were heavy or weather conditions marginal.

I plan to operate the railroad as the NKP did: by timetable and train-order rules. This pointed to a long mainline run – those fleet 2-8-4s could eat up the 111 miles between division points in under three hours. This in turn required a multi-deck track plan to achieve anywhere near the 10-scale-mile (600-foot) main line objective, which was based on lessons learned on Bill Darnaby's trend-setting Maumee Route. Even with the insightful help of civil engineer and master modeler Frank Hodina, we came

Elevations on Tony's former Allegheny Midland varied greatly, ranging from a waist-high 43" in the yards (left) to a shoulder-high 58" on the Coal Fork Extension (right). Judy Koester, both photos

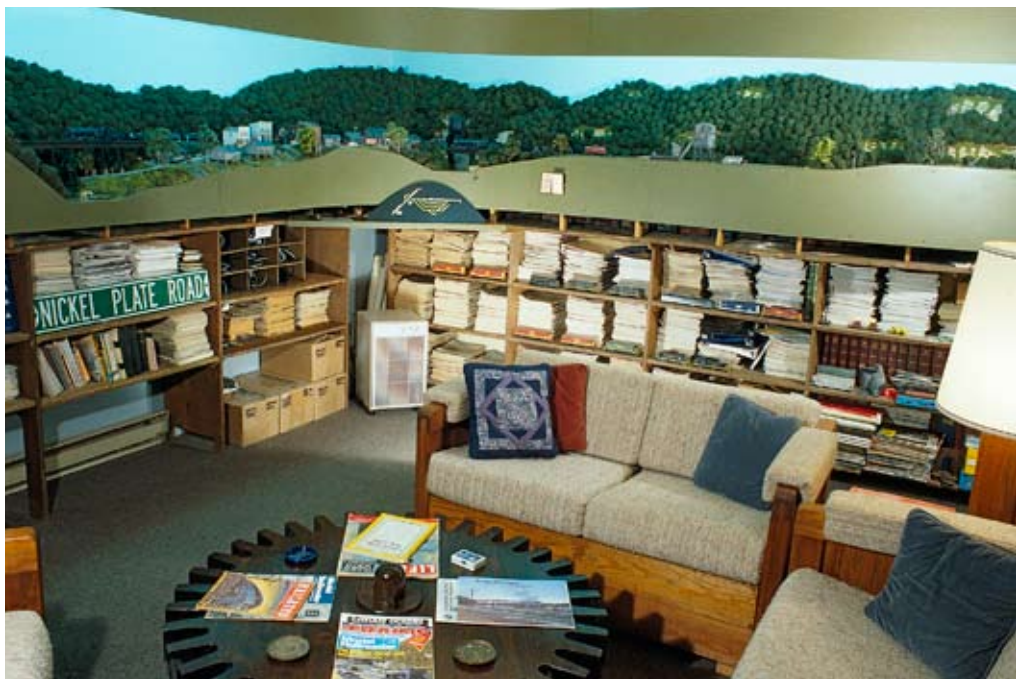
up a bit short: 500 linear feet of mainline run, about 8 scale miles. Close enough, we hope; test runs suggest we'll be fine.

Helix or continuous climb?

We had two design options: two level decks connected with a helix, or a continuous climb around the basement walls and the central peninsula. A hidden helix can be problematic: Trains disappear into one for quite some time; the helix usually constitutes the railroad's ruling grade, which can be a bad situation; and it can reverse the direction of a train in front of the viewer. That is, east to the right, preferred by most planners to keep the "sun" at their backs, may become east to the left after negotiating the helix.

In a small space, a helix is none-theless the best option to climb between decks. But with a 63-foot-long basement at my disposal, we decided a Maumee-style around-the-room continuous helix was a better bet. Instead of descending into the Wabash Valley from both directions, the HO edition of the Third Sub climbs westbound at 1 percent or less, then encounters an even steeper grade at Cayuga.

My initial goal was to make the climb up Cayuga Hill match the prototype's 1.29 percent. Tests with brass and plastic NKP Berkshires and Mikados showed that these models, not I nor the NKP, would determine the actual grade. Even with good trucks and metal wheels, I had to ease the gradient by relocating the summit about 30 feet farther west before those locomotives could take a 30-car train up the hill. Train length is therefore a major layout-design consideration, and we'll look at that in depth in the 2008 issue of MRP.



The 58" height on Tony's former Coal Fork Extension allowed the space under the layout to be put to good use.

Choosing a base elevation

Experience on the AM suggested that 43" was a good height for the classification yard at Frankfort, Ind., a major hub on the NKP where four divisions meet. We then calculated what a maximum 1 percent westbound grade, with all towns level to ease switching and spotting cars, meant in terms of two critical factors: deck spacing and west-end height.

I mocked up the two decks along the central peninsula near Linden, Ind. (lower level with top-of-rail height at 47½") and Metcalf, Ill. (63"), as shown on page 10. (The photo on page 8 shows this same area.) The top of a Walthers concrete grain elevator was hidden by the under-cabinet fluorescent fixture

The back tracks in Frankfort's westbound yard are a stretch for 5'-7" Perry Squier (left) unless he stands on a step stool; it's a stretch even for Tony at 6'-3". The rear-most track is 36" from the aisle, 6" more than good practice suggests.

needed for lower-deck illumination. A crew member's focus will not be on the roof of the elevator but on the railroad, however, and he has an unobstructed view of the depot and boxcar.

With worries about deck separation behind me, I focused on the viewing height of the entire second deck, which ranged from 53½" at Cayuga, Ind., to 68½" at the division point yard at Charleston, Ill. As you can see in the photo on page 8, the 42"-radius curve at the open end of the peninsula between Metcalf and Oakland, Ill., offers a rail-fan's eye-level view (for me, anyway) of the railroad at 63" to 65".

To help you imagine what similar elevations might mean on your railroad, I took the photo (on page 13) showing how Metcalf (top deck) appears relative to Perry Squier, who stands 5'-7". For Perry to switch Metcalf comfortably, he needs to stand on a step stool.

Even Frankfort, at 43" high, presents challenges, not because of its height but because of its depth (width). As shown in the photos above, it will be tough for shorter operators to reach the back tracks to uncouple cars unless they stand on a step stool. As shown in the right photo, it's a tough reach even for me. I narrowed the east- and westbound yards as much as I dared, so I'll have to live with it. Since I don't use permanent-magnet uncouplers, I may need to install electromagnetic uncouplers or add DCC-activated remote uncoupling devices, like those sold by Tony's Train Exchange, to my switchers.

Raising the floor in spots

East Yard on the Maumee is only 38" high, and operators working for longer periods of time find it's more comfortable sitting in an office chair on casters. Frankfort yard is a scale mile long, however; imagine trying to roll up and down that busy, carpeted aisle! Besides, even if Frankfort (and every other town) were 5" lower – 63½" at Charleston yard – that would still be above easy viewing or working height for many operators.

My solution is to follow Bill's example and place 10" Rubbermaid step stools around the railroad for use as needed. I don't like raised platforms, as it's easy to fall off the back or end unless railings are provided, and they constrict aisles. On a stool, however, you know that a step in any direction is off the stool.

The worst case is at the west end, Charleston yard. Here, Frank Hodina cleverly designed an isolated alcove between the yard and basement wall for the yardmaster to work in. I built an elevated floor, similar to those used with mushroom layout designs, to reduce the apparent height by almost a foot. (See the photo on page 13.)

The floor's height was limited by the basement's 85½" ceiling height (and lower beams), which is too low for a mushroom design. To make it easier for the yardmaster to reach the most distant tracks (the farthest is only 22" from the fascia), I added a continuous open-front step along the alcove side of the yard. The open front lets the yardmaster's feet fit under the step when an extended reach isn't needed.

Point of view

An acceptable layout height, or range of heights, quite literally depends on your point of view. For a single-deck railroad, the primary consideration is your own height and that of others – grandchildren, for example – you want to be able to see or operate the railroad easily. Construction and maintenance

//Learning points

- A good range of layout heights to aim for is from elbow height to armpit height – but whose?
- The ideal layout height for you may be a foot or more too high or too low for guests and crew members.
- Climbs over mountain ranges and/or separation between decks must be kept in mind as you set the minimum benchwork height.
- A foot to 16" is a good goal for between-deck spacing (railhead to railhead) in N or HO.
- The higher the benchwork, the easier it is to work under the railroad – but the harder it is to work on top of the railroad.
- Step stools placed around the room or raised floors – a mushroom design is an extreme example of the latter – make it easier for shorter operators to view and work on the railroad.

A step stool is needed for shorter operators to work on the top deck at Metcalf, Ill., which is 63" high at this point. The relatively narrow benchwork at this level (16") allows operators to maintain eye contact with their train as they walk along with it.

Tony raised the floor in the yardmaster's alcove behind the 68½"-high division-point yard at Charleston, Ill. The elevated floor leaves about 6'-5" of headroom. A narrow 8"-high step the full length of the alcove allows the yardmaster to reach the most distant track (the main line) 22" from the aisle.

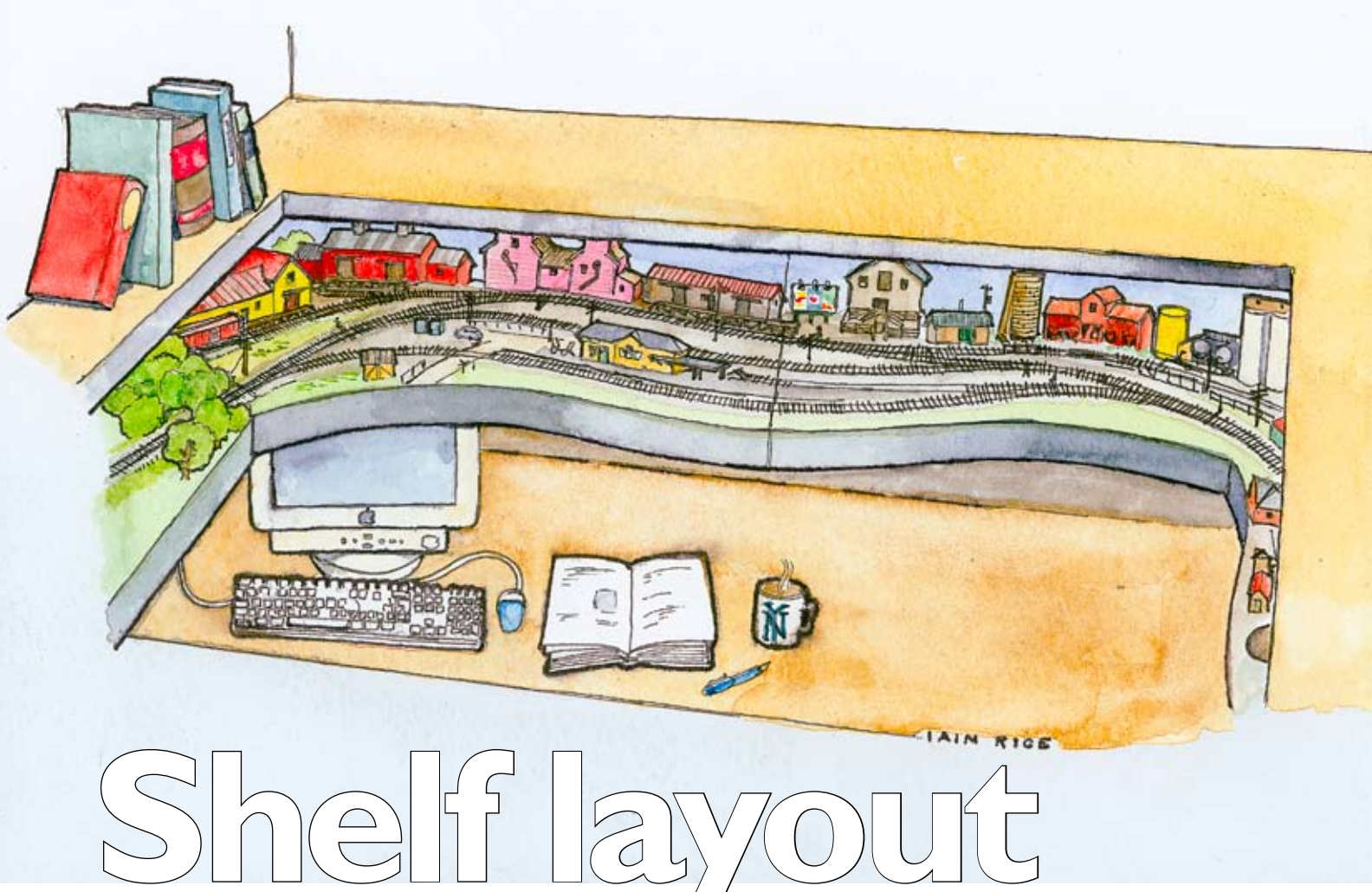
can be secondary considerations, but they may not seem secondary when your back starts killing you as you install a hundred switch motors and even more feeders.

Conversely, the higher the railroad, the easier it is to work under, but the harder it may be to reach over it during construction and operation.

A track planner must come to grips with the need for compromise, especially when designing a multi-deck railroad. Assuming a minimum deck separation of, say, 12", one deck may be a foot above or below the ideal, or both decks will be 6" or more off that mark. A better goal to aim for is 14" to 16" of separation, especially in HO, and even that's marginal for S or O scales.

It's impossible to achieve an ideal layout height unless you run a constant-level layout by yourself. But the closer you are to a 50" elevation – more specifically, elbow to armpit height – the better your layout will be for the average person to operate. **MRP**

Tony Koester is the editor of MRP. He is also a contributing editor to Model Railroader. *Tony has written four books for model railroaders on realistic operation, layout design, track-planning building blocks, and coal railroading.*



Shelf layout design tips

And an N scale plan for the Burlington Route

By Iain Rice//Illustrations by the author

Railroads, by and large, are long, thin things. So are shelves. Putting one atop the other, therefore, has a kind of inescapable logic.

In effect, almost all model railroads are built on a shelf of some kind, usually a large and very solid one hiding under the title of benchwork. What I want to consider here, however, is the model railroading potential of the kind of shelf they understand at Home Depot – the everyday domestic variety. As long as you can put a strip of right-of-way at a suitable height along a wall or several walls, you can build a shelf railroad.

All you need to go shelf-railroading is a space a foot or so high, as long as possible, and somewhere between four and five feet above the floor. Not such a tall order, surely? And it's surprising just how much railroading you can accommodate on a shelf as narrow as 6".

Shelf width and location

How wide a shelf you finish up with depends on a number of factors. The maximum width in practical terms is about two feet – not many shelf supports go wider than this, and at a decent display height, that's about as far as you can reach comfortably. Moreover, people considering shelf layouts generally have in mind something a good deal narrower.

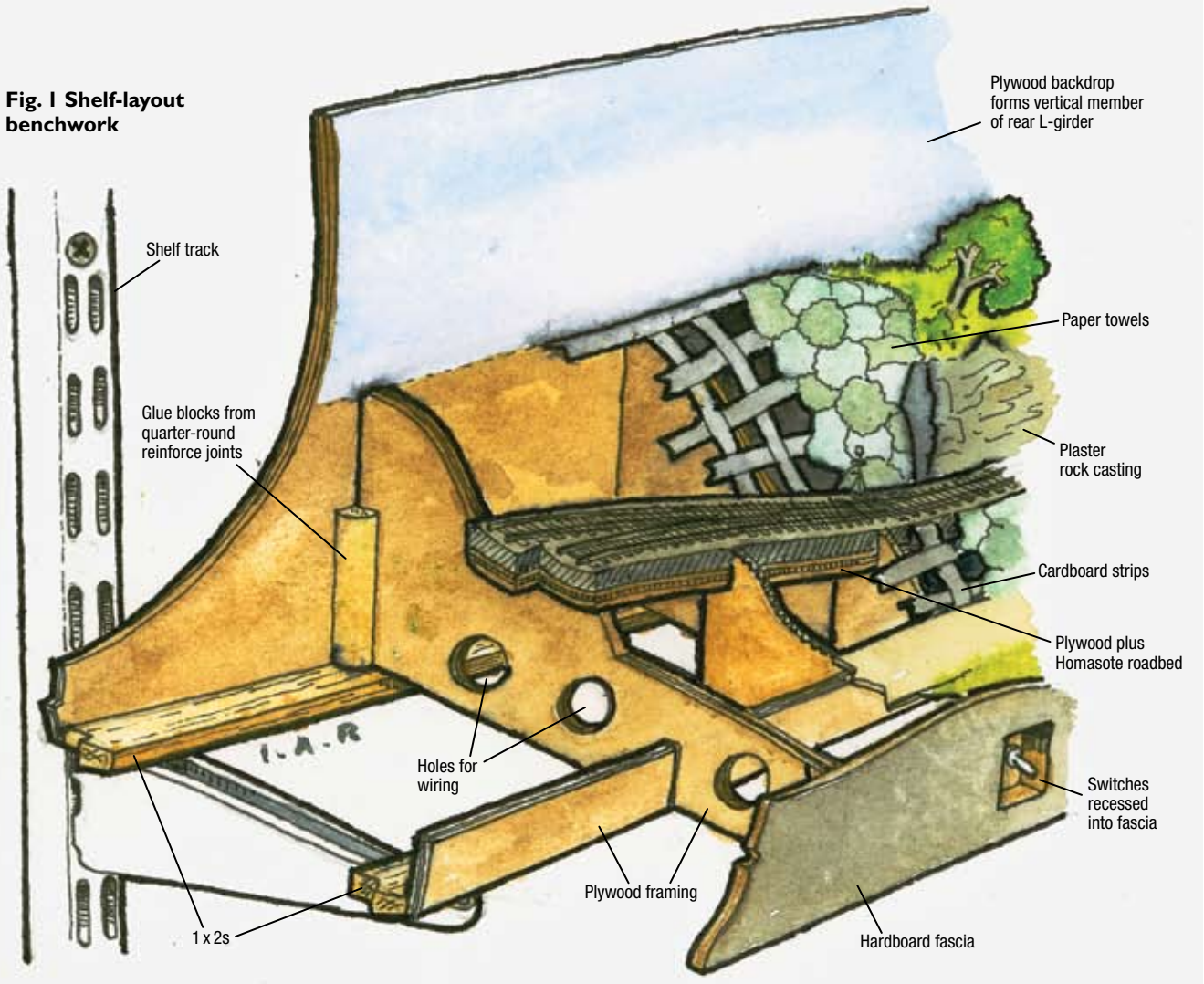
A two-foot-wide shelf is, after all, a rather unwieldy beast, and I have found that a width of 12" to 15" typically works much better. That's deep enough to accommodate several tracks or structures and a modicum of scenery while remaining compact enough not to intrude too much into the room.

Visually, the shelf layout works best at about eye level. At this height, you're looking across the shelf rather than down onto it, so the narrowness of the scene isn't so apparent. Eye level [See "Layout height: Shoulder high or bird's-eye?" beginning on page 8. – *Ed.*] is also an effective viewpoint for a backdrop, which visually expands even cramped layout sites. How else do you compress miles of apparent real estate into the thickness of a sheet of paper?

Shelf layouts can be sited in parts of the house – hallways and corridors, garages, narrow basements, and so on – that might not easily accept more-conventional model railroad formats. Shelves are also readily integrated with other room uses in studies, home offices, bedrooms, or family rooms. Shelf layouts are somehow more acceptable in domestic settings.

The layout shelf need not be a stand-alone feature; it could simply be one shelf along a wall that's part of a library

Fig. 1 Shelf-layout benchwork



or storage system, using the same supporting hardware and not impinging significantly on the space. This can be a key factor when negotiating rights to build your railroad.

Supporting systems

One of the great things about shelves is the amount of hardware that's out there to help you build them. There are some neat shelf-mounting systems with brackets that snap into slotted vertical tracks. They could have been designed with model railroading in mind.

Shelf-track, as a basis for benchwork, is quick to erect and plenty strong, spreads the load over a greater span, gives plenty of scope for adjustment, and makes it easy to get a level base for the railroad. Also, shelf-track has a minimal impact on a building's structure; it needs nothing more than a few easily filled screw holes, making it an ideal approach for railroading in apartments or other temporary accommodations.

Most brands of shelf-track systems work fine, but the John Sterling Fast-Mount line at Home Depot is my choice. Made of steel with a zinc or white finish, it offers sturdy brackets for shelves from 12" to 24" wide, the most useful sizes for model railroading. These brackets are available with triangular braces to make them rigid and stable under heavy loads. The twin-hook-and-slot system is also stable. The vertical tracks screw to the studs of normal interior walls or, by using anchors, to concrete or brick. The locating slots are spaced 1¼" apart, which provides convenient steps for height adjustment or different levels of terrain.

It pays to use full-height tracks (Fast-Mount track is sold in pieces six feet long) for layout shelves. They spread the load over nearly the entire length of a wall stud and make it easier to adjust the tracks to be vertical (ensuring that the shelves are level side-to-side). A long track allows a wide range of height adjustment or the use of two mounting positions for the layout – the normal display height and a lower working height. It also makes it easy to integrate the layout with other uses of the space, such as bookshelves.

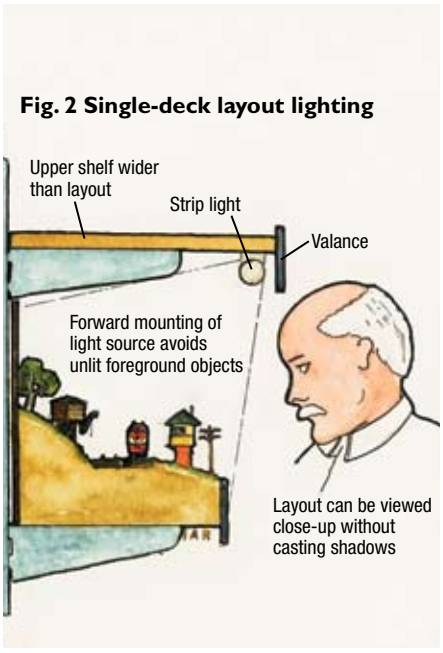
To ensure that the layout is well supported and level, don't space the shelf-tracks too far apart; about 16" to 24" is good, with the tracks lined up with wall-stud centers. Longer spans can be used if the roadbed is supported by benchwork atop the brackets.

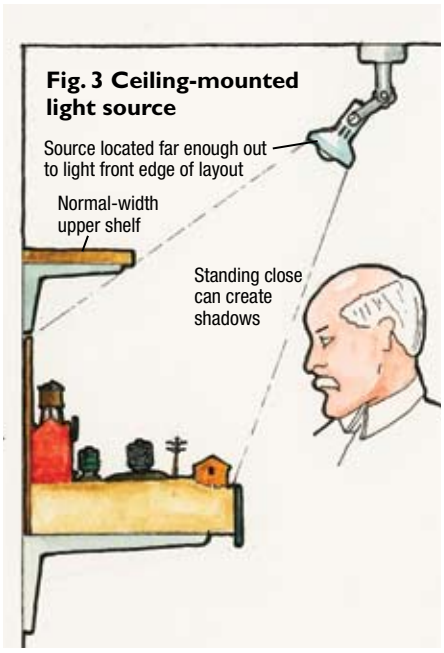
To ensure the shelf tracks are at the same height, use a level to align them. Attach one track to the wall, slot a bracket into it and another into the corresponding slot in the next track to be mounted, then lay the level across the brackets to determine the correct height for the second track. Fix that track with a single screw somewhere near the center and true it vertically before you finish securing it.

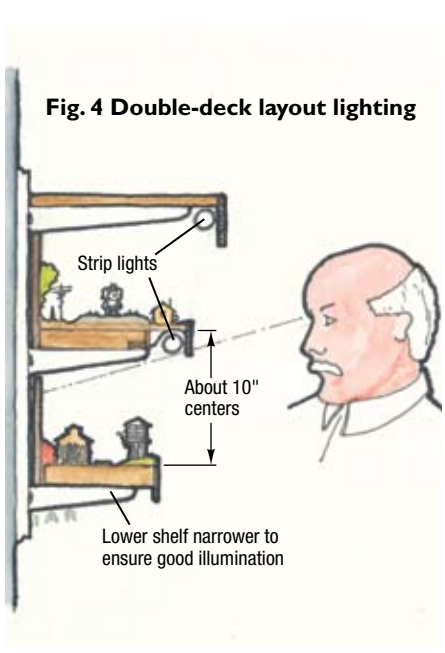
To check for level over several tracks, use a straight piece of lumber to span the brackets and check with the level.

Shelf benchwork

Shelf layouts are, by their very nature, easy to move. I'm always inclined to build things in chunks of manageable size, and designing a shelf layout in sections has a lot of advantages.







In particular, you can take down sections to work on them; even a layout designed to live 5 feet off the floor can descend to tabletop height when required, using a lower set of brackets.

I find sections from 4 to 6 feet long work well, and I make them mechanically and electrically self-contained. This allows me to test-run equipment with the section on the workbench and also keeps jumpers between sections as simple as possible. Joints between sections should be placed close to a support bracket.

At its simplest, benchwork for a shelf layout could be a plain plank of wood, but that has a lot of limitations both from the practical and the esthetic viewpoints (even the Corn Belt isn't that flat!). My usual approach is to use a miniature version of conventional L-girder, made with small-section lumber or a mix of lumber and plywood strips.

The sketch in **fig. 1** on page 15 shows how I typically make shelf benchwork. I use thinner grades of plywood (around ¼") to make the sections lightweight and easy to handle. Avoiding benchwork sags between supports is the key requirement, so vertical stiffness is the main objective of the design. Making the backdrop part of the shelf also helps, since it acts like a girder.

Losing the shelf look

Just because you build your model railroad on a shelf doesn't mean that it has to look like a shelf. It's possible to vary the width and to use a fair degree of verticality for scenery and structures.

Another dead giveaway on shelf layouts is the tendency for everything to be too straight and parallel. Just because the shelf is straight doesn't mean the track has to be. Avoiding trackwork that's always aligned with the shelf edge is a big help in creating a natural look.

With the "mini L-girder" benchwork system I've suggested, there's no need for the front edge of the shelf to be straight. You can install fascia with flowing curves that follow the scenery, making the shelves more esthetically pleasing. And, it's quite possible to vary the width of a shelf to accommodate tracks, structures, or scenic features.

At the rear of the shelf, by blending the scenery and structures carefully into the backdrop, you can go a long way toward hiding the rear edge of the scene, preventing it from feeling cramped. Low-relief structures, background flats, well-placed mirrors, and a tad of perspective modeling can add life and depth to a narrow site.

Another problem to avoid is always having the tracks and trains along the front edge of the shelf. Placing structures, rising (or falling) ground, fences, trees, or even static industrial spur tracks between the viewer and the main running lines adds visual interest.

It's also useful to be able to vary the amount of foreground to protect the trains from accidental knocks where the shelf butts up against other uses – storage, entryways, and places where folk might need to pass. *Model Railroad Planning*'s editor Tony Koester recommends maintaining a 6" elbow margin between tracks and fascia, but this may have to be reduced on narrow shelves.

Lighting and integration

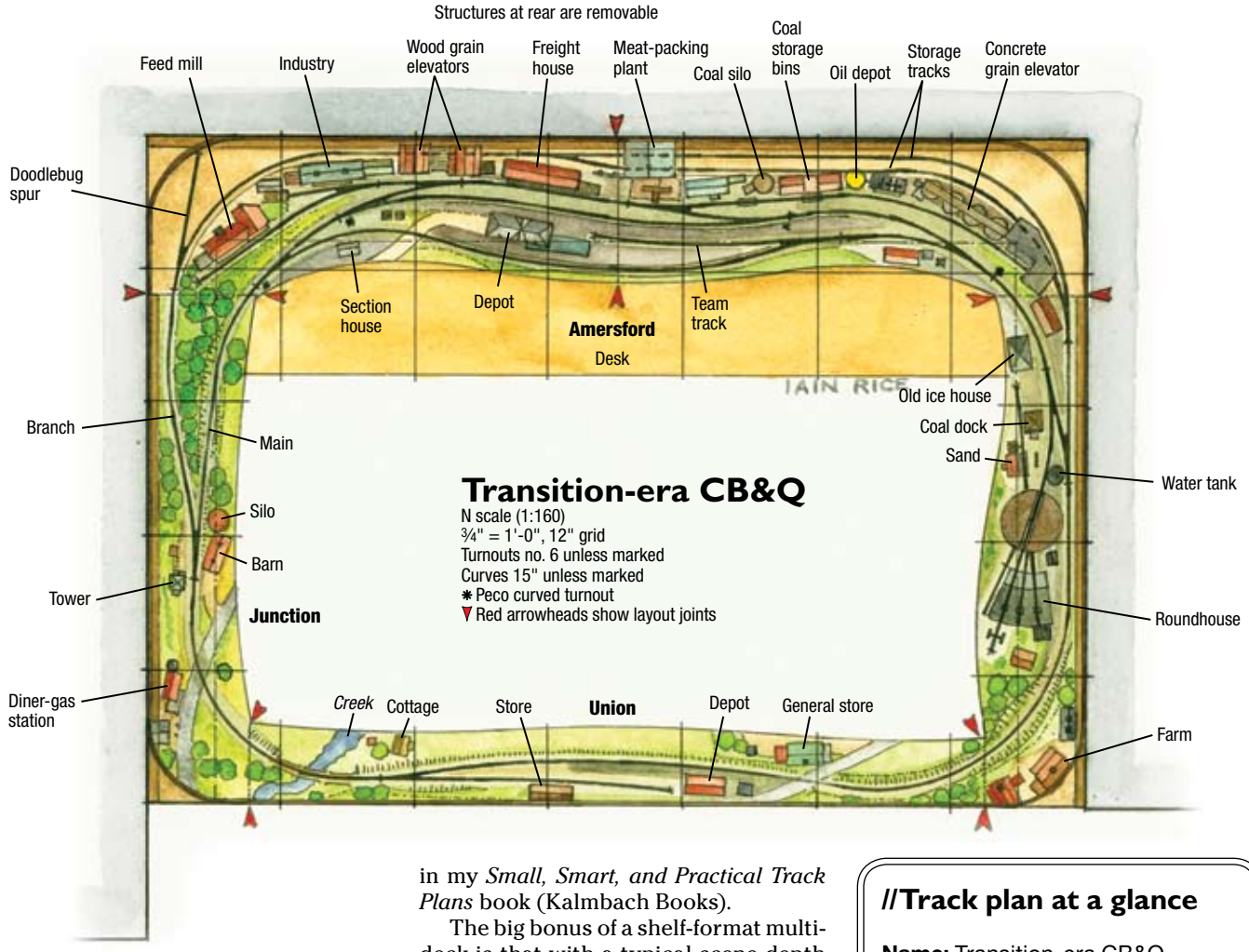
One of the great advantages of building a layout on a shelf supported by slotted tracks is that it's easy to add shelves above and below the railroad. Lighting can simply be hung from a higher shelf that will also serve to protect the layout from dust. Shelves below the railroad can support essentials like control system components, spare equipment, tools, books, magazines, and modeling supplies.

Being able to readily install shelves of different widths by selecting appropriate brackets is useful. For starters, light fixtures should ideally project into the aisle an inch or two more than the modeled scene. This allows the lights to properly illuminate the front of scenes and avoid having foreground objects lost in shadow.

I've found the best type of lighting for shelf layouts to be miniature fluorescent strip lights intended for use under kitchen cabinets. I install them behind a fascia at the front edge of the lighting shelf, as shown in **fig. 2**.

I prefer fluorescent or light-emitting diode (LED) strip lights for lighting shelf layouts. Both tend to diminish multiple shadows, which are difficult to avoid with a series of point sources such as low-voltage halogen spots or down-lights. The heat output of halogen lights is also a problem, especially where the fixtures are mounted relatively close to the models, as is they are on many shelf layouts.

Close-mounted lights let you keep everything self-contained and independent of the building structure and main wiring circuits. You also get greater efficiency, as the light from a point source (a bulb) diminishes by the square of the distance. A lamp four feet from an object illuminates with an intensity only 1/16 as great as it would a foot away.



Put another way, if you mount your lighting close, you can use a much lower-powered light source for the same effect. Less power means less heat. Better yet, light from a linear source (fluorescent tube) drops off linearly, providing another gain in efficiency. And fluorescents run cooler.

A shelf layout can also be illuminated by spotlights on a track-light system on the ceiling (see **fig. 3**). This does away with the problem of heating the layout, but the layout room may have to be cooled in the warmer months. It also means that the lighting will need to be wired into the house circuits rather than fed via a plug from an outlet, and there's a chance that the presence of operators will cast unwanted shadows.

Multi-decking made easy

When using track-supported shelf brackets, you can readily create multi-deck layouts simply by adding more shelves. However, you still have to get from one deck to the other. That's fine if there's room for a helix or around-the-room grade, problematic if not. I offer some ideas on how this might be done in my *Small, Smart, and Practical Track Plans* book (Kalmbach Books).

The big bonus of a shelf-format multi-deck is that with a typical scene depth of 12" to 15" mounted relatively close to eye level, you don't need anything like the 18" or more vertical separation that's the norm for conventional double-deck designs using deeper scenes. In HO scale, as little as 10" between levels can work, and 12" is plenty; in N scale, or for a very narrow site, you can make things even tighter.

One of the reasons close-stacking works is that you typically stand closer to an eye-level shelf than you do to a normal cabinet-height layout, and your focus is correspondingly tighter as you follow a train through the scene, as shown in **fig. 4**.

There is one other multi-deck concept to which the shelf layout format readily lends itself: stacking independent layouts. Two shelf layouts mounted one above the other can follow different themes or eras and even be built in different scales. Where linear space is limited, stacking layouts can allow a surprising amount of model railroading scope. It's also a great idea if your modeling interests aren't set in stone – you can try a new subject or scale while still having an operating railroad.

//Track plan at a glance

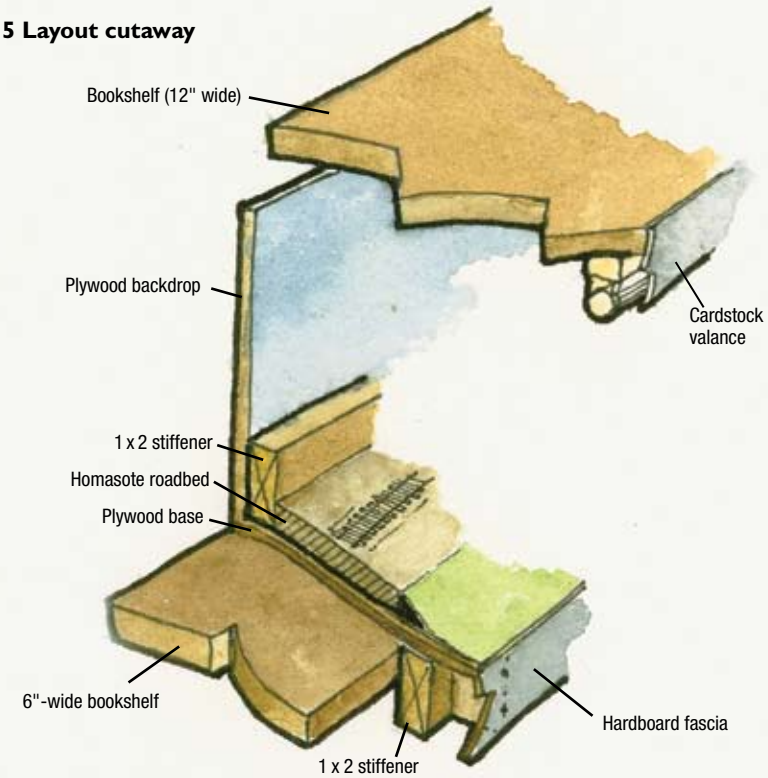
Name: Transition-era CB&Q
Scale: N (1:160)
Layout size: 5'-0" x 7'-0"
Theme: Chicago, Burlington & Quincy RR
Period: 1950s
Mainline run: 24 feet
Minimum radius: 12"
Minimum turnout: no. 6
Maximum grade: none

Subjects for shelf layouts

Most types of railroading can be represented in shelf format, although there are obvious limitations when it comes to things that require deep benchwork, such as turning wyes or turn-back curves. However, given that the vast majority of a full-size railroad's right-of-way consists of little more than one or two tracks flanked by cut, fill, fencing, or drainage, then a narrow shelf is all you need to model these essentials.

A shelf 12" wide will accommodate five or six parallel HO tracks, although there isn't much room for anything else. But a six-track yard can offer interesting switching. There's no need to compromise operation because of a narrow site.

Fig. 5 Layout cutaway



The shelf format lends itself particularly well to three distinct layout types: the compact switching puzzle – typically a yard or depot fed by staging; the around-the-walls linear railroad – either end-to-end or continuous-run format; and the double-deck end-to-end out-and-back, which is really just a variant of my favorite style of model railroad, the "teardrop."

The first of these is very much the sort of thing I dealt with in *Small, Smart, and Practical Track Plans*, which includes a number of compact shelf-based industrial switching layouts (including a triple-decker). In the same book there's also a classic around-the-walls, shelf-based point-to-point shortline design, and a double-deck point-to-point shelf railroad that fits in a small workshop over the workbench.

//Learning points

- Shelf depths of 12" to 15" work best for shelf layouts.
- Shelf tracks should be spaced 16" to 24" apart to ensure solid, level support.
- Building shelves in 4-foot to 6-foot self-contained sections makes them easy to handle, allowing you to remove sections from the layout and work on them at a table or workbench.
- Shelf track-and-bracket systems make it easy to build multi-level railroads or allow you the option to build additional layouts featuring different themes or scales.

A prairie railroad on a shelf

The accompanying N scale plan on page 17 is a good example of what you can do with a shelf layout. I designed it for a Dutch friend. The small layout measures 5 x 7 feet and is installed in the study alcove of a student's bedroom in a university residence hall. It's supported on a bookshelf about four feet from the floor, with more shelves above it and a desk below. There's a removable section that spans the open side of the alcove when the layout is in use. This section is stored on the shelf above the main layout.

The featured railroad is my old favorite, the Chicago, Burlington & Quincy (the "Q"). The focus is a junction and its depot where one of the CB&Q's numerous branch lines meets the main; the actual junction is a bit out of town. This mimics Culbertson or Huntley, Neb., on the southern route from St. Louis to Denver, but I dubbed my fictional example Amersford, an Americanization of the Dutch town's name.

The layout is set in the steam-diesel transition era, with steam engines and doodlebugs (gas-electrics) running on the branch but diesels predominating on the high iron. The advent of good-running, general-purpose N scale steam power such as Kato's United States Railway Association (USRA) heavy Mikado, Model Power's light Mike and Pacific, and Bachmann's Mountain and Consolidation has really opened up possibilities for steam-era modeling in N. The Kato 2-8-2 could be reworked into a Burlington O-4, the Model Power 4-6-2 into a believable S-1a, and the Bachmann 4-8-2 into a passable B-1a.

In spite of the layout's small size, it offers switching, continuous running, places for opposing trains to meet, a secondary whistle stop (Union), and a pair of staging tracks hidden inside or behind structures (removable) along the back of the yard.

The main section above the desk is 14" deep at its widest, but the other shelves don't exceed 9". The layout measures just 10" vertically. **Figure 5** provides a cutaway illustration showing the layout's basic construction.

The benchwork couldn't be simpler. It uses a ¼" plywood base set on the bookshelves and braced from above and below by 1 x 2s set on edge. The fascia is made from hardboard. The subroadbed is a layer of ½" Homasote glued to the plywood. This provides enough thickness to model low embankments found in a prairie landscape. The finished layout is portable, of course.

Lighting is from "slim-line" undercabinet fluorescent fixtures fastened in place with adhesive pads. They give off a nice, even light without generating much heat. Thick cardstock pinned to a shelf serves as a valance.

The plan's hidden sidings have a dual purpose: staging tracks for a mainline train and a fiddle yard for real-time consist changes for the branch. The short spur holds a doodlebug while the other tracks are for a branch freight or a mixed train.

Mainline curves have 15" or greater radii, with 12" radii shown where curves are hidden. Most turnouts are no. 6, but I show several Peco curved turnouts (marked with an asterisk on the plan) in the yard. Surface-mounted switch machines can be concealed in structures.

The layout could be wired for either conventional DC control or Digital Command Control. Appropriate structures will most likely need to be kitbashed or scratchbuilt. Despite that, the design demonstrates the premise of the versatility of shelf layouts. **MRP**

Iain Rice lives in the United Kingdom but frequently visits North America. He's a regular contributor to MRP *and the author of several popular Kalmbach books on layout design.*

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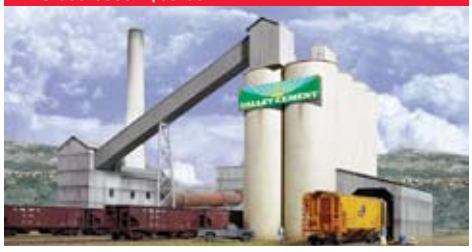

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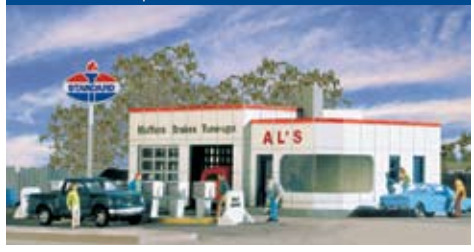

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Clinch River RR
An Appalachian coal

A 1950s N scale railroad designed for operation **By Phil Brooks//**Photos by the author

In June 2006, I celebrated a milestone by installing the last foot of track for my N scale Clinch River RR. Years of research, planning, and hard work are finally paying off in a layout that operates realistically and reliably. Since the CR was designed around plausible, prototypically inspired track arrangements and operating practices, I can move ahead without any nagging doubts about what the future would hold.

The concept of the CR was hatched on a 1977 sightseeing trip down the back roads of East Tennessee. As I rode along the steep mountains cut by the Clinch River, I had fun imagining a railroad that followed that meandering path, hugging the rock bluffs, and fighting steep grades. The idea of the Clinch River being "my railroad" was etched in my mind.

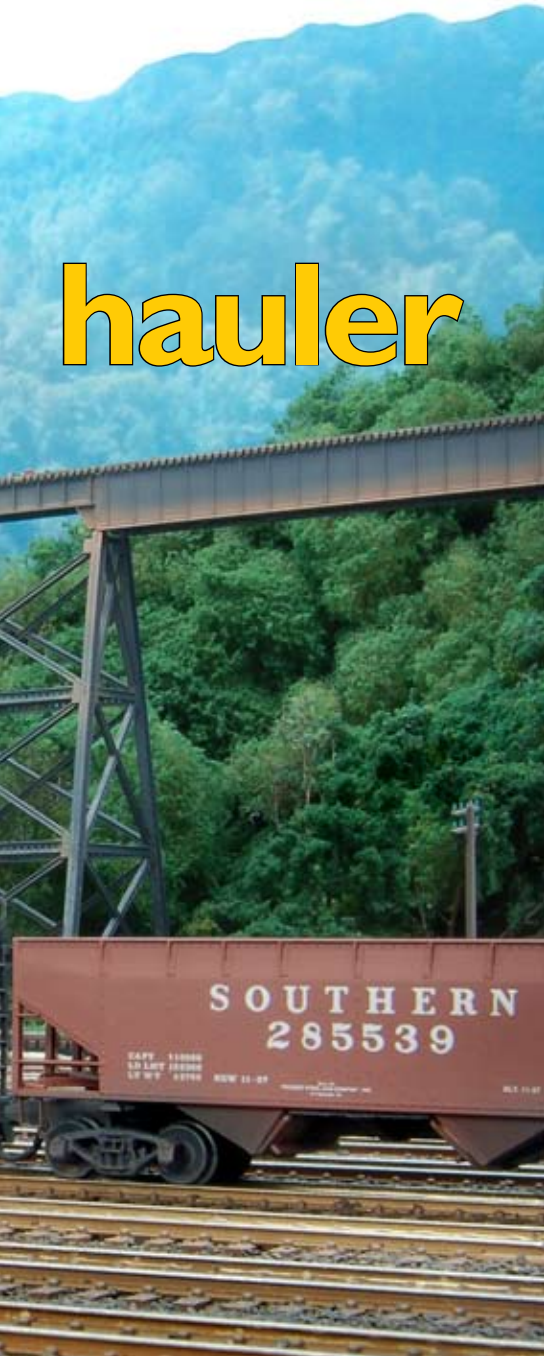
By then I had built two small N scale layouts, having become a model railroader in 1969 at age 9 with an N scale train set. Although I read any railroad literature I could get my hands on, including my first *Model Railroader* in 1972, I knew little of why real railroads existed or how they operated. Back then, N scale equipment ran poorly, and HO seemed only slightly better, so I packed my trains away and focused on college.

A flawed beginning

I got married and moved to Knoxville, Tenn., in 1983. My wife Penny had no idea what lay ahead when I built an HO layout. That layout was flawed by a lack of purpose. It also had far too many tracks, which meant that too little space was left for scenery.

I wondered if current N scale ran better than the old equipment. Testing a pair of Atlas RS-3s convinced me that N scale had finally come into its own. An 8-foot pair of Ntrak modules with return loops soon replaced the HO layout in our apartment.

After moving into our present home, the birth of daughter Mae pushed the railroad into a converted bay of our garage. I told Penny I'd try to "make do" with the new digs, while salivating over the amount of space. The celebration was premature: That layout lasted a little

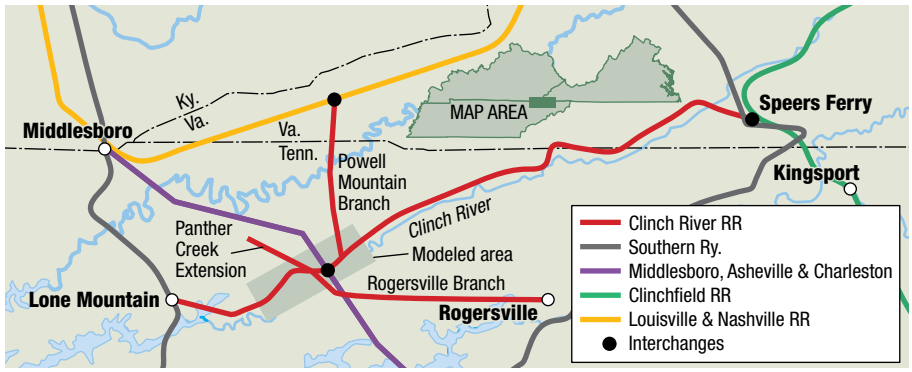


A Clinch River Baldwin VO1000 switcher works Big Creek yard as a Mike thunders across a towering viaduct on Phil Brooks' N scale layout.

more than a year until I found I could no longer stand the drafty garage doors and track-planning mistakes.

Getting it right

Determined to get it right this time, I started work on the present CR layout in early 2001. Good model railroads start with good room preparation, so that became my first order of business. I removed the garage doors, built a wall in their place, and installed a new exterior door. I added twin-tube 8-foot daylight fluorescent lights over the layout space behind hardboard valences, and I built a coved hardboard backdrop from benchwork to ceiling.



Illustrations by Rick Johnson

Finally, heating and air conditioning connections to the rest of the house and carpeted flooring made the space both layout-ready and comfortable.

Why N scale?

Early in the sketch phase of layout design, I seriously considered HO scale. Most of the steam locomotives and hoppers I needed are already available in well-detailed plastic in 1:87 proportion, and many HO steam locomotives can be easily equipped with sound.

But I ran into a roadblock when I tried to fit the required curves for HO steam into my available space. A decent mainline run pretty much required that I use a double-deck design. A large marshalling yard was high on my list of must haves, and such a yard in HO would overwhelm the layout. For me, the expense, materials, and space needed for an HO layout were deal-breakers.

How much N scale could I put in the same space? A lot! Even allowing for generous aisles, the main line from staging to staging is just over five scale miles (173 feet) long. There's room between passing sidings to preclude average-length trains (about 25 cars and a caboose) having the engine in one town and the caboose in another. Trains actually look like they're going somewhere.

The decision to build in N scale has created some unforeseen benefits. Since there are gaps in available steam-era structures in N scale, I needed to develop my kitbashing and scratchbuilding skills, a process I now find fun and rewarding. Structures like an Ogle steel coal dock forced me to learn to solder metal [and earned him a Best-in-Show award at the 2005 NMRA national convention – *Ed.*], and a Fairbanks-Morse cinder conveyor taught me etching techniques as well.

My years of tinkering in N scale and packing Digital Command Control (DCC) decoders into tight spaces gave me the confidence to believe that I would be able to overcome any technical problems I might encounter.

Achieving good performance

Except for Micro Engineering code 55 bridge track, I used Atlas code 55 for the layout. This product is well made, has tight tolerances, and is readily available; the turnouts come with the switch points insulated from each other and also from the frog, and the Atlas frogs can be powered – an important consideration for smooth running in N scale.

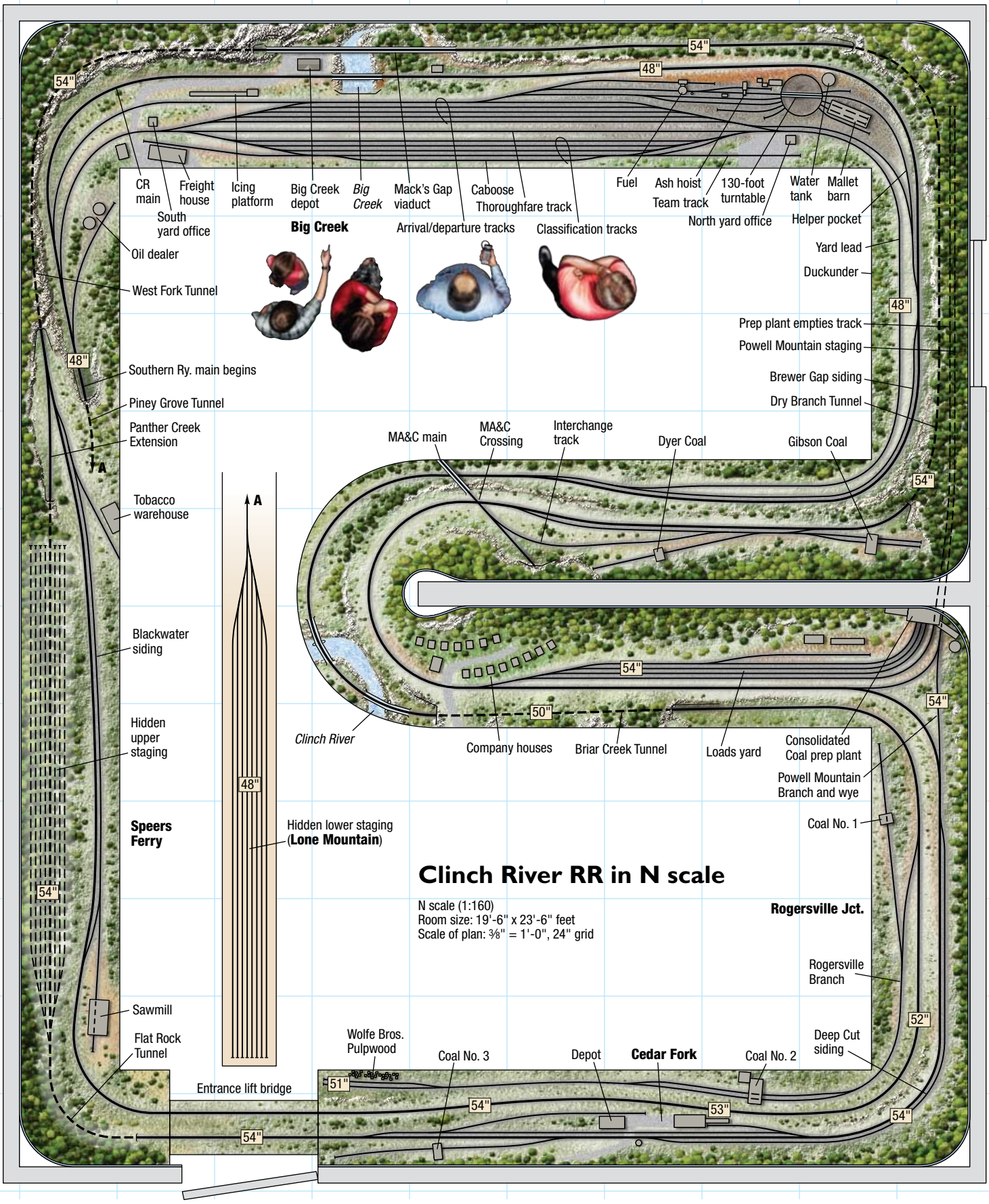
As a companion for the closer-to-scale track, I use wheels with low-profile flanges for better appearance and lower rolling resistance. My remaining ingredients for reliable running are properly weighted cars, providing all-wheel electrical pickup for locomotives, and avoiding tight curves. But I still had to address some nagging performance issues with N scale steam locomotives.

N scale steam

During the design process steam operations were foremost in my mind, so I worked to keep my curves as broad as possible while packing in as much layout as would comfortably fit. However, at the time I began designing, I wasn't positive that N scale steam locomotives would be up to the challenge of an operations-oriented layout with a lot of slow-speed switching and grades.

After much handwringing, I concluded that I was wasting time. I decided to build the layout's physical plant and have a little faith that good-running N scale steam would eventually be forthcoming. If steam didn't work out, I'd simply do what the prototype did: replace it with first-generation diesels. Knowing that I could achieve my operating goals with alternate equipment was a comforting safety net during construction.

Capable N scale steam is finally coming of age. For me, brass steam would be a budget buster, but Kato's amazing Mikado shows that plastic steam locomotives can be done well in 1:160 proportion. A major concern with N scale steam is anemic tractive effort. Finding space in such small models for adequate


54"
48"
CR main
South yard office
Freight house
Icing platform
Big Creek depot
Big Creek
Mack's Gap viaduct
Caboose
Thoroughfare track
Fuel
Ash hoist
Team track
130-foot turntable
North yard office
Water tank
Mallet barn
Helper pocket
Big Creek
Arrival/departure tracks
Classification tracks
Oil dealer
West Fork Tunnel
Yard lead
Duckunder
Prep plant empties track
Powell Mountain staging
Brewer Gap siding
Dry Branch Tunnel
Southern Ry. main begins
Piney Grove Tunnel
Panther Creek Extension
MA&C main
MA&C Crossing
Interchange track
Dyer Coal
Gibson Coal
A
Tobacco warehouse
Blackwater siding
Hidden upper staging
Clinch River
Company houses
Briar Creek Tunnel
Loads yard
Consolidated Coal prep plant
Powell Mountain Branch and wye
Coal No. 1
Speers Ferry
Hidden lower staging (Lone Mountain)
Clinch River RR in N scale
N scale (1:160)
Room size: 19'-6" x 23'-6" feet
Scale of plan: ⅜" = 1'-0", 24" grid
Rogersville Jct.
Rogersville Branch
Sawmill
Flat Rock Tunnel
Wolfe Bros. Pulpwood
Coal No. 3
Depot
Cedar Fork
Coal No. 2
Deep Cut siding
Entrance lift bridge
50"
51"
52"
53"

The Clinch River RR engine terminal at Big Creek is a busy place, since most trains begin or end their runs here. Engine terminals are good "industries" to model: hopper cars of coal and sand are spotted at the coal dock, cinders are hauled away, and diesel fuel is delivered in tank cars.

//The layout at a glance

Name: Clinch River RR
Scale: N (1:160)
Size: 19'-6" x 23'-6"
Theme: Appalachian coal road
Locale: East Tennessee and southwest Virginia
Era: 1957
Style: single-deck
Mainline run: 173 feet
Minimum radii: 16" main, 15" branch line
Minimum turnout: no. 5
Maximum grade: 1.5 percent
Benchwork: open-grid
Height: 48" to 54"
Roadbed: 1/16" foam tape on 1/2" sealed plywood with some wood spline
Track: code 55 flextrack
Scenery: plaster on screen wire with Styrofoam supports
Backdrop: painted Masonite hardboard
Control: Digitrax Digital Command Control (DCC)

weight is almost impossible, so traction tires are a much better solution.

I began fleshing out the Clinch River's steam fleet with the Life-Like/Walthers United States Railroad Administration (USRA) 2-8-8-2s, a good choice for mine runs. These locomotives are among the smoothest performers I've seen, but the model suffers from a lack of traction tires, limiting its tractive effort and performance on grades. It can just barely pull a 25-car train of empty coal hoppers and a caboose up my 1.5 percent ruling grade. While adequate for my purposes, I'd like this engine to come a little closer to the prototype's flatland performance of more than 100 loaded coal hoppers plus caboose, and sound would be nice.

Good news: During a recent conversation with a representative from Life-Like, I was told that the next run would have traction tires and may include onboard sound. Other companies are jumping into the N scale steam market, promising fine performance and sound, so my patience is being rewarded.

Freelancing and the '50s

I love Appalachian coal railroading, specifically the operations and equipment of the late 1950s, but most of my favorite prototypes were almost exclusively coal carriers. I wanted merchandise traffic in addition to coal drags, so I decided to create my own railroad to get the desired traffic mix. I might have taken a harder look at prototype modeling had I known how challenging freelancing would be and how many hard choices I'd have to make!

Realism is my goal, so I've been careful to focus on typical Appalachian coal railroading scenery, rolling stock, and practices. Adding too many spectacular elements leads to endless explanations as one attempts to defend the unusual. I made most of my decisions following careful research and observation, but sometimes I just got lucky: It's simply serendipitous that my childhood railroad name dovetails so well into the real-life history and locale of Appalachian coal railroading.

Hitting the books

The closest prototype in size and scope to the CR is probably the Interstate RR. Fortunately, Ed Wolfe has written at least five books about the Interstate and its environs. Chock full of track diagrams, maps, timetables, and first-hand accounts, the books are wonderful resources for the "hows" and "whys" of 1950s Appalachian railroading.

I have to give credit to some established model railroads – freelanced and prototype – for influencing my layout. Editor Tony Koester's Allegheny Midland inspired the Clinch River's hidden, stub-ended staging connected by a long main line to another hidden stub staging yard.

Allen McClelland's Virginian & Ohio has provided additional inspiration and

This under-construction view shows the first area visitors will see when they enter the train room. The Mikado on the lower line is crossing what will be two bridges spanning the Clinch River; fascia cutouts mark the river's location. This is the only area of the layout built with spline roadbed.

Upper staging will be hidden by hollow mountain scenery and controlled by the diode-matrix panel at left. The sawmill spur (foreground) also serves as a Digital Command Control programming track. Lower staging is accessible through window cutouts in the fascia.

ideas, along with Allen's wonderful notion of modeling railroading rather than just model railroading. Running trains on Bob Helm's strictly prototype HO Clinchfield layout has provided me with practical coal operations experience. It's always an advantage to listen to someone who has "been there, done that."

Developing the track plan

My layout design "druthers" had a strong emphasis on realistic operations and operator comfort:

- Medium to broad curves
- All track within easy reach
- A sizable, functional yard
- Digitrax Digital Command Control (DCC) wireless control
- Code 55 visible track with fascia-mounted switch-point throws
- Carpeted room with wide aisles
- Realistic coved sky backdrop with plenty of bright lighting
- Switching areas kept flat to allow switching of free-rolling cars.

After locating the main line on a topographic map of the modeled area, I used many of the map names for railroad locations. An exception is Mack's Gap Viaduct, named for my dad.

Early on, I made the decision to assume the namesake Clinch River was in the aisles for the most part, since modeling the river ate up precious railroad real estate. This also had the benefit of pushing my mountain ridges against the backdrops and camouflaging the scenery-to-backdrop transition.

I stacked the hidden staging yards and cut viewing ports into the fascia for lower staging access. I control all staging turnouts by diode-routing push buttons.

To maximize the length of my mainline run, I placed Big Creek Yard at the very end of the layout. I spaced passing sidings fairly evenly along the route and added a lap siding at Cedar Fork, which allows as many as three trains to meet there if the need occurs.

Yard design

I based Big Creek yard on an amalgam of prototype features, with Copper Creek Viaduct on the Clinchfield RR at Speers Ferry, Va., and the Chesapeake & Ohio's Clifton Forge, Va., yard with its multi-track yard bridge serving as the primary inspirations.

Big Creek yard deviates from the typical Appalachian prototypes in that coal hoppers don't get weighed there. This was a deliberate decision. Most yards of this type such as Dante ("dant"), Va., on the Clinchfield or Andover, Va., on the Interstate RR had separate receiving and scale yards that were connected end-to-end by a scale track. Modeling such a yard would take twice the real estate of my current yard, and slowly weighing individual coal cars would certainly plug up the yard during operating sessions.

Big Creek yard is actually two side-by-side, double-ended yards that are connected by a crossover to the yard lead. The back half is an arrival/departure yard that connects directly to the roundhouse leads. The front half is for freight classification. The center yard track is kept clear as a thoroughfare unless it's temporarily needed for another use.

Arriving or departing trains can slip in and out of Big Creek without interrupting the switcher. The yard lead connects to the main, so overflow trains can depart from the classification yard if necessary. I designated the front track as a caboose track, allowing the switcher to tack a cab on either end of a train.

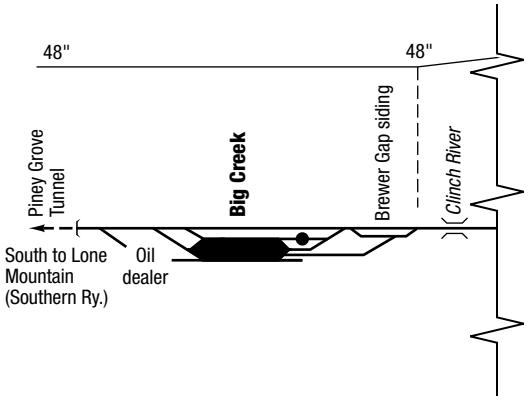
A trip over the line

I model 1957 on a dark (unsignaled) railroad. Passenger trains run on a timetable schedule, but all the freight movements are extras controlled by the dispatcher with train orders. Working N scale train-order boards would probably be a maintenance nightmare and delicate, so I'm looking for alternatives.

When I wrote about the CR in *Model Railroad Planning 2003* ["Clinch River on a bookcase" – *Ed.*], the southern terminus was a connection with the Southern Ry. at Lone Mountain, Tenn. I recently changed the Clinch River's terminus to Big Creek, which replicates the end-to-end hand-off between the C&O and Clinchfield at Elkhorn City, Ky.

The Southern Ry. also has trackage rights over the entire CR for passenger service. A side benefit to this arrangement is that I get to scratch my prototype-modeling itch by detailing Southern equipment. Southern had been completely dieselized for years by 1957, so first-generation diesels are the norm.

A trip over the CR begins with Southern trains at Lone Mountain, represented by south (hidden) staging. These trains



appear at Piney Grove Tunnel, then enter Big Creek yard to swap northbound cars for southbound. Southern Ry. passenger trains bypass the yard entirely and go directly via the main to Big Creek.

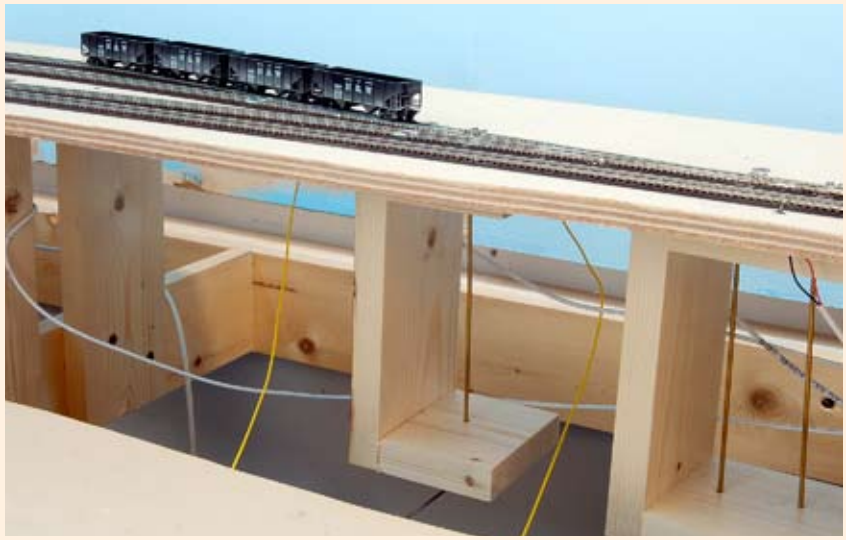
Big Creek yard supplies empty coal trains for the tipples scattered about the CR, and it receives loaded coal trains routed south with coal for power plants handed off to the Southern. Some loaded coal trains head north for interchange with the Clinchfield at Speers Ferry. Reefers loaded with perishables from northbound trains resume their trek north after a brief visit to the icing platform.

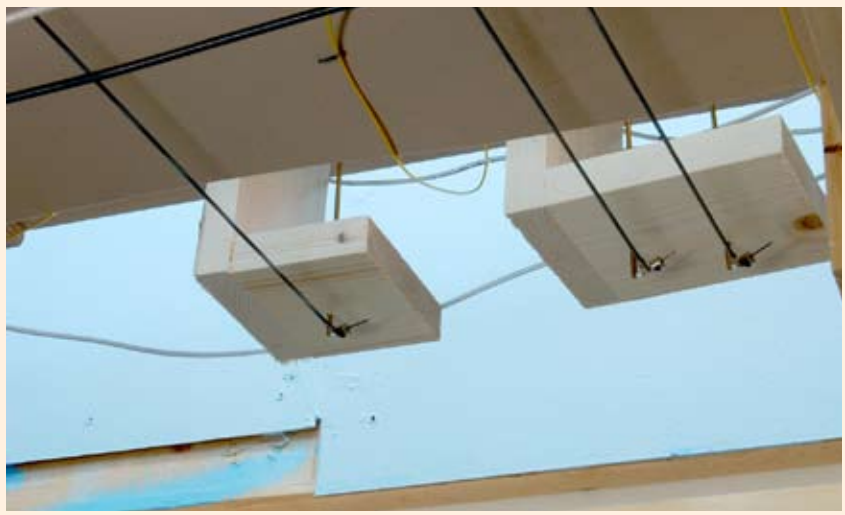
A northbound train departs Big Creek yard, crosses a duckunder at the back door, and enters Brewer Gap siding. Here an underpowered train receives a helper locomotive from the pocket on the back lead to the turntable. After crossing the Clinch River, the train enters Briar Creek Tunnel and begins the 1.5 percent climb up Blackwater grade.

The southbound Rogersville branch forks to the right halfway up the grade. This branch produces coal, pulpwood, and limestone. At the crest of Blackwater grade, the line levels out and crosses a lift bridge at the room entrance. Pushers are cut off at Blackwater siding. Continuing northward, the line passes the Panther Creek extension, which is a hidden connection for continuous running. The line enters West Fork Tunnel before crossing Mack's Gap Viaduct and continues through Dry Branch Tunnel. Dyer Siding leads to two coal loaders and an interchange track, the latter fed by a dummy crossing with Jim Collier's Middlesboro, Asheville & Charleston.

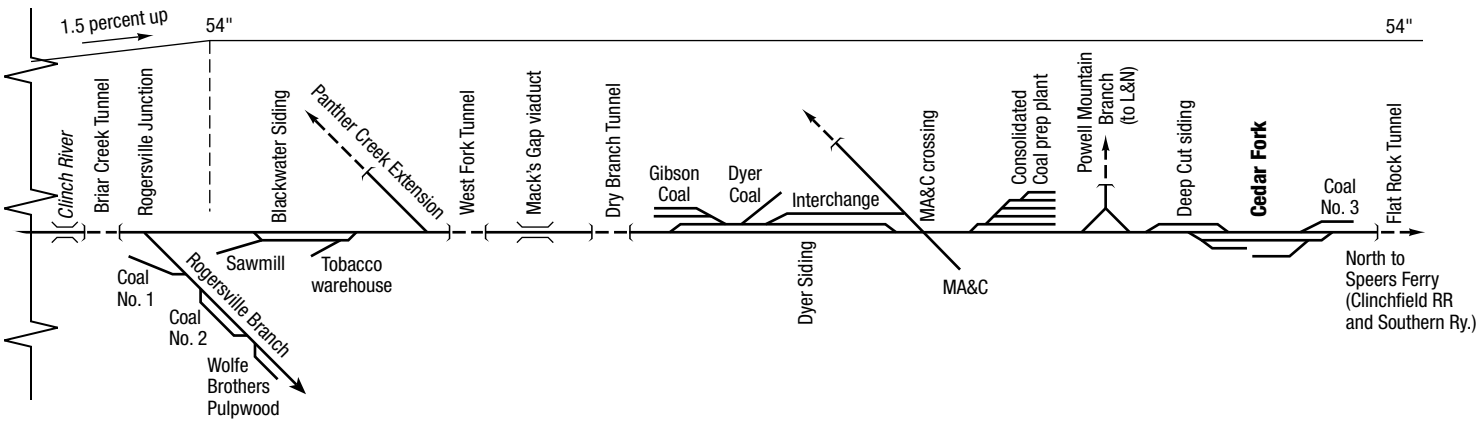
Next is the Consolidated Coal prep plant that receives raw coal from area tipples as well as empty hoppers. This plant removes shale and dirt from the coal, sorts the coal by size, and ships processed coal. One track in the coal yard leads to a long hidden staging track behind the tipple, which represents a huge empty-car holding yard above the plant. To the left is a wye that represents the beginning of the Powell Mountain

//Turnout controls





Most of the benchwork on the Clinch River is open grid with a subroadbed of ½" plywood. The L-bracket under the lead hopper (top photo) is part of a homemade switch-throw mechanism. A fascia-mounted double-pole, double-throw toggle switch moves a model airplane push rod (above photo), which rotates a .032" wire inside the brass tube and the switch rod. Plastic beads change the leverage, and 1/16" collars, used by radio-control modelers, keep the pushrods from sliding off the wire. The toggle also powers the frog and light-emitting diodes that show switch position on the fascia.



The caboose-red diesel paint scheme's white frame stripe was copied from CR steam locomotives. The new herald decorates the Alco's short hood, while older-style heralds on cabooses provide a sense of history.

Switching areas are located within easy reach of the aisles, critical with manual uncoupling. Phil is a 6-footer, and so at 54" the Consolidated Coal yard is "a perfect switching height for me." The tipple in the background is a placeholder and will eventually be replaced with a scratchbuilt complex with conveyors and walkways arranged to hide the opening in the backdrop.

Phil makes landforms using hot glue to bond Styrofoam bulkheads. Then he staples and hot-glues aluminum screen wire to the bulkheads and adds a layer of plaster-soaked paper towels. When the plaster is dry, Phil paints the landform and applies ground foam. The forest canopy is foam-covered polyfiber.

//Learning points

- Those who haven't recently checked the running qualities and diversity of N scale motive power are in for a pleasant surprise.
- Modeling the steam-to-diesel transition era is becoming increasingly practical.
- Best-in-show contest-quality modeling can be done in N scale.
- Building an N scale railroad in an "HO space" allows for long trains and scenery that towers over the models.

Branch, which is a connection to the Louisville & Nashville. This branch also supplies raw L&N coal for the prep plant.

The wye allows locomotives working the prep plant to turn before they head back down the hill with heavy coal trains. Around the bend is Deep Cut siding and Cedar Fork station. Then comes a short trip over the room-entrance lift bridge and through Flat Rock Tunnel into the layout's hidden staging area, which represents the unmodeled northern section of the Clinch River to Speers Ferry, Va., and connections with the Southern and Clinchfield.

Looking down the track

Building up the Clinch River's hopper fleet remains a priority, as does adding more large steam engines for mine runs. There are unfinished areas to scenic, and I still need to set up a car-forwarding scheme. I'm not convinced that every operator is able to read N scale car numbers, so I may add car photos to car cards like some other N scalers are doing to help aging eyes.

Friends who model in N are lowering cars and adding body-mounted Z scale couplers to replace oversized N couplers for a closer-to-scale appearance, an idea I find intriguing. I hope eventually to add a SurroundTraxx below-layout transponding sound system for locomotive and ambient sound. Transponder-equipped decoders are already in the locomotive fleet to support this.

So far, I've enjoyed the long journey getting to this point, and the CR has met and sometimes even exceeded my goals. Not bad for a little railroad dreamed up on a joyride. **MRP**

Phil Brooks is a graphic and multimedia designer who lives with wife Penny and daughter Mae in the Knoxville, Tenn., area. Phil also enjoys playing electric bass in a local rhythm & blues band.

Test-running your model railroad in cyberspace

Better to make changes with a mouse now than with a saw later

By Jim Richards//Screenshots by the author

Who wouldn't want to see how well trains actually operated over their track plan before laying a single piece of track? Operational problems can be hard to spot on a flat, sketched-out track plan, no matter how neat or accurate it is. *Trainz,* a powerful railroad simulator program designed by Auran from Brisbane, Australia, is also an empowering tool for model railroaders that takes track planning beyond the tedious pencil-and-trace method.

Recently, I'd finalized the paper track plan for my new HO scale Athabaska RR. Having previously used *Trainz 2004*, I thought I'd start noodling with a 3-D track design based on the Athabaska. After three weeks of work, I'd built my entire railroad in the computer complete with track, scenery, structures, and running trains.

While operating cyber-trains, I found several glitches that I'd missed on my paper track plan. They ranged from outright gob-smackers, such as a missing crossover to get westbound passenger trains into a major station, to subtleties, such as adding a yard lead across Charlotte River for improved operations.

Freight and passenger trains stand ready to head west from unscenicked Alberta staging. In Surveyor mode, the basic screen is a ¾-kilometer grid.

In *Trainz*, I could nitpick the track plan many times, make modifications, then run trains to see if the changes worked before committing to wood, screws, and glue. Test-running a model railroad with *Trainz* saves time and money. With some practice, you can put a 3-D railroad world on the screen almost as quickly as you can think it up – and then operate trains within it.

Three SD40-2s, including two units in freelanced livery, lead a westbound grain train along Chilanko Lake on Jim Richards' virtual Athabaska RR. He used *Trainz*, a computer railroad simulator, to test-run his layout before building it.

In Driver mode, Jim got a behind-the-throttle view of an F7 leading an eastbound passenger train into Grande Rivière station. *Trainz* helped the author spot a major glitch in his original track plan at this location.

The basics of *Trainz*

The software includes many ready-made railroads to operate from around the world. But the fun really starts when you enter Surveyor mode, click Create New, and start building. A "USA" option lets you set up North American traffic and signaling conventions.

The basic screen is a flat ¾-kilometer grid of 10 meter x 10 meter squares. Click on Track and lay main lines, yards, and passing sidings in minutes. Extend the grid in any direction, for any distance, laying track as you go. You can model a section of your favorite prototype, or you can stretch out rules that conform to your layout room's dimensions. For HO scale, one foot of room space equals 2.65 squares in *Trainz*.

The layout isn't limited to a flat surface. You can pull up the grid into mountains or push it down into valleys. You can add grades to your right-of-way and ballast under your track. Then you can fill in the blank landscape with water, grass, trees, and other ground cover.

The program offers a variety of buildings, bridges, and other structures as well as other animated effects. Grade-crossing signals flash and gates close. Some industries include dust and sound effects when cars load or unload. Roads have moving traffic.

Under Rolling Stock, design your roster from a worldwide menu of locomotives, freight cars, and passenger cars. Then set up a train on the track.

Running cyber-trains

In Driver mode you select your locomotive, crack the throttle, and watch it head out, including realistic smoke and sound. Align turnouts ahead of your train. Click on the Cab icon for a view from behind the controls.

Go back to Surveyor mode and install a signal system and track markers. This allows you to act as dispatcher in Driver mode, controlling multiple trains running under artificial intelligence. Suddenly, it's a virtual operating night.

Fun with cyber-layouts

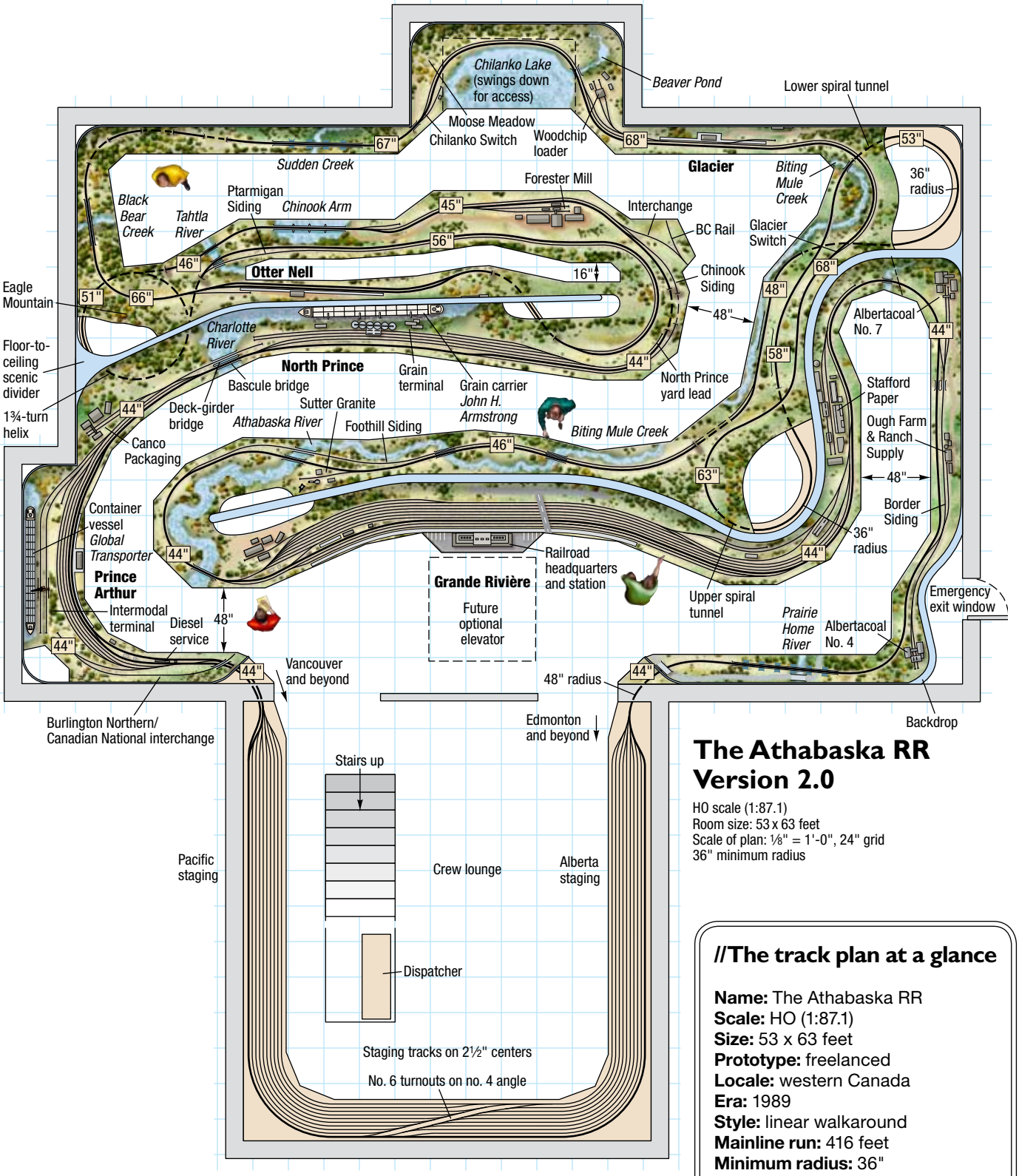
Since acquiring *Trainz* two years ago, I've designed and operated a few cyber-layouts. For my first attempt, I went completely bonkers. Working until dawn night after night, I built a vast mountain railroad designed to handle 75-car unit trains and overstuffed with detail.

Then I built a smaller tabletop layout without extensive scenery. On this layout, I focused on learning operational features, such as how industries and signaling systems work in *Trainz*.

Next, I re-created my entire hometown of Port Hope, Ontario, Canada. Set in 1953, it included all the railroad features and every haunt I remembered from my teenage years. What a blast to

//Learning points

- Time and money spent learning railroad simulation software may be saved many times over as potential problems are uncovered prior to layout construction.
- Virtual layouts can be saved and alternate layouts created.
- Trains can be operated from the locomotive cab or observed from outside (as in a helicopter), and engine sound volume decreases as the observer moves away from the train.
- Under artificial intelligence many trains can be operated at once on the virtual layout to simulate an operating session, while you act as dispatcher.
- By installing a signal system on your virtual railroad you can learn how to efficiently use operating signals on your actual layout.
- A large library of decorated structures and equipment is provided, but locomotives and rolling stock can be "painted and lettered" in a freelanced scheme and "tried out" prior to painting actual models.
- You can preview the landscape of your layout by adding hills, trees, water, and other scenery.
- Virtual model railroading is an adjunct to, not a substitute for, actual model building and layout construction and operation.



The Athabaska RR Version 2.0

HO scale (1:87.1)
Room size: 53 x 63 feet
Scale of plan: ⅛" = 1'-0", 24" grid
36" minimum radius

Illustration by Theo Cobb

//The track plan at a glance

Name: The Athabaska RR
Scale: HO (1:87.1)
Size: 53 x 63 feet
Prototype: freelanced
Locale: western Canada
Era: 1989
Style: linear walkaround
Mainline run: 416 feet
Minimum radius: 36"
Minimum turnout: no. 6
Maximum grade: 2 percent

"watch" from downtown again as Canadian National (CN) and Canadian Pacific (CP) steam locomotives traversed the river valley viaducts!

Working on the railroad – virtually

My latest *Trainz* project involved the layout that I plan to actually build. My Athabaska RR is set in western Canada and based on a track plan that I'd commissioned from John Armstrong to fit into my prior basement. [See "The Athabaska: Working with John Armstrong" in *Model Railroad Planning 1998*. – *Ed.*] For the larger basement of my new house, I'd embellished the track plan to fit the space.

My first virtual test train comprised three CN zebra-striped SD40-2s, 35 tank cars, and a CN caboose. Heading west, I departed Alberta staging, negotiated the double-track main west of Border Siding, entered Grande Rivière, and stopped with the train occupying the westbound freight track.

Back at Alberta staging, I started up a westbound passenger train headed by

CP F7A and B units leading eight Santa Fe *Super Chief* cars, a reasonable representation of CP's *Canadian*. (The new *Trainz 2006* includes CP *Canadian* passenger cars.) As the passenger train followed the westbound freight, I discovered to my surprise that there was no crossover to the eastbound main into the passenger station!

Back in Surveyor mode, I could easily install a virtual crossover – but that meant two more turnouts to build in reality. When my old friend Tony Koester had reviewed the Athabaska track plan on paper a few months back, he thought there was too much double track. "Don't make life too easy for your dispatcher," he commented.

Then I saw that if I single-tracked the main from Grande Rivière east to Border Siding, dispatching would be more challenging (more fun!). Border Siding could be reduced to a simple runaround, serving Albertacoal tipples Nos. 4 and 7 plus Ough Farm & Ranch Supply. Also, the need for a crossover to reach the passenger station would be eliminated.

I made these changes in less than 15 minutes, returned to Driver, and ran the westbound freight and passenger trains again, with no problems.

Next, I ran a local freight out of Grande Rivière to test eastbound operations on the new single-track main. As the local switched both coal mines and Ough Farm & Ranch Supply, an empty eastbound coal drag hammered past Border Siding without interrupting the local's switching moves.

By running two cyber-trains over my virtual railroad, I'd easily found flaws in my track plan. I noticed things I might have realized only after running real HO trains on laboriously laid real track.

One bridge or two?

East of the Prince Arthur yard I spotted another location for a section of single-track main line to challenge a dispatcher. My historical justification was that in the 1900s the Athabaska could afford only a single-track bascule bridge across the Charlotte River. In my layout's era, the upriver businesses are defunct, so the bridge is not operational except for rail traffic. Erasing the westbound main, I single-tracked that section and dropped in a one-track bridge – except I now had no switching lead for the container terminal.

I set up a switcher on the engine pocket, then I brought a 35-car container train into the yard at Prince Arthur. The switcher pulled out cuts of cars to feed the container terminal, but it occupied the main line over the bascule bridge for each move.

Using *Trainz*, the author built a cyber-layout of his home town of Port Hope, Ont. as it looked in 1953. A Canadian National passenger train rolls past the Queens Hotel, while a Canadian Pacific freight crosses the Ganaraska River valley.

A westbound Athabaska RR freight rolls off the Charlotte River bascule bridge for a meet with an eastbound at Prince Arthur. The deck-girder bridge provides a switching lead for the GP38-2 working the container terminal.

But what if, when the container terminal opened in the 1980s, the Athabaska had sprung for a second bridge specifically to extend the yard's switching lead? In five minutes, I zipped in a deck-girder bridge and stretched a new lead across the river. I tested the setup by running another freight along the main, while a switcher worked the terminal. Switching was more efficient, and the main line remained clear.

Perfecting Prince Arthur

Surveyor Mode allowed me to get a helicopter-like view of any area of my layout. While "hovering" above Prince Arthur I noticed that a second, west-end lead would help with switching at the Burlington Northern RR/Canadian National RR interchange track, but there wasn't enough space.

If I double-tracked the main line out of Prince Arthur into the staging yard

A unit coal train rumbles past a GP38-2 switching the woodchip loader at Chilanko Lake. The author built this lineside industry from structures, such as a container crane, included in the *Trainz* structure menu.

With a container ship unloading in the background, the *Athabaskan* meets a grain train at Prince Arthur. American double-stack cars weren't available in *Trainz 2004*, so the author used European container flatcars as stand-ins.

through a tunnel, the westbound main could skirt around the outside track of the staging yard (westbound trains, deflected by the Pacific Ocean at Prince Arthur, turn south to Vancouver, and will all be recycled to Alberta staging in any case). The double-track arrangement would also provide a workable switching lead for the interchange track without blocking eastbound traffic into Prince Arthur. To prove the point, I switched the interchange while an eastbound coal drag rolled through Prince Arthur without stopping.

An "alternate" plan

Single-tracking from Prince Arthur past North Prince Grain Terminal had created a siding at Chinook. I started to load it up with a typical 35-car train, only to find that I ran out of siding at 29 cars. So I extended both ends – to Chinook Arm in the east (moving the grade crossing in the process) and to North Prince in the west – and was able to accommodate a 35-car grain train, plus caboose (the Athabaska is provisionally set in 1989, the end of the caboose era in Canada). However, this resulted in a short section of single track from North Prince to the Charlotte River.

After a long, hard look at the situation, I decided to try something radical: scrubbing Chinook Siding completely and going with single track from North Prince all the way to Ptarmigan. To try this, I created an alternate version of the entire layout (one click) so I could save the existing trackage. In the alternate, I erased all of Chinook Siding, then loaded the main line with long trains from Biting Mule to Prince Arthur (20 minutes). But when I went into Driver and ran these trains, I quickly realized something definitely was missing: Chinook Siding had not only helped traffic flow but had also been a valuable, gratifying scenic feature. I abandoned the alternate and went back to the original layout – with Chinook Siding.

This new section of single track at North Prince may be unprototypically short, but fortunately model railroaders have a sense of vision that can suspend reality and imagine miles of distance in just a few feet (otherwise we'd need jumbo jet hangars for our layouts). My internal story is that the Athabaska is actually in interminable preparation for demolishing the historic bascule bridge across Charlotte River and double-tracking the main line all the way into Prince Arthur. Until then, dispatchers can have fun dealing with the bottleneck on my layout.

An evolving plan

Having operated several way freights, I sensed the need for an industry near Chilanko Lake. Space was tight, so I created a wood chip loader from items in the structure menu.

I reclaimed some land from the east end of the lake by pulling up the ground level. Then I dropped in some lakeside structures and ran a spur from the eastbound main.

I successfully switched the new spur with a way freight from Prince Arthur. But when I ran a westbound passenger train, the buildings obscured the view of the main. So I moved the spur to the north side of the main and rearranged all the structures at that location.

Chilanko Lake looked better but now had another operational problem: The turnout for a trailing point spur off the westbound main was more than an arm's length away from the aisle, too far for easy operations.

I laid a short runaround track off the westbound side of the main line and ran the spur off that with a facing-point turnout. Now all three turnouts would be within arm's reach. To test operations using this arrangement, I switched

the spur while a passenger train rolled by in full view as it passed the lake.

Other operational improvements of my evolving plan included runaround tracks at both ends of Grande Rivière yard, a switching lead at the east end of North Prince Grain Terminal, an east-end switching lead for Grande Rivière, and a granite quarry at the foot of Biting Mule Pass.

Refining scenery

Running virtual trains also helped me adjust my scenery. I moved rivers, rerouted roads, added creeks, waterfalls, bridges – I even relocated a major glacier on the backdrop.

Thanks to building the virtual Athabaska, I've been able to save on ⅛" hardboard. At sea level, I've hung a four-foot-high backdrop, but in mountainous areas I'm getting away with as little as a one-foot sliver of sky. I know it's enough, because it's all there in the computer.

Virtual paint and decals

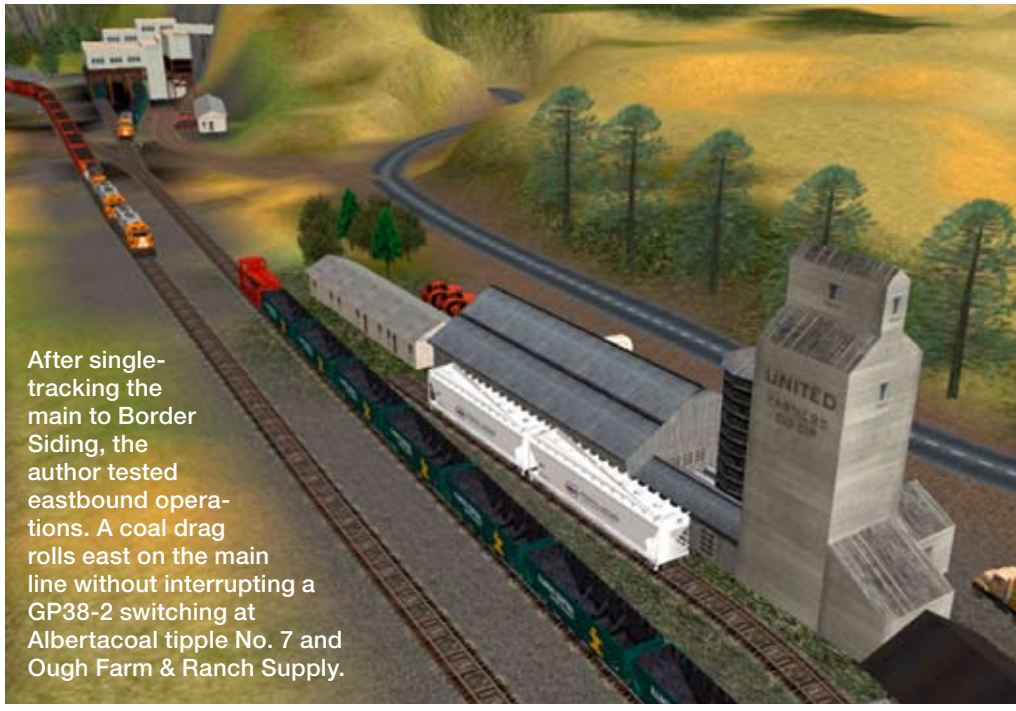
Veteran modelers Tony Koester, Bill Darnaby, and Perry Squier dropped in for a visit recently, and they were surprised to see locomotives and other rolling stock lettered for the Athabaska running on my computer screen. An auxiliary *Trainz* program, called *Paintshed*, enabled me to try out various color and lettering schemes on cars and locomotives and then run them in normal consists. This is a big help in designing a company paint scheme. I'll keep evolving the Athabaska RR's corporate look, just as prototype railroads do.

As I study the layout on screen and adjust the plan on paper to conform, I'm getting close to a railroad I can build with confidence. With *Trainz*, you can rapidly and flexibly try out different trackage arrangements until you arrive at a satisfactory plan. *That* version is the one to build using power tools on expensive lumber.

A replacement for modeling?

Friends have joked, "Now that you've built it in the computer, you don't need to build it for real!" Nothing could be further from the truth. The computer simulations have clarified my vision and stimulated my energies. As I write this, I'm preparing my basement and pushing forward with the groundwork – backdrops, lighting, and floor treatment – for the "real" HO Athabaska. **MRP**

Jim Richards has contributed to both Model Railroad Planning *and* Model Railroader *magazines. He and his wife, Jean, recently moved into their new home in Colorado.*



After single-tracking the main to Border Siding, the author tested eastbound operations. A coal drag rolls east on the main line without interrupting a GP38-2 switching at Albertacoal tipple No. 7 and Ough Farm & Ranch Supply.

Two SD40-2s idle at the Chinook helper siding, while a westbound approaches from Black Bear Bridge. Using *Trainz*, Jim added specific scenery details, such as the waterfall and an operating signal system.

//Trainz system requirements

Recently, I upgraded to *Trainz 2006*. The system requirements are listed below. You can also visit www.auran.com/trainz to learn more. – *J.R.*

Operating system: Windows XP/2000/ME/98
RAM: 512MB minimum, 1 GB recommended
Processor: Pentium IV 1.5Ghz or equivalent minimum, Pentium IV 2.0 Ghz recommended
Graphics: 64MB 3D graphics card minimum, 128MB 3D graphics card recommended
Other: DirectX 9.0 or higher video card and DirectX compatible sound card, approximately 4 GB of free hard drive space

Orange-and-silver FP7 no. 805A eases the *California Zephyr* to a stop in front of the Western Pacific's depot at Stockton, Calif., on Tommy Holt's HO scale Western Pacific layout. Mike Barrett scratchbuilt the depot.

Modeling Western Pacific's First Sub

A trip to Portola, Calif., creates a WP fan

By Tommy Holt//
Photos by the author

My adventure with the Western Pacific RR (now part of the Union Pacific) began in 1991 when my wife Angela and I visited Portola, Calif. I'd seen an advertisement in *Trains* magazine for the "Rent-A-Locomotive Program" at the Portola Railroad Museum. I was building a rather nondescript freelance model railroad at the time, but for reasons I'm still unsure of, my wife was pushing me to model a prototype railroad. Our trip to the museum was the catalyst for making that change.

After looking at the equipment on display at Portola, we spent several days exploring the Feather River Canyon and chased the ghosts of the WP to Sacramento. The way I saw it, the WP was a modeler's dream railroad, from commercially available four-axle diesel locomotives in a cool orange-and-silver paint scheme to great scenery. The fact

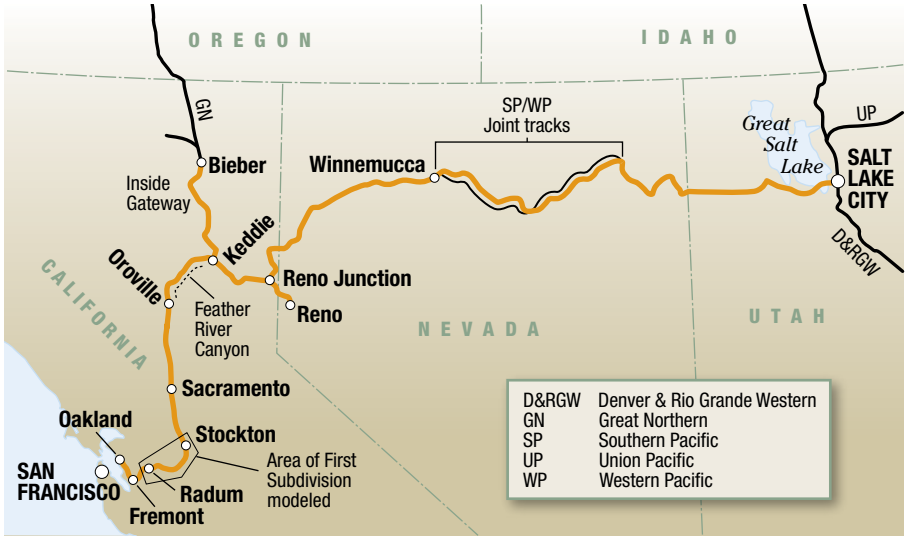


Illustration by Jay Smith

that lots of research trips to sunny California would be required to make it happen was also a plus.

When we returned home to Texas, I began the process of rebuilding my existing model railroad. [See the August 2000 issue of *Model Railroader*. – *Ed.*] As a portion of the WP. I chose the segment between Stockton and Fremont – part of WP's First Subdivision – because the track profiles were the closest to what I'd already built. That layout wasn't a perfect match, but it kept me occupied while I began researching the WP.

Networking

I soon met quite a few Bay-area modelers who knew other WP modelers who knew former WP employees. Gradually, my degree of separation diminished, and I accumulated the information necessary to build an operationally accurate representation of the WP's First Subdivision.

I came to like Stockton even more and decided to design my new railroad around it. Stockton was the first division point yard east of Oakland on the WP, with several interchanges, lots of industrial switching, and plenty of through traffic – the components I felt were needed to make this an interesting-to-operate railroad. The 1960s had fascinated the modeler in me for some time, so my research was confined mainly to that period; 1966 won the Oscar after I'd weighed all the facts:

- Orange-and silver paint scheme almost universal at this time (no Perlman Green yet)
- Running boards outlawed (grace period until 1978); new cars being built without them
- Colorful new freight cars mixed in with lots of old equipment
- *California Zephyr* still running daily each way
- Old-style Union Switch & Signal Traffic Control System (Centralized Traffic Control) green machine still in use in Sacramento
- On-line military depots (Lathrop and Lyoth) active customers (remember Vietnam?)
- Brand new Electro-Motive Division GP40s delivered in 1966
- Four sets of FTs still on the roster; 1966 their last year

A new home for us – and it

As I began the layout design process, we bought a new house with a large backyard for the purpose of building a separate structure for the railroad. I planned to build the structure myself, so I was confined only by my ability to construct and pay for it. If I made it too large, I might never finish it. But I didn't want to go to all this expense and bother only to discover that it wasn't large enough to contain my dreams.

It turned out quite well. The entrance opens into the crew lounge where there's comfortable seating (with 1960s period furniture) for about 12 people. Adjacent to the lounge is the dispatcher's office, located in a separate room but close enough to open the door to call crews. Nearby, but separated by a large picture window, is my workshop. There's a bar between the lounge and the bathroom.

My photo studio is also located on the first floor of the building. The railroad occupies the entire second floor in a 1,500-square-foot room that's clear of any support posts; the trusses span the entire room to allow this space to be rearranged in the future.

Sectional benchwork

I built the benchwork in 8-foot segments so I could easily disassemble and reuse the components. I've long detested

The author designed and built a special building behind his Texas home for his photo studio and model railroad.

The first floor houses the Union Switch & Signal Centralized Traffic Control machine (that's MRP editorial director Andy Sperandeo).

Crew members waiting for their next assignment can read a magazine or watch television in the lounge.

The workshop and photo studio (not shown) are located on the ground floor.

Ample 4-foot-wide carpeted aisles surround the central entry stairs. The railroad's valances and fascias are plywood painted "Centralized Traffic Control-machine green."

Tommy painted the layout skirting flat black.

He cut the roadbed for his layout from ¼" lauan plywood.

For the WP First Subdivision, Tommy used ¾" birch plywood in 8-foot super dominoes for the benchwork. This photo shows the benchwork in progress.

On most of the layout, Tommy used wallboard for the backdrop. However, where coved corners were required, he used 1/16" door-skin plywood.

//The layout at a glance

Name: WP's First Subdivision
Scale: HO (1:87)
Size: 30 x 48 feet
Prototype: Western Pacific
Locale: Stockton, Calif.
Period: 1966
Layout style: linear walkaround
Layout height: 52" to 58"
Benchwork: segmental (8-foot sections)
Roadbed: ¼" lauan plywood
Track: Micro Engineering code 83 main, code 70 elsewhere
Length of mainline run: 360 feet
Turnout minimums: no. 8 main line, no. 6 elsewhere
Minimum curve radius: 36"
Maximum grade: 1 percent (same as prototype)
Scenery construction: plaster over cardboard lattice, plywood, or foam
Backdrop construction: wallboard
Control system: wireless EasyDCC

having to squeeze by another operator when running a train, so I established a 4-foot standard aisle width and built the benchwork around it.

For framing I used ¾" birch plywood. It was slightly cheaper to rip 1 x 4s from ¾" plywood than to buy pine 1 x 4s at the home-supply store. Moreover, cabinet-grade birch is stable and straight, making construction a pleasure.

After ripping the roadbed from ¼" lauan plywood, I ran the pieces through the table saw using a wooden jig to get a 30-degree ballast slope on the sides. A second, wider layer of ¼" beveled plywood under the top piece accurately mimics the prototype subroadbed profile.

I kerfed the straight pieces of ¼" roadbed on both sides to make smooth curves. Later, I filled the kerf cuts with plaster. The roadbed and subroadbed sit on top of ¾" birch plywood track boards; ¾" plywood gusset plates overlap the bottom of each joint.

Lighting and electrical

An integral part of the design, the overhead lighting is all fluorescent fixtures using General Electric Chroma 50 tubes. These have full-spectrum 5000K, or daylight, color balance. See "Fluorescent lighting" on page 38.

I installed electrical outlets every eight to ten feet throughout the layout on both sides of the aisles. Each aisle is

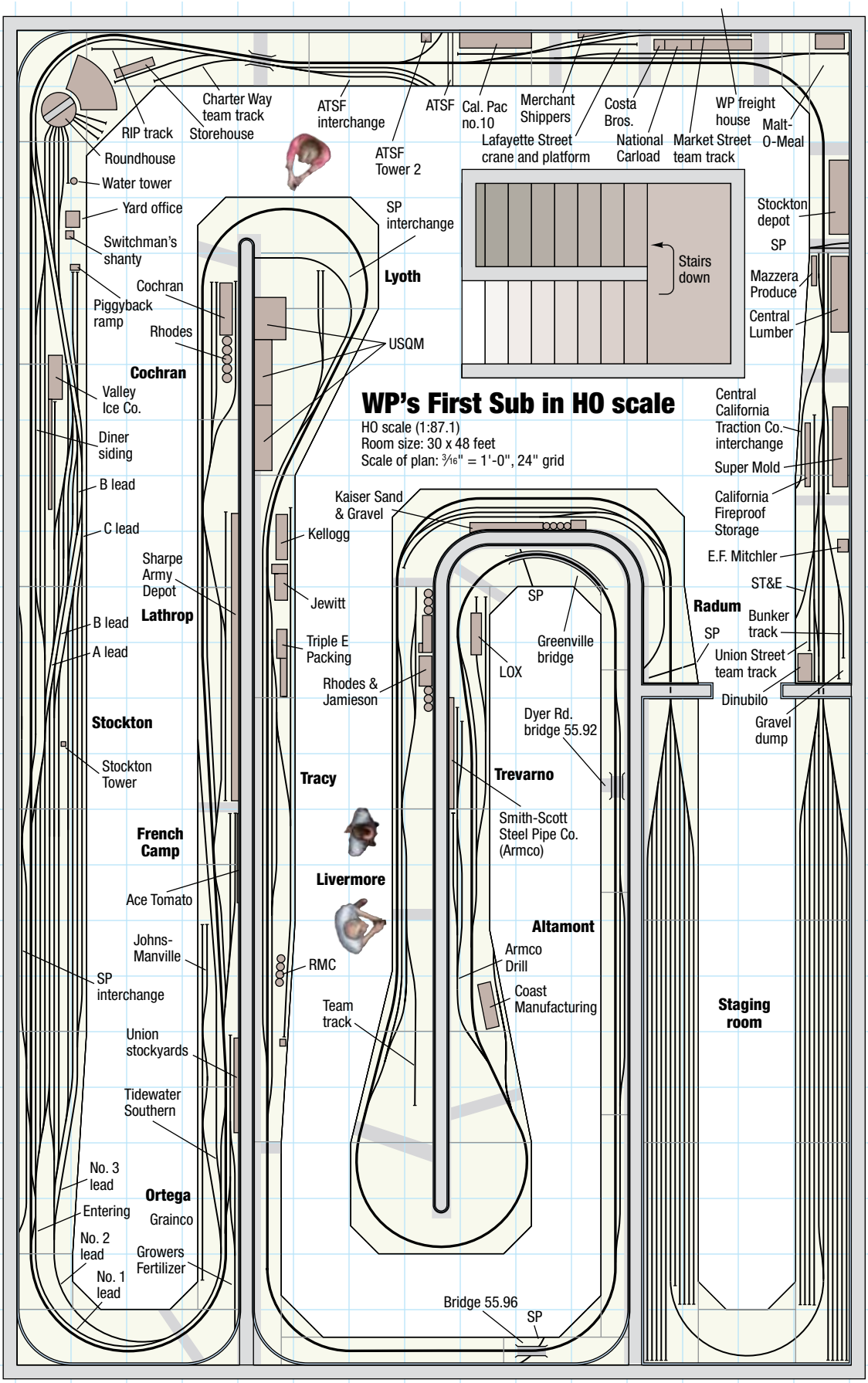


Illustration by Rick Johnson

powered by a separate 20-amp circuit, so there will never be a problem when using additive lighting for photography. Two flood lamps can eat up an entire circuit, but I can take the power from the next aisle with an extension cord if needed.

An illuminated double-pole single-throw (DPST) master power switch at the top of the stairs controls power to the railroad, computer interface, and a separate set of convenience outlets hidden behind the skirting for various power stations and devices.

A sincere design

The single-deck design is sincere, meaning the main line doesn't run through the same scene twice, with no duck-unders. You enter the room by coming up the stairs inside the railroad. The yard is 52" from the floor, which is chest high on me, but the main line climbs up another 6" to crest Altamont Pass, the highest point on the First Sub. I used a maximum grade of 1 percent, as did the WP, and the grade locations also mimic the prototype.

By including a balanced portion of the railroad on either side of Altamont Pass, I could get the main line back down to 52" before it enters the west-end staging yard. To do this, I had to make the design fit on either side of the pass without compromising prototypical operation. This area is compressed a great deal more than Stockton Yard, but the operation retains its authenticity.

I included most of the on-line customers on my modeled portion of the First Sub, which meant leaving out large sections of open country. An alternative design had more of the scenic climb up the Altamont, with the modeled portion ending just beyond that siding. In that scenario, the staging yards would have been an over/under double-deck arrangement. Unfortunately, this would have cost me six on-line customers, greatly impacting the operating potential of the railroad.

The compression in Stockton Yard is quite different. If you include the Flora Street Yard, which is both a staging and an operational yard, then the prototype-to-model compression ratio is just a little bit over 2 to 1. This was close to my original goal for the railroad: a model yard that operates like its prototype. I run the fast clock at a slow 2:1 ratio because I want operators to feel they have plenty of time to do their jobs in a prototypical manner.

Operating sessions

Our three-hour operating sessions therefore simulate only six hours of the WP timetable. I have operated on many railroads where, because of the tremendous compression of both time and space, it wasn't possible to keep up with all the trains that were coming and going. For me, that's the difference between a railroad that feels like a model and one that feels like a railroad.

All switches are controlled by Tortoise motors and are operated by toggles on the fascia that line up with the switch rod. The toggle-switch position indicates the switch position: When the toggle is up, the switch is reversed; when the toggle is down, the switch is normal.

I wanted the act of aligning a switch to feel "manual," and I wanted the switchman to have to walk to the location of the switch to throw it. I experimented with manual mechanisms for aligning switches from the fascia, but I liked the continuous force that the Tortoise puts on the points, and the two built-in single-pole double-throw electrical contacts are also handy.

//Fluorescent lighting for photography

The fluorescent lamp best known for color matching and rendition is General Electric's Chroma 50. Because of its high color-rendering index of 92, it has been used for years in the printing business for color matching and proofing. It's specifically made for this type of application, but because it has such pure white light, it's also found in offices.

These full-spectrum fluorescent lamps were also used in professional photography for many years before the digital revolution. For interior photos requiring a balanced natural effect between the interior (fluorescent light) and the exterior (daylight), many photographers replaced the tubes in existing fixtures with Chroma 50s and could then shoot a single, perfectly balanced exposure. The alternative was either to place large filter gels over the exterior windows or to shoot the interior and exterior separately but on a single piece of film.

Even with the growing obsolescence of film, daylight bulbs are handy when photographing the layout. If you use additive lighting such as electronic flash, then your light sources are balanced with each other, which means the same in digital photography as it did with film. If you use additive lighting such as halogen 3200-3400K floodlights, leaving the daylight fluorescent lights on overhead nicely simulates the color that fills the shadows from an overhead blue sky. I also feel the light from the full-spectrum tubes is more pleasing to look at.

These qualities make them worth serious consideration by model railroaders. They are available from electrical-supply stores as 24", 36", and 48" T12 (1½"-diameter) tubes. – *T.H.*

Staging

I confined staging to its own room to provide a visual separation between the modeled world and the off-stage area. The concept of out-of-sight, out-of-mind is in effect here, but the staging room is easily accessible by simply walking through a doorway.

I built the staging yard ladders with Peco medium-radius turnouts because they are compact. During construction, I laid out ladders using standard turnouts, but this made the ladders 24" longer. More room for trains is a good thing: 19 staging tracks hold trains from 17 to 22 feet in length.

The longest siding on the railroad holds a 20-foot train, and the longest yard lead has more than enough length to accommodate anything in this range. The Flora Street staging yard represents Stockton's "Old Yard" and does double duty on the model: Flora Street siding runs through the yard and is used by the "Flora Street Flyer" (local industry switcher) crews to run around their trains. Stockton Terminal & Eastern (ST&E) interchange traffic is handled through Flora Street, just as on the real WP.

Finishing touches

After much procrastination, I recently installed carpet in the layout room. The railroad was designed with carpeting in mind, but I held off for a long time for fear of damaging it during the various stages of construction. The plywood floor finally got to me, however.

The acoustic properties of carpet changed the dynamics of operating sessions completely. Sound decoders and the background sound system both seem more localized, and the resonance of human movement isn't as noticeable. I bought a canvas drop cloth to protect the carpet during construction and "hired" a robot to vacuum up the dust.

The dispatcher's office downstairs was purposefully built out of sight of the railroad to better simulate the conditions of WP dispatchers working in Sacramento. The five-foot-long Union Switch & Signal CTC cabinet is a replica built from US&S plans by David Barrow. When he converted his railroad to a switching operation, he gave me the cabinet to use for my project. I gutted the machine and re-configured and rewired the modular panel faces to match the WP.

I'd photographed the original track-schematic model panels, so I was able to duplicate the look of the original with new photoetched panels. Mike Burgett of Control Train Components (ctcparts.com), a modeler and a professional railroad signal system engineer, supplied the actual WP signal logic diagrams. I collected enough prototype hardware to completely refit the machine and make it behave exactly like the original.

I couldn't have succeeded without the help of Mike Duncan, my computer-engineer friend who made the computer interface function properly. We installed Bruce Chubb's latest C/MRI hardware, and while I did the wiring, Mike wrote the software and provided the genius that actually made the signal system work.

Although the railroad is fully operational, it's still scenically challenged. But

Tommy cut waybill boxes into the fascia panels, an idea he borrowed from Rick Fortin. He also mounted phones, local switch controls, and track diagrams on the fascia.

Tommy asks the dispatcher for "work time" (WP's term for "track and time") to work on the main. Since the dispatcher's office is located in a separate room (see page 35), the phones are necessary for communication.

//Staging drawers

Since we can never have enough staging, I installed six sets of four drawers around the layout at interchange points with other railroads. These drawers allow me to easily "pick up" and "set out" at the interchanges when staging the railroad. The staging room itself has two sets of drawers that serve the same purpose.

During the benchwork phase, I designed and built these drawers with the help of my good friend Bill Smotrilla. His woodworking expertise made fast work of cutting the components to a standard size so they could all be made at once. A simple ladder framework supports the drawers, with each rung of the ladder holding a drawer glide.

The drawers are simple boxes made from ½" plywood with ¾" drawer faces added for a finished look. I routed the handles out of the faces to create a comfortable, recessed hand grab without any protrusions.

Each drawer has four evenly spaced plywood dividers to form compartments for cars. I experimented with softer materials such as foam, but I found that the carbody

details would get caught on the dividers when picking up the car. I considered adding a furring strip along the bottom of each compartment to act as a track for the cars, but I've never had a problem with cars being damaged in the drawers. Approximately 25 cars, depending on length, will fit in each drawer. This gives me the potential to stage 600 cars off line but readily available. – *T.H.*

With the benchwork built, Tommy's layout is taking shape. Industries such as Kaiser Sand & Gravel at Livermore are now being installed on the First Sub.

Current National Model Railroad Association president Mike Brestel (left) and past president John Roberts enjoy an impromptu operating session on the First Sub. The four-foot aisles make it easy for operators to pass each other.

//Signal protection shields

I added acrylic shields along the fascia to protect the signals from passing operators. I first saw the shields on David Barrow's HO scale Cat Mountain & Santa Fe layout where they were protecting fragile bridges. After having custom signals hand-crafted for the railroad by Sunrise Enterprises, I felt it was the least I could do to protect them.

I discovered that rather than providing protection from my operators, these shields actually protect signals from me. I'm the one who cleans the track and am therefore most likely to damage them (this part isn't conjecture).

A local plastics firm cut the shields, most to a standard size. I had them cut with rounded corners on the top and the edges smoothed to lessen the pain of a chance encounter. I drilled my own holes to save a few bucks and used a countersink to give the installation a finished look. – *T.H.*

//Learning points

- The availability of high-quality models with railroad-specific details and the advent of railroad historical organizations has made modeling a prototype much easier and more rewarding.
- Field trips to visit favorite prototypes, even fallen flags (railroads no longer in existence) or abandoned lines, is helpful and inspirational.
- Linear layout design tends to ensure a track plan is "sincere" – that is, the main line doesn't pass through the same scene more than once.
- Staging (storage) drawers near interchanges and staging yards make it easier to rotate equipment on and off the layout.
- Chroma 50 fluorescent tubes, or the equivalent, simulate true daylight, both to the eye and to daylight film.

I'm not without a plan. I purchased a Noch GrasMaster static grass applicator after seeing Peter Ross's article "Model realistic tall grass" in the May 2006 issue of *Model Railroader* magazine. I also bought about 150 pounds of real rock ballast from Smith & Sons in Chardon, Ohio. This firm offers a tremendous variety in both color and size, making it easy to match the ballast shown in Western Pacific prototype photos in my collection.

Because of my monthly operating schedule, all scenery projects will be done in small doses. Keeping the operating environment tidy and neat is a high priority for me. There's nothing like a clean, comfortable place to play with trains! **MRP**

Tommy Holt, a professional photographer and owner of Third Eye Photography, lives with his wife Angela and daughters Casey and Shannon in Austin, Texas. Though his photos have appeared regularly in the pages of Model Railroad Planning*, this is Tommy's first byline in the annual magazine. He also wrote an article on his original Western Pacific First Subdivision, which appeared in the August 2000 issue of* Model Railroader *magazine. In addition to writing and taking photographs for magazine articles, Tommy presents clinics on model photography at National Model Railroad Association conventions. When not making photographs or working on his layout, Tommy enjoys playing golf.*

An entire prototype railroad on a sheet of plywood

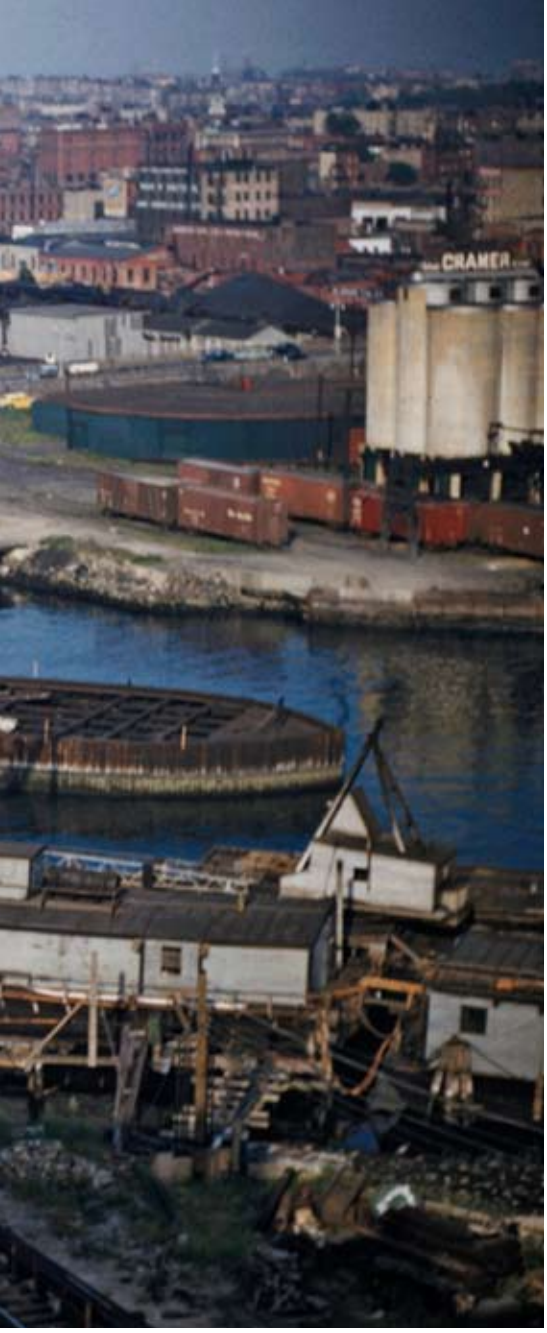
Lackawanna's Harlem Transfer is the ideal prototype

By Charlie Conway

What more could the fans of accurate prototype modeling and realistic operation wish for than a model of an entire railroad with every track, every turnout, and every building scaled exactly?

Most railroads are so large that it's hard to capture even a small segment of one without compression or compromise. The former Delaware, Lackawanna & Western's Harlem Transfer was a delightful exception. The little waterfront terminal was wedged into a city block measuring only 330 x 650 feet. In HO scale, the entire railroad fits neatly on a 4 x 8-foot table.

What the Harlem Transfer lacks in size it makes up for in operational interest and density of detail. If marine modeling is your cup of tea, there's plenty of room for the tugboats, lighters, barges, and car floats that linked the isolated terminal to the nation's rail network. You'll find a wooden transfer bridge, a



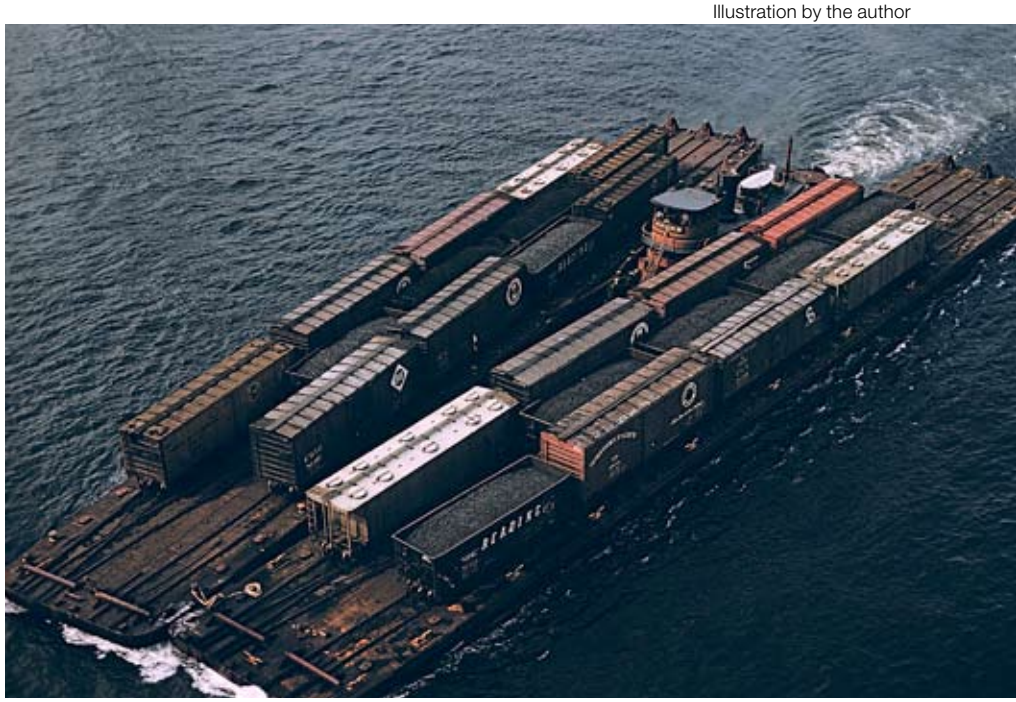
The Harlem Transfer is at the right center of this 1954 photo. The original oval freight house, painted dark blue, is still evident behind Cramer Coal's concrete coal silos. That's New York Central's Harlem River swing bridge and its lift-span replacement at the left. John Dziobko photo

Illustration by the author

sorting yard, team tracks, freight houses, a transfer crane, a coal dealer, and – as with most 4 x 8 layouts – continuous running! All of this is wrapped up in only 32 square feet.

Harlem River off-line terminals

In the late 19th century, the South Bronx area of New York City was a busy manufacturing district that was home to iron works, stone finishers, printing plants, commercial bakeries, and furniture makers. At one time, half of all



Conrad Milster photographed the low-profile tug *Bronx* shepherding a pair of car floats up the East River to the Harlem Transfer yard on September 3, 1959.

//The extreme-radius modeler

The Harlem Transfer turns the question of minimum curve radius on its head: its 90-foot minimum radius corresponds to 12⅜" in HO, which is well below ordinary layout minimums. Is reliable operation possible with such sharp curves? The answer is yes, provided certain precautions are taken. The following guidelines will help you attain reliable operation on sharp curves like these, even if you're using fine-scale track standards:

- Align rail ends carefully. A horizontal offset, especially in the outside rail, will put cars on the ties every time.
- Avoid track gauge "pinch points" — even a fraction under gauge on a sharp curve is big trouble. In fact, a tad of extra width (.015"-.020") in sharp turns works wonders.
- Steer clear of sharp S-curves.
- Verify that couplers have sufficient swing angle.
- Make sure trucks can swivel freely without fouling on side sills, underframe, or steps.
- Use equalized, free-rolling, true-running, accurately gauged trucks so all wheels remain firmly on the track.
- Weight cars consistently. Rather than basing the weights on length, I prefer a uniform loading of about 1¼ ounce per axle.
- Use only locomotives capable of truly smooth creeping. Jerks and jolts create trouble.
- A general rule regarding minimum radii: if the prototype could do it, we can do it too. But remember, we'll have to take the same measures the prototype did to deal with sharp curves: limiting car length, applying manual assistance when coupling and uncoupling, and dealing with the occasional derailment. – *Iain Rice*

In the mid-1950s, the original freight shed was replaced with a two-story concrete block building that was more fire resistant. The new building's curved wall is evident behind boxcab no. 2 in this January 1961 photo by Matt Herson.

//Learning points

- Car floats represent the rail network "beyond the basement" in a prototypical manner.
- A rail-water interchange provides opportunities for very compact modeling and interesting switching operations.
- An off-line rail-marine terminal can be connected to a larger layout by using car floats.

American-made pianos were manufactured there. To support this activity, the Harlem River waterfront developed into a busy distribution center for coal, lumber, flour, hay, bricks, automobiles, heavy machinery, and general freight.

Only the New York Central and New Haven railroads could tap this lucrative market by land. The other railroads gained a foothold in 1898 when investors chartered the Harlem Transfer Co. to provide rail service by car float. A tug would haul these car floats to and from mainline float yards in New Jersey – an 18-mile journey via the East River. The investors purchased a five-acre waterfront parcel of land and hired an engineer named Walter Berg to lay out a terminal on the tiny site.

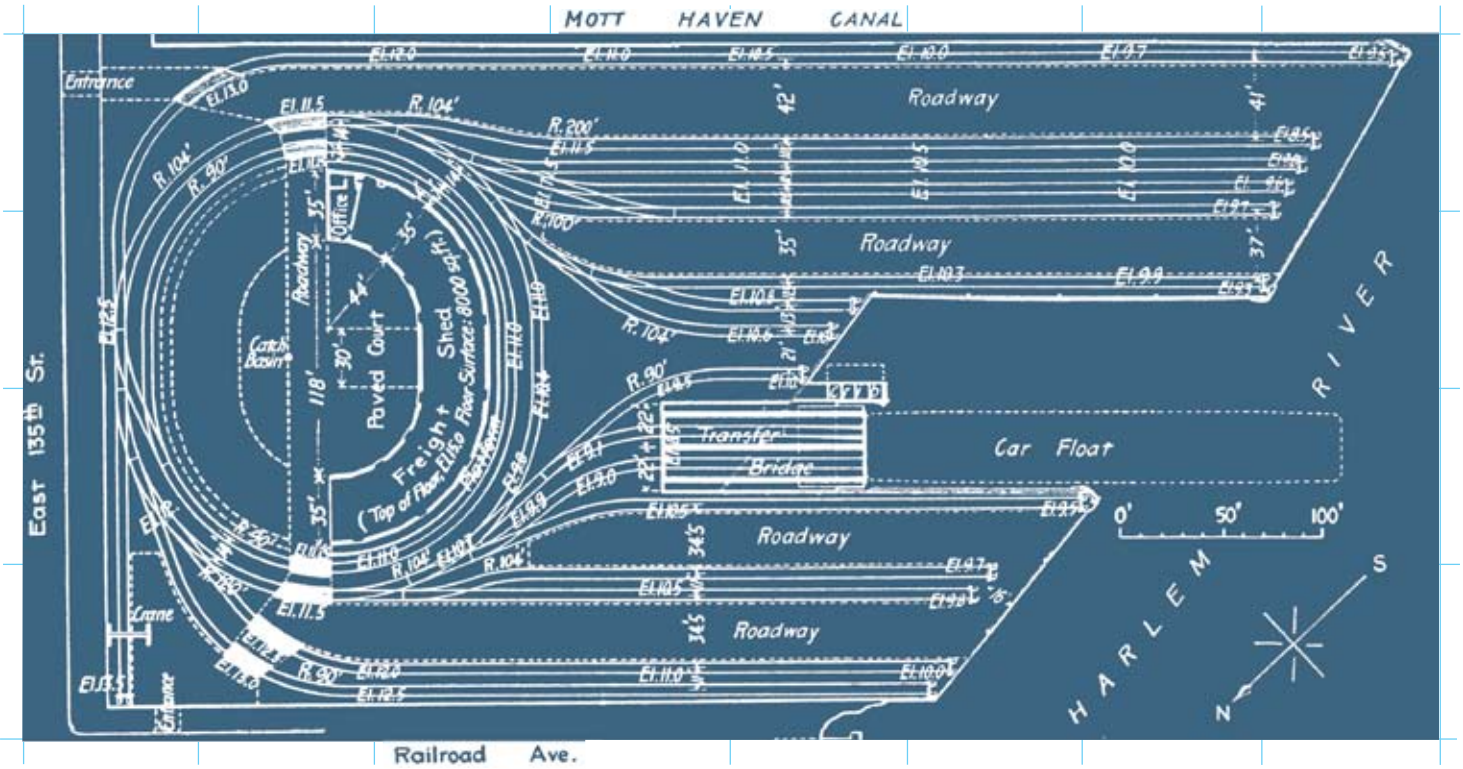
An ingenious solution

Berg's solution was ingenious: an oval freight shed surrounded by two loops of track. The inner loop would serve the freight shed, while the outer loop would be a switching lead for all the other tracks. This elegant concept not only made maximum use of the available space but it also eliminated the need for runaround moves by the switcher. To reach the opposite end of a cut of cars, the engineer simply backed around the loop. The result was a remarkably compact and efficient facility – the model for four such terminals on the Harlem River.

Less-than-carload (LCL) freight was handled in an oval, steel-framed shed surrounding a central court. Initially, only half the oval was built. Team tracks were provided to accommodate carload freight, and a small transfer crane was tucked in the northern corner of the site to handle heavy loads.

The terminal's transfer bridge (where the car floats docked) was a 100-foot-long wood Howe truss structure typical of those around New York harbor at the time. The landward end was supported on a bearing; the outer end rested on a hollow wooden pontoon that rose and fell with the tide.

The company purchased a pair of car floats, a second-hand wooden-hulled steam tug named *Commander,* and a Baldwin 0-4-0T steam dummy – (drawings by G. Harold Geissel were published in the March 1967 MR). The little anthracite burner weighed only 41 tons but proved its mettle by hauling 11 cars around the loop track. In August 1898, the Harlem Transfer opened for business with three tenants: Erie, Central RR



The prototype 1898 track plan shows Walter Berg's original concept and the dimensions of this compact terminal.

of New Jersey, and Lackawanna. The Baltimore & Ohio signed on in 1902.

Lackawanna takes charge

In 1905 the Lackawanna acquired a controlling interest in the Harlem Transfer as part of its effort to expand its freight presence in New York. Rather than simply absorbing the company, DL&W allowed the Harlem Transfer to operate independently. In 1906, the CNJ and the Lehigh Valley opened their own Harlem River terminals and withdrew from the Harlem Transfer, but the B&O and Erie continued to use the terminal until the mid 1920s.

The Harlem Transfer crew moved a lot of freight. In June 1927, the terminal handled 96 car floats, 1,375 cars, and nearly 20,000 tons of cargo. Despite this performance, the Lackawanna never promoted its little subsidiary much, perhaps because options for development were so limited.

In 1911, the Lackawanna ordered a replacement 1,000-hp steam tug with an iron hull, christened *Bronx*. She had a short funnel and a low-profile wheelhouse that allowed her to slip under the Harlem River bridges without requiring them to open.

After the turn of the century, pressure began to mount in metropolitan New York to curtail smoke from steam engines, prompting the city's railroads to experiment with diesel-electric technology for low-powered switchers. No place was better suited to the capabilities of these early diesels than the Harlem River off-line terminals. In 1926, the Lackawanna ordered a pair of 300-hp boxcab locomotives from the Alco-GE-Ingersoll-Rand consortium. One of these engines became Harlem Transfer no. 2.

Changing times, changing plans

The Harlem Transfer, like most waterfront terminals, was subject to frequent alteration. A few of the changes to the terminal include the following:

• Around the turn of the century, the company leased Railroad Avenue and laid two new team tracks in the right-of-way. Two warehouses and a shed for no. 1 were also built in this period.

• In 1913, construction of the Lexington Avenue subway tunnel under the Harlem River required nearly a third of the Harlem Transfer property to be excavated. All the tracks on the west half of the site were removed, and the loop tracks were severed. To keep the terminal in operation, the transfer bridge was moved to the east side of its slip, where it remained. After the subway tunnel was finished, tracks on the western part of the site were restored.

• In the late 1920s or early '30s, Cramer Coal & Oil leased portions of the site and built poured concrete silos and an office building with truck scales. A new 25-ton transfer crane was installed, and a 30 x 250-foot steel warehouse was erected at the south edge of the slip. Sometime in the late 1940s or early '50s, the wooden transfer bridge was replaced with a steel pony truss.

• In addition to the existing concrete coal silos, a cement block replacement for the oval freight house was built in late 1957 to handle palletized flour.

The Harlem Transfer Co. continued to operate independently following the Erie Lackawanna merger in 1960. In February 1962, boxcab no. 2 was scrapped and replaced by ex-Lackawanna GE 44-tonner no. 53. The *Rochester*, a modified ex-Erie diesel tug, replaced the *Bronx* around 1963.

By the mid 1950s, rail-marine operations in the New York harbor area were in decline due to growing labor costs, competition from trucks, and a general contraction in the nation's manufacturing sector. The fortunes of the Harlem Transfer declined steeply as manufacturing businesses cut back and disappeared from Harlem and the Bronx.

The terminal lasted as long as it did because the landlords and bakers of

//The track plan at a glance

Name: Harlem Transfer Co.
Scale: HO
Layout size: 4 x 8 feet
Theme: complete Harlem Transfer Co. in New York Harbor
Period: 1898-1968
Mainline run: 12 feet
Minimum radius: 12⅜"
Minimum turnout: 12⅜" radius
Maximum grade: none

Photographer Matt Herson stood with his back to the transfer bridge as boxcab no. 2 pulled a cut of cars onto the loop track in this 1961 photo. That's a tool or oil house in the foreground, a flour-storage warehouse with billboards on the roof at right, and the new freight house at the rear.

Harlem Transfer (ex-DL&W) GE 44-tonner no. 53 worked the terminal from early 1962 until service ended in July 1968. It was photographed at Croxton Yard, N.J., in September 1968 after being retired. Allan H. Roberts photo courtesy Matt Herson

Harlem and the Bronx continued to receive regular shipments of coal and flour. But even this bulk material revenue could not stay the inevitable. In July 1968, the last car float was cast off, and the Harlem Transfer terminal was shut down and left to weeds and rust.

Modeling the Harlem Transfer

In its original configuration, the Harlem Transfer fits on a 4 x 8-foot table, but modeling the terminal accurately will require scratchbuilt structures. Depending on the chosen scale and era, much of the rail and marine roster will have to be built from scratch as well.

[Despite the very sharp curves, it would be simple to build a model of this terminal using sectional track with built-in roadbed (which ideally would be disguised for the Harlem Transfer). The new Trix line of C track includes curves of approximately 14" (360mm), 17" (437.5mm), and 20" (515mm) radii along with 14" radius curved turnouts and 17" radius conventional and double-slip turnouts. The track has code 90 rail; the turnouts have deeper flangeways to accommodate the European NEM wheels, but a frog insert for RP-25 wheels will be available in the near future. Trix also markets 40-foot North American-prototype freight cars with swinging drawbars for switching on this extremely tight radii. – *Ed.*]

Here are a few other considerations:

• Particular care must be taken with the extremely sharp curves – as small as 90-foot radius (12⅜" in HO). Avoiding horizontal offsets at rail joints and widening the gauge .015" - .020" on the sharp curves will also help prevent derailments. [See "The extreme radius modeler" on page 44 – *Ed.*].

• Walter Berg's plan is ingenious, but it includes S curves. You may wish to revise these or at least test your rolling stock on a mock-up before laying track.

• Team tracks on the prototype were set on tight 11-foot centers (1½" in HO

//How to bridge your car float

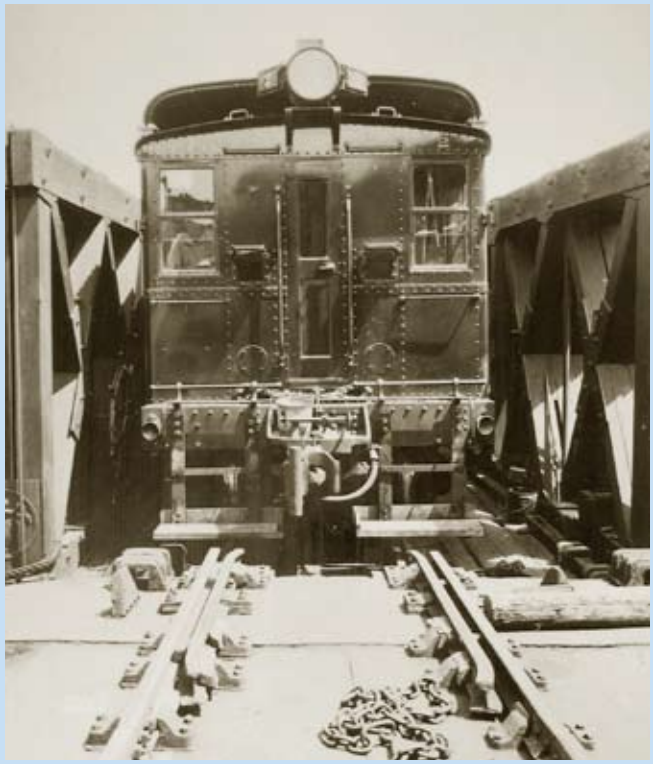
As a tugboat deckhand for the Lehigh Valley in the 1950s, I learned first-hand how the railroads moved freight cars in New York Harbor. I often worked on the *Cornell*, one of the "Harlem boats" that served the 149th Street terminal in the Bronx, a few blocks up-river from the Harlem Transfer.

Landing or "bridging" a car float, particularly under the influence of wind and tide, could be a tricky proposition. As the tug captain guided the float toward the transfer bridge, a crewmember secured a line from the car float to the slip extending out from the bridge. This "rack line" was used to "rend out" or arrest the momentum of the float. When the float was in position, the bridge crew took over, securing heavy manila ropes to hooks on each corner of the bow. The "rack-and-pin" man would then use large, geared manual winches to pull the float tight against the transfer bridge. Once the car float was secured, the lines from the tug were let go.

To bring a pontoon-type bridge down to the level of the float deck, a reach car or the locomotive itself was run out onto one track of the bridge to push it down. The rack-and-pin man slid heavy steel pins or "toggles" into pockets on the float, and the locomotive backed out and returned to repeat the operation on the other side. Small adjustments were made to the horizontal alignment of the rails with a screw mechanism.

After the float was bridged, the "shore floatman" removed the chains and chocks that secured the cars, and the railroad crew went to work. Unlike most yard switching, pulling and reloading floats required that all cars be moved under the control of air brakes.

The conductor determined how to handle the cars on the float without excessive listing. It was customary to "pull" the port (left-hand) track first, followed by the starboard, and then the center tracks. Heavy loads often required the sequence to be modified: the conductor might elect to pull only half the port track, then the entire starboard track, the rest of the port track, and finally the center track.



The engineer of no. 2 will have to back off a little to align the transfer bridge rails with the deck of the car float.
Photo courtesy of the Railroad Museum of Pennsylvania

Reloading was generally performed in the reverse order of pulling, with the conductor carefully watching the listing of the barge. When all the cars were spotted and secured, weight was again applied to the bridge to release the pressure so the toggles could be withdrawn. Finally, the lines were cast off, allowing the tugboat to pull the float back to clear the transfer bridge. – *David C. Pearce*

scale). Increasing this spacing will avoid sideswipes between cars.

• The Harlem Transfer was squeezed into its site, but we aren't quite so constrained. In an unusual reversal, it may be useful to selectively expand the site to ease tight clearances.

Operating an off-line terminal

Modeling a small off-line marine terminal allows us to dispense with much of the artifice required to model a large railroad – no fast clocks, no staging, no mirrors, just the real tracks and customers, only smaller.

Work begins before the float arrives. Empty cars must collected and lined up on a departure track. When the car float arrives it has to be "bridged," or aligned and locked into the dock, and the waybills retrieved. Waybills were handled in watertight bill boxes mounted on the float; a similar model bill box could be mounted to the fascia of your layout.

As the float is pulled, cars are placed on an arrival track. The float is then reloaded, outbound waybills go into the bill box, and the float is cast off. After waving farewell to the marine crew, the newly arrived cars can be distributed.

If only a single car float is used, it will need to be "fiddled" between operating sessions. If several movable car floats are used, little tampering will be required. Car floats could be interchanged with a mainline float yard that's part of a larger layout of your own or one belonging to a friend.

//On our Web site

For more information on marine railroading and lots of other helpful material, visit our Web site at www.modelrailroader.com

Further information

Readers interested in New York harbor railroading should consider joining the Rail-Marine Information Group. Visit their Web site at www.trainweb.org/rmig. For a look at the "railroad navy" in the 1950s and '60s, see Thomas R. Flagg's *New York Harbor Railroads In Color* in two volumes from Morning Sun Books.

My thanks to Kurt Bell, John Drennan, Thomas Flagg, Ron Hoess, David Pearce, David Pfeiffer, Iain Rice, Thomas Taber III, and John Teichmoeller for their generous assistance. **MRP**

Charlie Conway's interest in urban rail-marine modeling was kindled by an article on the Severna Park Club in December 1975 Model Railroader. *He recently dismantled his HO layout based on the Jay Street Connecting RR for a move to the West Coast. Charlie also enjoys sailing, flying, and playing the violin.*

The Hardwick & Woodbury Division

Fifth-season New England short line

It pays to listen to one's inner entrepreneur

By Mike Confalone//Photos by the author

I'm a fastidious modeler when it comes to the look and feel that I'm trying to achieve. Thanks to extensive research and knowledgeable friends, I'm able to accurately represent the way structures looked and how Vermont's railroads operated in April 1978, from the weathering on the freight cars down to the matted grass, mud, and bare trees of early spring – the state's "fifth season" or "mud season," as the locals often call it.

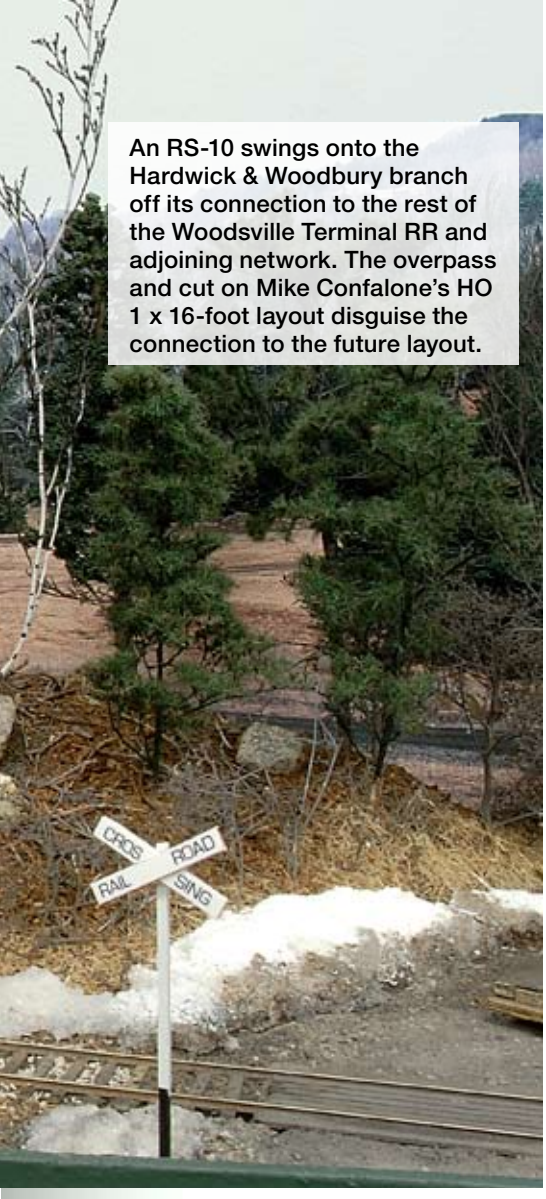
All of this sounds like prototype modeling, doesn't it? But the story you're about to read isn't really about prototype modeling. Or is it?

Superimposed freelancing

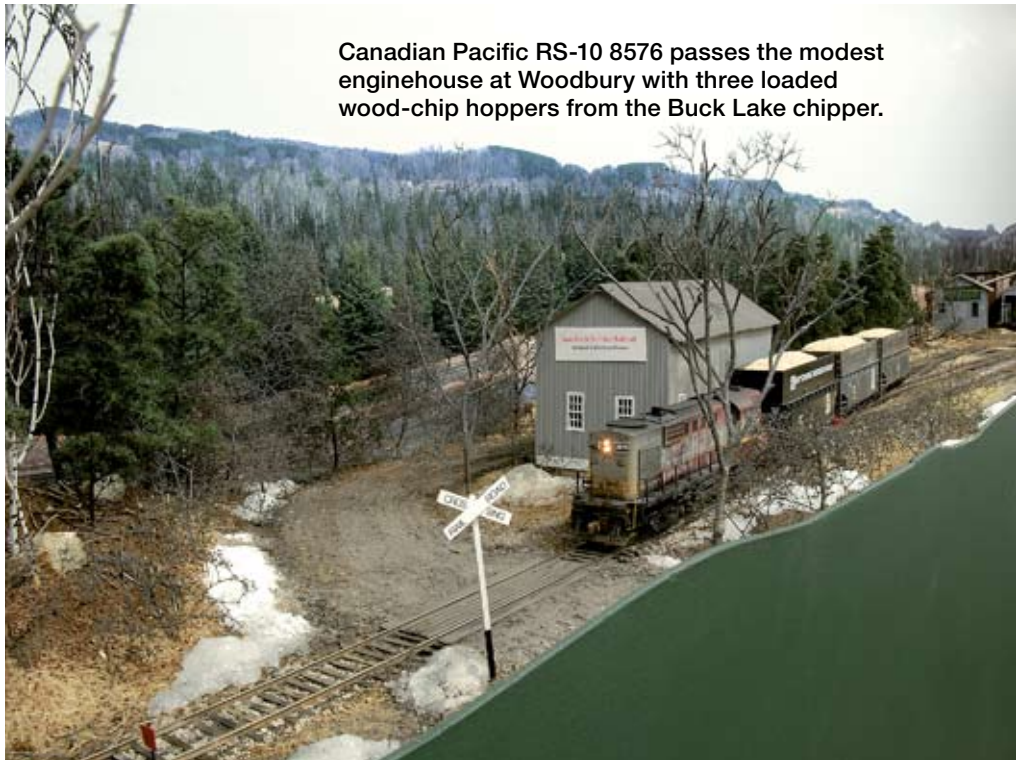
Although my HO railroad is small, just 1 x 16 feet, my goal is to build a larger layout in an adjoining part of the basement depicting the railroads of St. Johnsbury, Vt., as they appeared in 1978. In the late 1970s, St. Johnsbury's railroad yard was an important interchange point between the Maine Central, Canadian Pacific, and Lamoille Valley (LVRC) railroads.

I plan to include parts of the Maine Central, the Canadian Pacific, the LVRC, and the Boston & Maine's branch lines to paper mills at Berlin and Groveton, N.H.

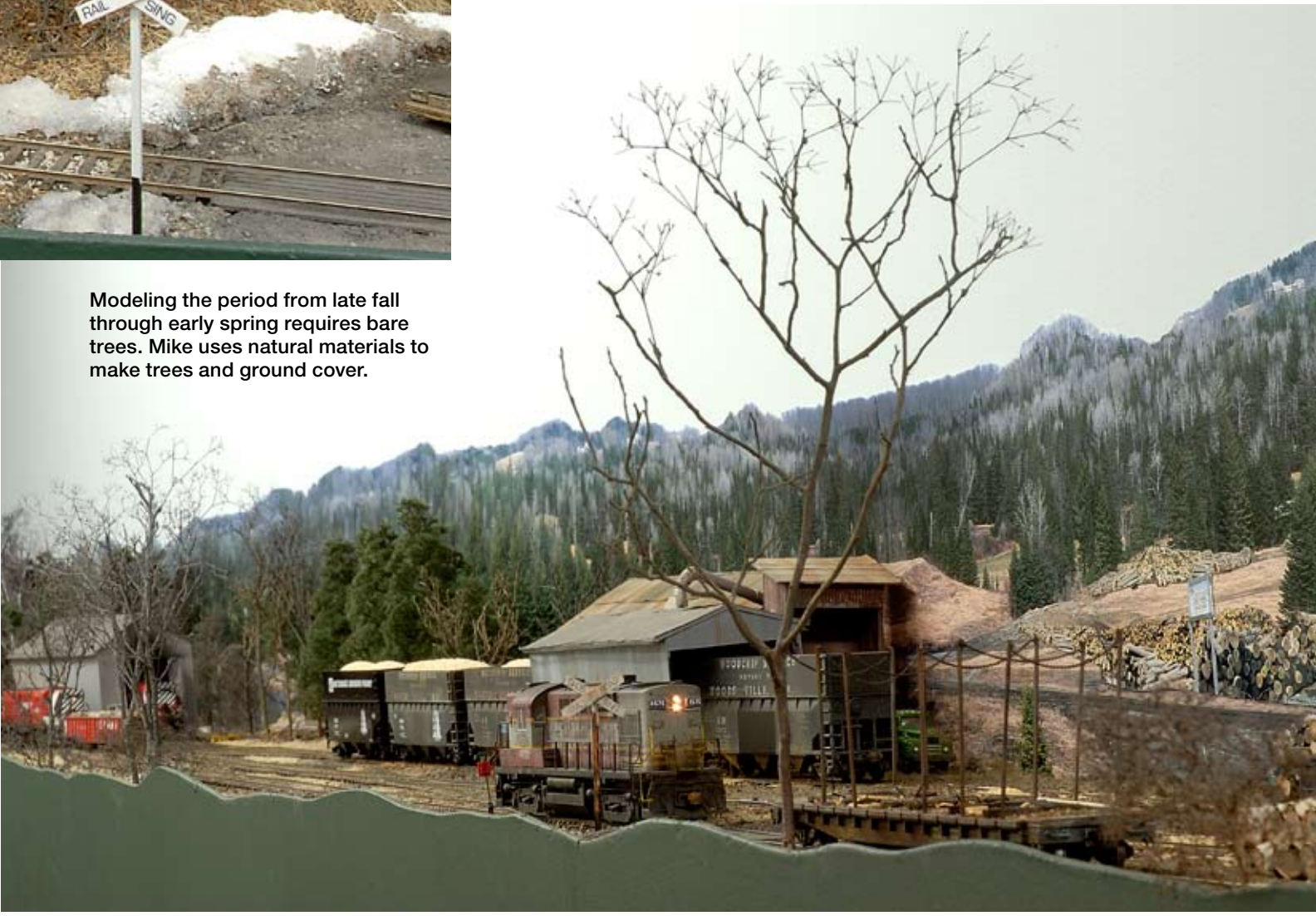
That said, from my earliest days in the hobby I've had the desire to model my own railroad – to freelance. Despite a



An RS-10 swings onto the Hardwick & Woodbury branch off its connection to the rest of the Woodsville Terminal RR and adjoining network. The overpass and cut on Mike Confalone's HO 1 x 16-foot layout disguise the connection to the future layout.



Canadian Pacific RS-10 8576 passes the modest enginehouse at Woodbury with three loaded wood-chip hoppers from the Buck Lake chipper.



Modeling the period from late fall through early spring requires bare trees. Mike uses natural materials to make trees and ground cover.

//Setting the stage

My scenario assumes that a new electric utility, Northeast Kingdom Power (NEKP), was formed in the mid-1970s to service the northern tier of Vermont. A subsidiary of New England Electric Service (a real company), NEKP operates three wood-fired power plants in the area. Two of these plants actually exist and burn wood chips.

In my model world, NEKP is in the process of securing a steady supply of wood chips. The utility contracts with a new short line, a Boston & Maine spin-off, to switch the old B&M terminal at Woodsville, N.H. There actually was a fairly substantial wood chip operation here as recently as the late 1960s. The B&M had a fleet of special 40-foot wood chip hoppers in captive service with "Woodsville – Local Wood Chip Loading" lettering. The chips were primarily forwarded to paper mills at Berlin and Groveton.

I've assumed this operation restarted and, in cooperation with the B&M, a new terminal road called Woodsville Terminal has been formed. It's the first of two freelanced operations planned for my model railroad.

Power for the new line is a pair of ex-B&M Alco switchers, still in B&M paint but lettered for Woodsville Terminal. The railroad switches the chip loader, makes up a unit chip train, supplies crews, and provides and maintains power as part of its agreement with NEKP. The former B&M diesel house at Woodsville serves as base of operations.

Concurrently, Northeast Kingdom Power secures a fleet of refurbished wood chip hoppers (40-foot cars from the old B&M captive fleet) to be used on a unit chip train bound for their largest plant at Burlington, Vt. (In real life, this plant received a unit chip train from the Central Vermont, now the New England Central.) The hoppers have been refurbished and painted in an austere basic black with NEKP's pine tree/lightning bolt company logo.

Woodsville Terminal supplies the road power: a trio of leased Canadian Pacific Montreal Locomotive Works (Alco's Canadian subsidiary) RS-10s and an A-B set of decrepit B&M F7s. In 1978, CP actually was leasing some of its RS-10s and RS-3s to neighboring Delaware & Hudson and the B&M's last Fs had just been retired.

From a prototypical standpoint, it made sense to lease what would likely have been available, and cheap, at the time. In my view, this is a critical prototypical element, the sort of thing that makes the freelanced railroad believable. There are no fancy paint schemes on the power here; this is '70s subsistence shortline railroading.

The caboose-less loaded unit chip train originates in the terminal at Woodsville, crosses the Connecticut River to Wells River, Vt., and then uses trackage rights over Canadian Pacific north to St. Johnsbury. From there it continues 96 miles west over the LVRC and is interchanged to the Central Vermont for forwarding to NEKP's generating station at Burlington, Vt.

As it traverses the LVRC, the chip train approaches Granite Junction, 40 miles west of St. Johnsbury on the modeled portion of the Lamoille Valley RR. Here the old Hardwick & Woodbury spur branched off, and it's here that my freelanced "afterthought" comes to life.

The Hardwick & Woodbury spur is a short remnant of a nine-mile branch to Woodbury, Vt., which served the granite industry here many years ago. This was the old Hardwick & Woodbury RR, ripped up in the 1940s.

The railroads serving Vermont's "Northeast Kingdom" provided a rich source of inspiration. Ben Bachman photo

Another opportunity to freelance within the prototype setting was staring me in the face. What if the tracks hadn't been pulled up but rather sat rusting for decades until a new power plant and a wood-products company were located at the end of the branch in the mid-'70s?

In my scenario, with a cooperative effort between the state and power company, the railroad was repaired and returned to service. Several candidates presented bids, and Woodsville Terminal RR was selected. After necessary rehabilitation of the track, WT began operating the railroad as its Hardwick & Woodbury Division.

The short line serves the new power plant by shuttling wood chips from the Buck Lake Forest Products Co. chipper. Chips are also shipped, via rail, nine miles to Granite Junction for interchange to the Northeast Kingdom Power unit chip train, which makes a daily run. In addition to the two sources of chips, a Timber Resources Group log yard (an actual company) ships hardwood logs in CPR gondolas to off-line companies: Columbia Forest Products Veneer Division in Presque Isle, Maine, and Megantic Manufacturing in Megantic, Quebec, Canada. These moves are based on traffic over the CPR in the '70s. Finally, additional hardwood logs from Timber Resource Group are shipped up the branch to the A. Linoge & Sons Lumber Co. sawmill. The logs are finished into furniture-grade lumber, which is then loaded in CPR 40-foot double-door boxcars and interchanged to the LVRC for forwarding to Ethan Allen Furniture Co. manufacturing plants in Orleans and Beecher Falls, Vt. (again, actual companies). A reverse move of waste wood and slabs from A. Linoge & Sons travels back to Buck Lake Forest Products to be chipped, and the cycle continues.

An additional customer at Woodbury is a local mom-and-pop grain dealership that regularly receives a shipment of bagged grain in a 40-foot boxcar.

To emphasize the '70s shortline character of the H&W Division, power and structures are modest. Another former B&M switcher alternates with one of the CPR RS-10s as the assigned "Woodbury switcher."

In addition to the NEKP chip hopper fleet, WT has a small group of 40-foot flatcars with stakes for slab service, as well as 40-foot bulkhead flats for log transport. Boxcars and gondolas from CPR are available as needed for off-line log and lumber transport. – *M.C.*

strong motivation to strictly model a prototype or region, the entrepreneur in me won't be silenced.

Over the years, I've built various incarnations of my own freelanced railroad set within Vermont's "Northeast Kingdom." However, my efforts lacked focus and the layout's weren't believable. As my interest grew in prototype modeling, so did my desire to build a plausible freelanced railroad.

What follows is the story of how I came to build the Woodsville Terminal RR's Hardwick & Woodbury Division, an unplanned 1 x 16-foot afterthought.

Size isn't everything

The Hardwick & Woodbury Division is in a hallway isolated from the 21 x 53-foot layout room. Access through the wall to reach Granite Junction and the outside world is provided through a rock cut. The track plan is simple, a three-track yard with the main line coming out of the cut and entering this out-in-the-woods section of Woodbury. A wood chipper, a commercial power plant, H&W enginehouse, and a log yard are all located here.

Despite the modest size of this part of the layout, the railroad looks large, especially in photographs. The key is the backdrop. I took landscape photos in the actual area in Vermont as it looked in April. I had three images scanned (at 300 dots per inch), appropriately sized and printed, and then fastened to the wall in a series. I had some printed in reverse to avoid noticeable repetition. The resulting high-resolution photo backdrop provides remarkable depth, giving the feeling of being out in the evergreen woods of the Northeast Kingdom.

This method goes counter to some who prefer a low-resolution or abstractly painted backdrop that plays second fiddle to the rest of the railroad. In my case, the backdrop takes center stage, simply because it looks real.

//The layout at a glance

Name: The Hardwick & Woodbury Division of the Woodsville Terminal RR
Scale: HO (1:87)
Size: 1 x 16 feet
Theme: freelanced short line
Locale: Vermont
Era: spring 1978
Style: shelf
Mainline run: 16 feet
Minimum radius: 24"
Minimum turnout: no. 6
Maximum grade: none
Benchwork: 1 x 4 grid with ⅜" plywood top
Height: 51"
Roadbed: cork
Track: Micro Engineering codes 55 and 70
Scenery: plaster gauze wrap covered with Celluclay, vermiculite, white glue and brown latex paint mixture
Backdrop: photo backdrop on painted drywall
Control: Digitrax Empire Builder Digital Command Control (DCC)

A Montreal Locomotive Works RS-10 in CP Rail paint pokes its nose out of the enginehouse at Woodbury, Vt. Inches behind the building is the digital photo backdrop.

Woodsville Terminal RR Hardwick & Woodbury Division, April 1978

HO scale (1:87.1)
Size of layout: 1'-0" x 16'-0"
Scale of plan: ½" = 1'-0", 12" grid
24" minimum radius

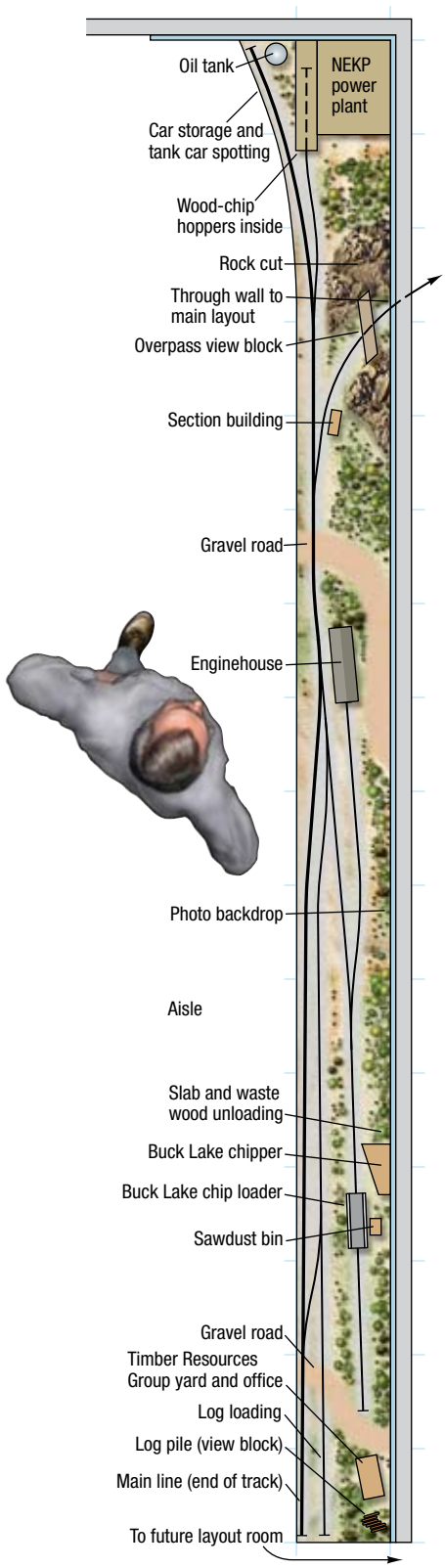


Illustration Theo Cobb

//A day on the H&W Division

The sun is beginning to rise as the two-man crew reports at 6 a.m. on April 16, 1978. The thermometer reads 22 degrees. It sure doesn't feel like spring.

Inside the house, veteran Canadian Pacific RS-10 no. 8576 rumbles away, its Alco 244-series diesel engine gasping and wheezing its familiar song. After a quick check of the power, the crew climbs aboard and exits the house, heading into the modest Woodbury Yard and down to the Buck Lake Forest Products chip loader.

Three chip hoppers are loaded and ready to go. The locomotive pulls the cars, then runs around the cars and shoves them into the power plant. Then three empties are pulled from the plant and spotted back under the loader.

Two CPR gondolas loaded with veneer logs are ready at the Timber Resources Group (TRG) log yard. The gons are destined for the LVRC interchange at Granite Junction. The crew grabs these cars as well as an empty slab flat from Buck Lake and two loaded log flats from TRG, then heads for the engine shop/office.

With paperwork in hand, the crew climbs aboard, and five-car Work Extra 8576 South leaves in a cloud of smoke, white flags snapping in the brisk April air. The train enters a cut on the outskirts of town and disappears from view.

About an hour later, the crew arrives at the A. Linoge & Sons Lumber Co. at Hardwick. Here, the crew drops the log flats and empty slab car on the siding and lifts a Canadian Pacific 40-foot double-door boxcar loaded with furniture-grade hardwood. The old locomotive and its three-car train head up the final two miles to Granite Junction for a meet with Lamoille Valley's daily Morrisville to St. Johnsbury freight MJ-2, powered today by bright yellow ex-Delaware & Hudson RS-3s.

The crew next hands over the veneer logs and boxcar to the LVRC for forwarding to St. Johnsbury and lifts the previous day's LVRC westbound JM-1 interchange cars – two empty log gons, an empty boxcar, and an empty covered hopper for fly ash loading at the Woodbury power plant. The 8576 then runs around its train and departs.

Next is a quick stop at A. Linoge & Sons in Hardwick to set off the empty lumber box dropped by LVRC and to pick up a pair of empty log flats, a loaded slab flat, and a flat loaded with tree-length logs not suitable for sawing that will be forwarded to Buck Lake for chipping.

At 11 a.m., Work Extra 8576 North leaves Hardwick and arrives back in Woodbury at noon. After lunch, the crew begins spotting cars brought over from Hardwick and Granite Junction. They spot the loads of slabs and waste wood at the chipper, the empty log gons at TRG, and the empty fly ash car at the power plant.

The empty chip cars spotted at the Buck Lake chipper are now loaded and ready to move. The train is once again destined for Granite Junction, this time for a rendezvous with Northeast Kingdom Power's loaded chip train.

What a great day to be at Granite Junction! With the chaotic chant of Alco diesel engines and the drone of EMD 567s all converging on this sleepy junction in northern Vermont, it's a railfan's dream. Or is it just a modeler's dream? Or a little bit of both?

After the meet and with the chip train on the move again, Extra 8576 departs Granite Junction and heads for home, arriving Woodbury at 5:30 p.m., just shy of the crew's hours-of-service limit. After tucking the engine in the barn, the crew books off and heads home. Another day on the H&W Division has come to an end. – *M.C.*

Mike can lay track straight when he wants to, but he deliberately depicted the effects of no track maintenance during the years this branch line lay unused. Slow speeds also help to effectively lengthen the branch.

Modeling the "fifth season"

I can recall only a few modelers who have attempted to model early spring. The tendency is to model summer, fall, or even winter. I took a different path.

The idea of modeling what Vermonter's refer to as "mud" or "fifth" season came from a combination of influences. First, the look of early spring between very late March and mid- to late-April has a strong regional feel. The yellow matted grass, mud, and patches of snow and ice, along with dark evergreens, swollen rivers, and bare deciduous trees, make for some dramatic scenery that just shouts northern New England.

I've long admired Jack Ozanich for tackling this season on his stellar Atlantic Great Eastern [see *Great Model Railroads 2005. – Ed.*]. And I was inspired by the look of Paul Dolkos's bare trees on his Boston & Maine layout, although Paul models November, which requires a different approach.

I found Lou Sassi's "ground goop" scenic base technique to be very effective, along with his idea of using ground-up leaves for the forest floor. These great modelers laid the groundwork for me to tackle my fifth-season layout.

Except for the enginehouse (a Laserkit from American Model Builders) and the power plant (a Walthers Tri-State Power Authority kit built with extensive modifications by Leo Landry), I scratchbuilt the structures from styrene.

I extensively weathered and detailed all my freight cars and locomotives. The RS-10s are Life-Like Proto 1000 models with added detail. The S-3 is a Proto 2000. The F7s are Athearn Genesis models.

I used Micro Engineering code 55 and 70 flextrack and installed no. 6 turnouts. All turnouts are hand-operated; Details West targets add a realistic look. The Alco RS-10s and EMD F7s are equipped with SoundTraxx sound decoders.

Running the railroad

You might think that a foot-wide railroad that's only the length of two sheets of plywood wouldn't provide much operation. But despite its small size, the H&W Division provides hours of enjoyment for a crew of two. See the sidebar, "A day on the H&W Division," on the facing page.

This plan could fit into almost any room by bending it into an L or U shape. I hope it inspires those of you who don't have much space to try your hand at prototype based, model railroading. **MRP**

//Learning points

- Combining prototype-based freelancing with prototype modeling can satisfy two competing interests.
- An abandoned railroad may provide the basis for a freelanced short line.
- Modeling actual industries and locations can add plausibility to a freelanced railroad.
- Modeling something "off the beaten path," such as mud season in New England, may prove inspirational.
- A small railroad can become part of a larger layout later on.

Mike Confalone is a model railroader, avid railfan, and publisher of Railroad Explorer *magazine. He's also published the books,* Delaware & Hudson Passenger Trains, the Final Decade*;* Alcos Northeast; *and* Rails Across New England (Vol. 1). *Mike, wife Susan, and son Thomas reside in Goffstown, N.H. He thanks Leo Landry, Tim Stevens, and Tim and Justin Franz for their enthusiastic support.*

//On our Web site

For a video showing how Mike operates at slow speeds, visit www.modelrailroader.com

Ex-Boston & Maine wood-chip hoppers were employed when the Northeast Kingdom Power plant opened in Woodbury; some have had the B&M herald painted over in favor of the NEKP pine-tree logo.

Will the turnouts fit?

Trackwork "penciled in" may not fit the space

Turnouts are important parts of any layout, but they must be carefully planned to avoid crowding and provide smooth transitions for good operation.

By Paul J. Dolkos//Photos by the author

For some time, *Model Railroad Planning* has extolled the virtues of using computer-aided-design (CAD) programs to plan a layout. But most of us still do our track planning with pencil and paper.

The problem with pencil pushing is that its inherent flexibility allows us to create all manner of improbable track configurations. Turnouts are usually the elements that make penciled layout ideas difficult or impractical to translate into a model railroad. We seldom allow enough length for the turnouts in a yard ladder, or we draw a diverging route with an angle that's too sharp.

Turnout dimensions

One way to avoid these problems is to factor basic turnout measurements into your initial musings. To that end, this article includes a table listing the basic dimensions of a sampling of today's commercial turnouts.

You may also want to review the National Model Railroad Association's Recommended Practice RP-12 for comprehensive information on turnouts in all scales at www .nmra.org/standards/rp12 .html. Since RP-12 isn't a standard, it's followed in only a general way by manufacturers trying to satisfy the needs of scale modelers and train set buyers, so dimensions vary accordingly.

Many of these turnout variations – such as the distance or "lead" between the points and frog – are subtle. While they may make the turnout better suited for certain track configurations, these variations generally don't affect operation. However, the track gauge and guardrail clearances are critical to smooth operation, and they're covered by Standard S-3. See Jim Hediger's "Track buyer's guide" in the October, November, and December 2003 issues of *Model Railroader.*

Table dimensions

The chart lists eight measurements for each turnout, starting with the frog angle and curved-leg radius; the others are defined as follows:

Dimension Q is the distance from the points to the intersection of the track center lines.

Dimension L refers to the lead or distance from the switch point to the point of the frog.

Dimension L+ is the minimum track length that a given turnout can occupy. It's measured from the sharp end of the switch points to the back of the frog wing rails plus a bit of rail length on each end for rail joiners. Note that the sectional-track turnouts are modular (they're designed to fit in place of other matching sectional-track components). They can be shortened, but at the cost of modular sizing, so no L+ dimension is specified.

Dimension P is the length of the extended straight track section ahead of the points.

Dimension S, the overall length of the straight leg, is the maximum track space that a specific turnout occupies. But this includes additional rail lengths at both ends that can often be shortened to allow turnouts to be spaced closer together. See dimension L+.

Dimension C is the overall length of the turnout's curved leg measured in a straight line.

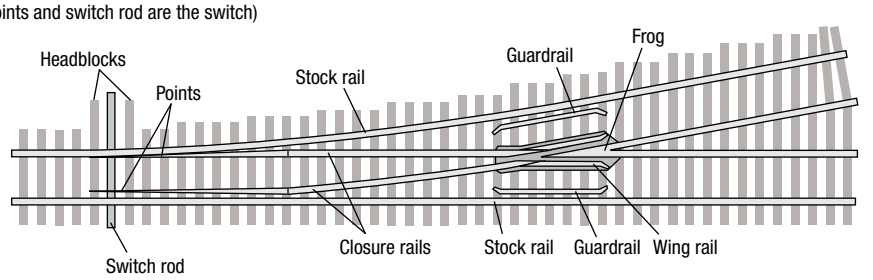
Turnout terminology

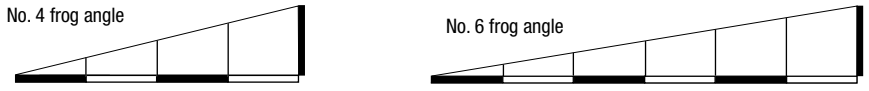
The terms "turnout" and "switch" are often used interchangeably in the hobby. Properly speaking, turnout refers to the entire assembly – points, frog, guardrails, stock and closure rails, and everything else. Switch refers only to the movable point rails that establish the routing. On the prototype, crews "line switches," which is correct terminology, since the switch is the movable part of the turnout they are normally concerned with.

Commercial turnouts are commonly offered as nos. 4 or 6, less frequently as no. 8, and Walthers catalogs a no. 10. The number refers to the frog angle: A turnout with a route that diverges 1 unit by the time a wheel has rolled 6 units from the tip of the frog is a no. 6 turnout. The lower the number, the sharper the angle of the diverging track; no. 4 is sharper than no. 6.

Some manufacturers' offerings – Peco's small-, medium-, and large-radius turnouts, for example – have frog angles that fall in between these typical sizes. Some have curved rail running through the frog, providing a gentler diversion in less space. (Prototype turnouts in North America usually have straight rails through both sides of a frog so that the trucks are not trying to pivot as they pass through the frog.) There are also situations where wye (both routes diverge equally) or curved turnouts (not covered here), provide alternatives to create the desired track arrangement in a given space.

TURNOUT PARTS
(Points and switch rod are the switch)





Illustrations by Rick Johnson

Using photocopies of turnouts and actual track sections, track arrangements can easily be assembled on the floor or on cardboard or plywood sheets laid on the benchwork. A floor covered with 12" square tiles makes a ready reference to determine exactly how much space is required for each arrangement.

Better-looking track

Compared to the prototype, the curvature in most model railroad turnouts is quite sharp, and some may limit the operation of long-wheelbase equipment. Other than on an interurban, streetcar, or light-rail transit system, you'll seldom find a prototype no. 4 turnout, and then probably only on industrial trackage. Even no. 6s are relatively rare.

Railroad industry recommendations in the 1940s called for the use of no. 8s for sidings and yards, nos. 10 or 12 for low-speed mainline movements, and nos. 16 to 20 for high-speed movements. The maximum train speed permitted through most prototype turnouts is about double the frog number.

For better-looking track, it's therefore good practice to use small-angle (high-number) turnouts whenever possible, especially on the main line. It's also a good idea to try to operate, pushing and pulling, the longest cars and locomotives you plan to use through several turnouts of the frog number you're thinking of using in your layout.

Of course, the size of your available layout space often limits the turnout size, which is why no. 4s appear frequently on model railroads. But as you plot your track arrangements, try to substitute longer no. 5s or, better yet, 6s for 4s and 8s for 6s. This is doubly true for crossovers, which involve S-curves that can create operating problems. You'll give up some siding length, but changing to a larger angle will noticeably improve the appearance of your track. Trains will also look and perform better gliding through the broader turnouts since the trucks and couplers aren't being forced to their limits.

There's no substitute for smoothly flowing trackwork. Sight down the track and make sure that the back-to-back turnout alignment is straight and not kinked in an effort to create a greater or lesser diverging angle.

Design alternatives

Number 4s are often used on yard ladders to gain extra length on the body tracks by reducing the length of the ladder. Not only does the appearance suffer but the use of long-wheelbase locomotives may also be restricted on the ladder because of the sharp turnout angle. An alternative is to use no. 6s and create short, gentle curves beyond the frog on the diverging tracks.

This may require some slight shifting of the diverging rails to avoid kinks, but it permits building the ladder on a sharper angle – for instance, 11½ degrees instead of the normal 9½ degrees of a no. 6 turnout used in a straight ladder configuration. In HO, body-track length increases by more than an actual foot. This is explained in detail in Andy Sperandeo's book, *The Model Railroader's Guide to Freight Yards* (Kalmbach).

COMMERCIAL TURNOUT DIMENSIONS

TURNOUT	FROG	CURVED LEG	Q	L	L+	P	S	C	COMMENTS	MANUF. ITEM NO.
N SCALE	Angle	Radius **	Dimensions in inches							
Atlas N, code 55, no. 5	11 deg		1 1/8	3	3 1/4	1 23/32	6	6		2050
Atlas N, code 55, no. 7	7 deg		1 3/16	3 9/16	4 5/8	9/16	6	6		2052
Atlas Standard N Line, code 80, standard*	13 deg	19	1 1/2	3 1/4	4	1 1/16	4 7/8	4 7/8	Manual switch throw	2702
Atlas Custom N Line, code 80, standard*	13 deg	19	1 1/2	3 1/4	4	1 1/16	4 7/8	4 7/8	No above table machine	2750
Atlas Custom N Line, code 80 no. 6	9 d 3'		1 3/8	3 7/16	4 1/2	1 1/16	6 1/16	6 1/16		2752
Bachmann E-Z Track*, code 75	15 d 30'	11 1/4	1 5/16	2 7/16	n/a	1	6 5/16	6 1/4	Roadbed & switch machine	44861
Kato Unitrack, no. 4*, code 80	12 d 30'	19	1 3/4	3 1/4	n/a	7/8	4 15/16	4 7/8	Roadbed & switch machine	20-222
Kato Unitrack, no 6*, code 80	11 deg	28 1/4	2 1/2	3 11/16	n/a	7/8	7 5/16	7 5/16	Roadbed & switch machine	20-202
Micro Engineering N, code 70, no. 6	9 d 30'		1 1/2	3 3/8	4 3/8	7/16	5 15/16	5 15/16	Sprung points	15-405
Peco Setrack, code 80, 9" radius*	22 d 30'	9	1 9/16	2 1/4	3 1/16	5/16	3 7/16	3 7/16	Sprung points	ST-6
Peco Streamline, code 80, medium radius*	14 deg	18	1 7/8	3 5/16	4 1/8	1 3/16	4 7/8	4 13/16	Sprung points	SL-396
Peco Streamline, code 80, large radius*	8 deg	36	2 3/16	4 3/8	5 5/8	1 3/16	6 1/4	6 1/4	Sprung points	SL-389
Shinohara N, code 70, no. 4	13 deg		1 1/8	2 11/16	4	5/16	5 3/8	5 5/16		669-601
Shinohara N, code 70, no. 6	9 d 30'		1 3/8	3 1/2	4 3/4	5/8	7	6 7/8		669-603
S SCALE										
S Helper Service, code 155, no. 3*	19 deg		2 1/8	4 11/16	n/a	5/8	10	9 9/16	Roadbed & manual switch throw	641-464
S Helper Service, code 110, no. 6	9 d 30'		3 3/16	8 9/16	11 1/2	3 15/16	17 1/4	17	On cork roadbed	641-1215
S Helper Service, code 110, no. 8	7 deg		4 5/8	10 7/8	14	3 3/8	20	20	On cork roadbed	641-1217
O SCALE										
Atlas O, code 148, no. 5	11 deg		5	11 5/8	14 3/4	3 1/2	20	20		151-7024
Atlas O, code 148, no. 7 1/2	6 d 30'		7 3/4	16 1/4	20 1/2	1	24 1/2	24 1/2		151-7021
Peco Streamline O, code 124, 6-foot radius	7 deg	72	3 13/16	13	15 1/4	1 1/4	16 3/8	16 3/8	British style details, bullhead rail	SL-E792BH
Peco Streamline O, code 143, medium radius, no. 7.25	7 deg	72	2 7/8	12 7/8	15 1/8	1 3/16	16 1/4	16 1/8	Sprung points	SL-E792FB

Trackwork mock-ups

After preparing your layout plans on paper, or even before, you can validate turnout arrangements ahead of time by arranging the actual turnouts and pieces of track on the floor, or on plywood or cardboard sheets laid on top of the benchwork. Make numerous photocopies of left- and right-hand turnouts, then arrange and tape them into the various configurations you're test fitting. Even when I handlaid my own turnouts, I used photocopies to help establish the placement of each component.

Another technique is to use the ¾"-scale trackwork templates printed in the track section of the Walthers HO catalog. They're a bit small to work with, but they work well as a sanity check with initial plans. They could also be photocopied and enlarged to, say, 200 percent (1½" scale).

Measure twice, cut once!

Prior to installing turnouts, it's a good idea to measure the gauge and alignment with an NMRA standards gauge. Sometimes the depth of the frog and guardrail flangeways needs to be increased. The frog casting may sit slightly high, causing wheels to rise and lose electrical contact on a dead frog; if an engine stalls, don't assume it's due to a dead (unpowered) frog until you check for this. Filing will usually correct such problems.

And remember that when locating turnouts, you'll often find that the rail length ahead of the points and beyond the frog is longer than necessary for a specific arrangement. It's easy to trim the excess length with rail cutters to make everything fit as it should, and a few file strokes will clean up any burrs.

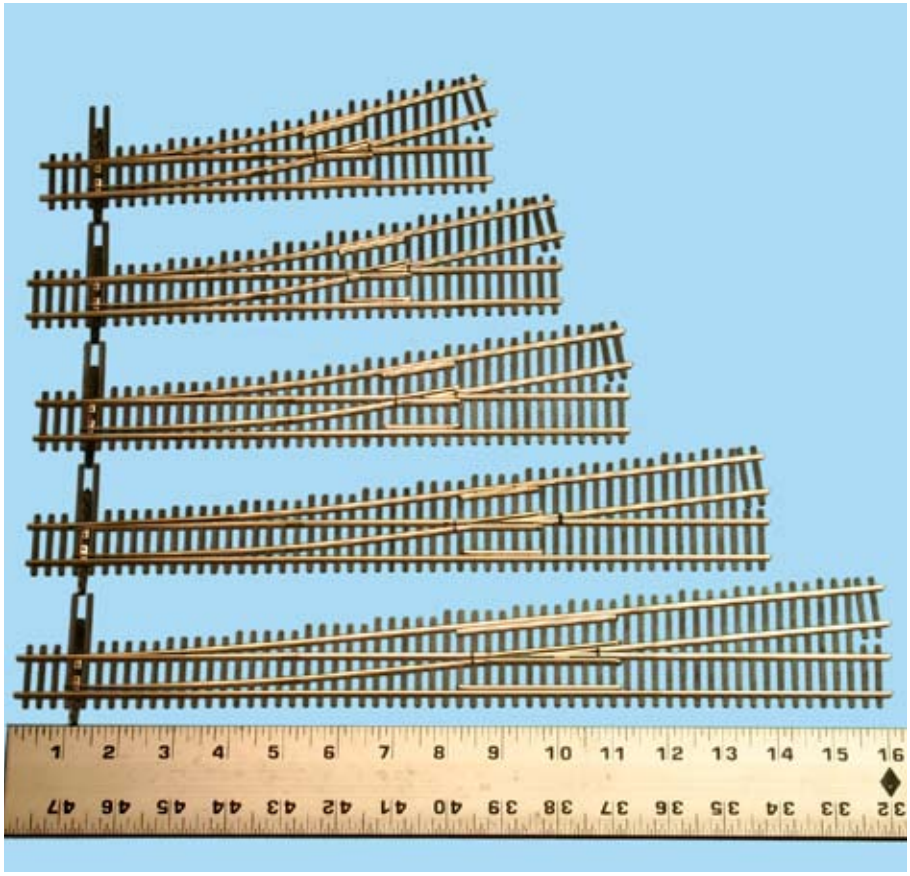
A crossover (butted-together pair of turnouts between two tracks) often calls for some rail trimming; occasionally, short pieces of rail may need to be

TURNOUT	FROG	CURVED LEG	Q	L	L+	P	S	C	COMMENTS	MANUF. ITEM NO.
HO SCALE	Angle	Radius**	Dimensions in inches							
Atlas True-Track, code 83, Snap-Switch	17 deg	18	3 3/16	5 5/16	n/a	1 13/16	9	10 5/8	Roadbed & switch machine	480
Atlas, code 83, Snap-Switch	16 d 30'	18	3 3/16	5 5/16	6 3/8	1 13/16	9	7 5/8	Manual switch throw	542
Atlas Custom-Line, code 83, no. 4	12 d 50'		2 1/2	5 5/8	6 3/4	1	9	7 15/16		561
Atlas Custom-Line, code 83, no. 6	9 d 30'		3 3/16	7 1/16	8 3/8	1	12	9 15/16		563
Atlas Super-Track, code 83, no. 6	9 d 30'		3 1/16	6 5/8	8	1	11 9/16	11 9/16		505
Atlas Custom Line Mark IV, code 83, no. 8	6 d 20'		4 5/16	8 3/4	11 1/4	1	13 1/2	12 3/16		566
Bachmann E-Z Track, code 100, sectional*	18 deg	18	1 5/8	4	n/a	2 1/4	9	10 7/16	Roadbed & switch machine	44561
Bachmann E-Z Track, code 100, no. 5	11 d 30'		2 3/4	5 1/2	n/a	1 5/16	11 7/16	11 5/16	Roadbed & switch machine	44565
Kato Unitrack, 19.25 radius*, code 83	17 deg	19 1/4	2 1/16	4 1/2	n/a	13/16	9 11/16	7 1/2	Roadbed & manual switch throw	2-840
Kato Unitrack, no. 4*, code 83	16 deg	21 5/8	2	4 1/2	n/a	13/16	7 1/4	7 1/16	Roadbed & switch machine	2-850
Kato Unitrack, no. 6, code 83	9 d 30'	34 1/8	2 1/2	6	n/a	3/4	13 1/2	13 1/2	Roadbed & manual switch throw	2-862
Life-Like, code 100, sectional*	15 deg	18	2 3/4	5 5/8	7 1/4	1 3/16	9	7 3/8	Electric switch machine	8610
Life-Like Power Loc, code 100, sectional*	17 deg	18	1 3/4	4 1/4	n/a	5/8	9 1/8	8 15/16	Roadbed & switch machine	21336
Micro Engineering, code 70, no. 6	9 d 30'		2 7/8	6 3/8	7 5/8	1	10 13/16	10 9/16	Sprung points	14-805
Micro Engineering, code 83, no. 6	9 d 30'		2 7/8	6 3/8	7 5/8	1	10 13/16	10 9/16	Sprung points	14-705
Model Power, code 100, sectional*	15 deg	18	3 3/8	5 5/8	7	1 3/16	9	7 3/8	Electric switch machine	L-5044
Model Power, code 100, no. 6	9 d 30'		3 3/16	6 13/16	8 3/8	1 1/8	12	10	Electric switch machine	170
Peco Streamline, code 83, no. 5	10 d 30'		2 7/16	5 11/16	6 7/8	7/8	8 1/4	8 1/4	Sprung points	SL-8352
Peco Streamline, code 83, no. 6	9 d 30'		2 1/2	6 5/16	7 5/8	7/8	9 3/16	9 3/16	Sprung points	SL-8362
Peco Streamline, code 83, no. 8	6d 30'		3 1/2	9 1/16	10 1/2	7/8	12 11/16	12 5/8	Sprung points	SL-8382
Peco Streamline, code 100, small-radius*	10 deg	24	2 1/8	4 13/16	6 1/2	7/8	7 1/4	7 3/16	Sprung points	SL-92
Peco Streamline, code 100, medium-radius*	10 deg	36	3 1/16	6 1/16	7 1/2	13/16	8 5/8	8 1/2	Sprung points	SL-96
Peco Streamline, code 100, large-radius*	10 deg	60	4 3/8	7 1/4	9 1/4	7/8	10 3/16	10 1/16	Sprung points	SL-89
Shinohara, code 70, no. 4	13 d 30'		2 7/32	5	6 1/2	1 1/8	9 9/16	9 7/16		669-301
Shinohara, code 70, no. 6	9 d 30'		2 1/8	6 1/8	7 1/2	1 1/16	10 7/8	10 13/16		669-303
Shinohara, code 100, no. 4	14 d 15'		2 5/16	5	6 1/2	1 1/4	9 1/2	9 1/2		669-101
Shinohara, code 100, no. 5	11 deg		2 9/16	5 13/16	7 1/4	1 1/4	11	11		669-191
Shinohara, code 100, no. 6	9 d 30'		2 5/8	6 1/2	8	1 15/16	11 13/16	11 3/4		669-104
Shinohara, code 100, no. 8	6 d 20'		4 1/8	8 7/8	10 1/2	1	14 3/4	14 3/4		669-105
Walthers, code 83, no. 4	13 d 20'		1 1/2	5	6 1/2	15/16	8 7/8	8 15/16		948-8801
Walthers, code 83, no. 5	11 deg		2 1/2	5 5/8	7	1 1/8	10 5/16	10 5/16		948-8891
Walthers, code 83, no. 6	9 d 30'		2 3/4	6 1/2	8	7/8	11 5/16	11 5/16		948-8803
Walthers, code 83, no. 8	6 d 20'		2 7/16	8	10	7/8	13 7/8	13 7/8		948-8805
Walthers, code 83, no. 10	5 d 20'		1 5/16	8 9/16	11	15/16	16 1/8	16 1/8		948-8884

LEGEND
Q: Distance from switch point to intersection of center lines
L: Lead, distance from switch point to point of frog
L+: Minimum length that turnout can be trimmed to allow next turnout to be installed
P: Straight section ahead of points
S: Overall length of straight leg of turnout
C: Overall length of curved leg of turnout (measured as a straight line)

* Diverging rail curves through frog.
** The curved leg is usually not a constant radius. With the exception of no. 4 turnouts, it's generally greater than the minimum radius of most layout curves. For example, the typical curved closure rail radius in HO turnouts is: no. 4, 15"; no. 5, 26"; no. 6, 43"; no. 7, 49"; no. 8, 67"; no. 10, 117" (per NMRA RP-12). A radius is specified in the table for sectional track turnouts which normally matches curved track sections or when specified by the manufacturer.

Dimensions may change due to product revisions and production variations.



Here's a comparison of turnout sizes using Walthers code 83 (from the top) nos. 4, 5, 6, 8, and 10 HO turnouts. Modelers tend to use the three smaller sizes, although even the three larger sizes are still quite sharp for full-size railroads.

inserted. Many times the track on the diverging turnout leg is too long or too short to fit two turnouts back to back while achieving the desired track spacing. If you have to trim the rails, mark the cutting points by scoring the top surface with a hobby knife. Definitely measure twice and cut once! A flat file is also handy to remove small amounts of rail and smooth the joints.

Inserting a short piece of rail requires laying down a few ties to fill the gap and then spiking or gluing down the rail insert. If the rail gap to be filled is extremely short, consider shortening the turnout's diverging rails so a longer piece can be inserted.

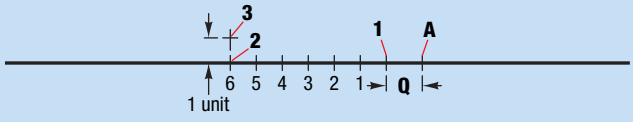
Ensuring success

I hope the chart, photos, and tips provided here will help you get your trains running more quickly and more smoothly. Your number-one tool in this regard is your eyeball. If close inspection of the track connected to all three ends of a turnout shows that it's properly aligned, both vertically and horizontally, you should be pleased with the turnout's performance. **MRP**

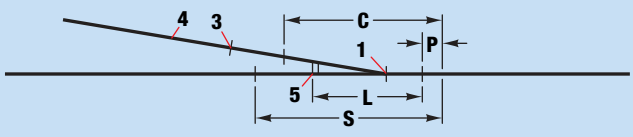
Paul Dolkos, a regular contributor to MRP since the inaugural 1995 issue, models the Boston & Maine in the transition era in HO scale.

//Laying out turnouts on track plans-I

To lay out a turnout at a given location on a tangent, points to be at A:



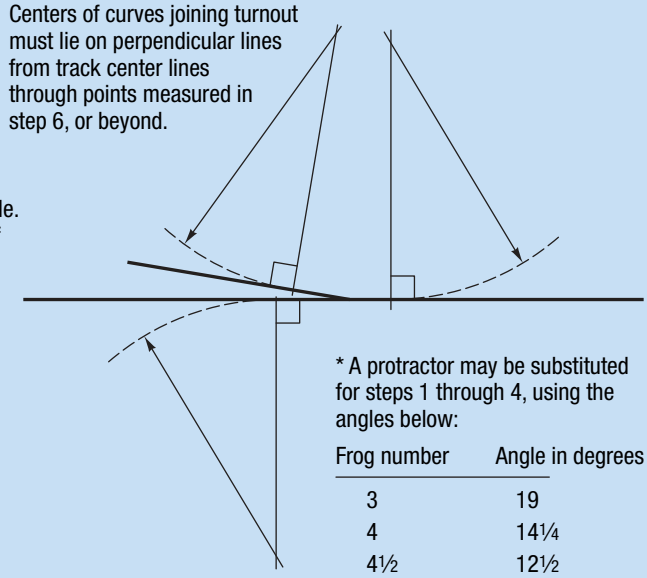
1. *Measure point-to-intersection distance Q from "Turnout dimensions" table.
2. *Measure number of units equal to turnout frog number – units may be of any convenient length.
3. *Draw perpendicular and measure one unit.†
4. *Draw line through points 1 and 3.
5. Measure length L from "Turnout dimensions" table – this locates frog.



6. Measure distance P, then S, and then C for turnout type (NMRA, kit, or ready-to-use). This locates rail joints or other points at which curved track can join turnout.

† For equilateral or wye turnout, measure ½ unit on each side of straight center line.

Centers of curves joining turnout must lie on perpendicular lines from track center lines through points measured in step 6, or beyond.



* A protractor may be substituted for steps 1 through 4, using the angles below:

Frog number	Angle in degrees
3	19
4	14¼
4½	12½
5	11½
6	9½
8	7⅙

Today's modelers have more choices of ready-to-use turnouts in more sizes than ever before.

//Accuracy makes track plans more reliable

The layout instructions on these pages show the proper way to position and draw turnouts on a track plan. Accuracy is important here, especially in using the proper angles and dimensions for turnouts. Be especially careful to avoid crowding the turnouts as you draw them, so tracklaying can proceed without difficulty.

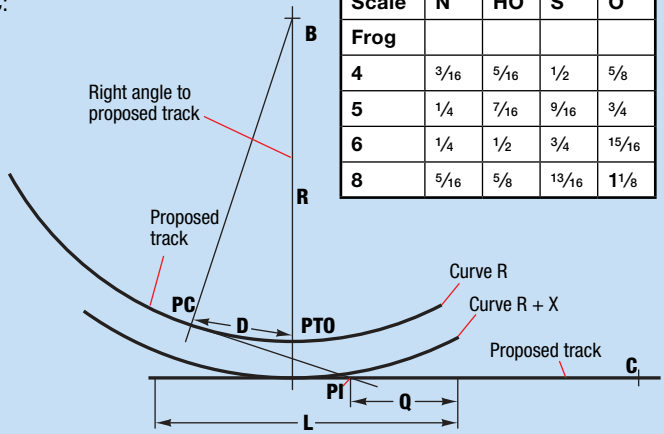
Don't be afraid to mix commercial turnout brands as they offer a wide range of variations that can be used to handle specific situations. The trick here is to make sure each turnout is drawn accurately to maintain a smooth flow for the wheels. It's also a good idea to do these plans in pencil so you can change them as you go. – *Jim Hediger*

//Laying out turnouts on track plans-2

To join a curve to a tangent through a turnout at a given location on a tangent, with the center of the curve at B and tangent to pass through C:

1. Draw curve center lines of radii R and R + X
2. Draw tangent from C to join curve R + X.
3. Draw right angle from tangent to B – this locates the point of tangent offset PTO.
4. Measure distance D equal to radius R divided by the frog number – this locates the point of curvature PC. Draw line from B to PC.
5. Draw line from PC perpendicular to B-PC – where this crosses tangent is the point of intersection PI.
6. Measure distances Q and L to each side of PI to locate point and frog of turnout.

Offset X in inches				
Scale	N	HO	S	O
Frog				
4	3/16	5/16	1/2	5/8
5	1/4	7/16	9/16	3/4
6	1/4	1/2	3/4	15/16
8	5/16	5/8	13/16	1 1/8



The East Spokane Local pounds the diamond at NP Crossing on Dave Clemens' 14 x 18-foot HO scale Idaho-Montana Ry. & Navigation Co.

Spokane to the Palouse Plateau

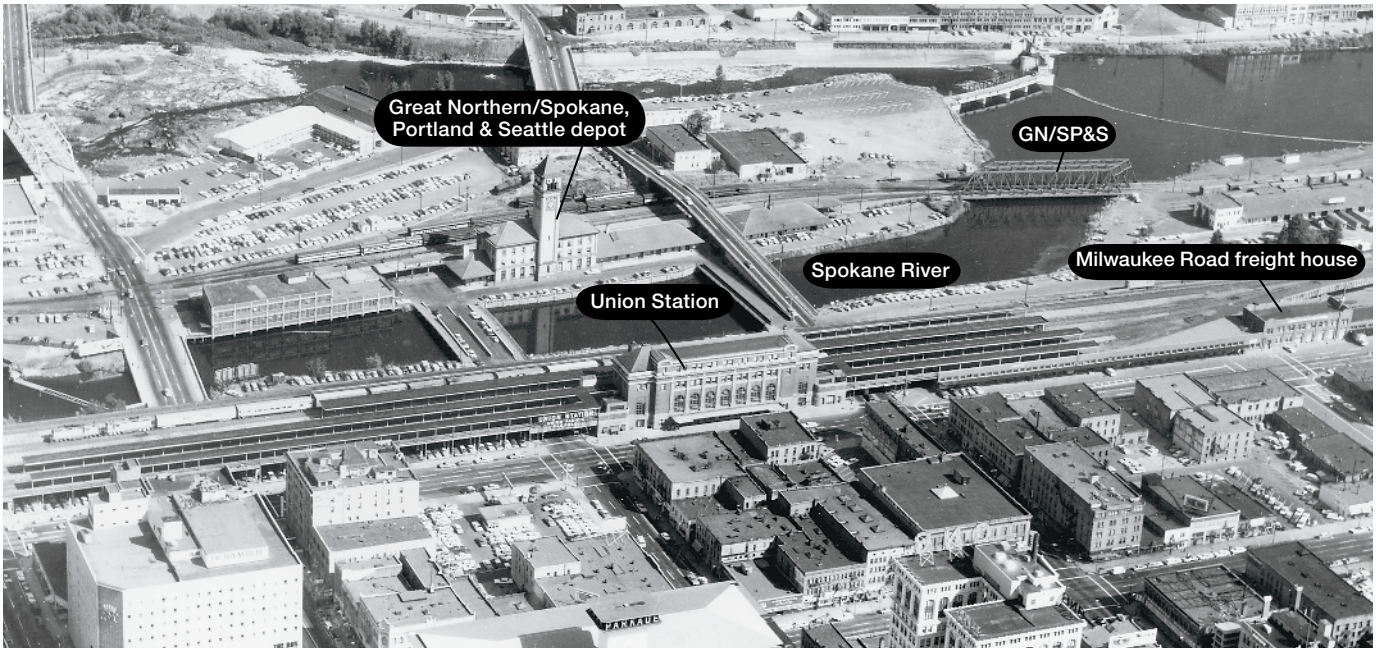
A freelanced subsidiary joins the Union Pacific and Milwaukee Road in the Pacific Northwest

By Dave Clemens//
Photos by the author

It's easy to stereotype freelance layouts as unprototypical, and some are, but many are just fictional in name and highly prototypical in operation. The latter is how I view my Idaho-Montana Ry. & Navigation Co. (IMR&N). According to my version of history, the freelanced railroad is part of the bustling railroad scene in the Pacific Northwest in 1951. The IMR&N is based on the Union Pacific and Milwaukee Road operations and stations serving Spokane, Wash., and the surrounding area. Now I can enjoy the best of both freelance and prototype model railroading.

Time to move on

My HO scale Camas Prairie (CSP), featured in *Model Railroad Planning 1998*, lasted almost three years when good fortune smiled. My wife Kathy agreed that I could use the living room for my layout "as long as you don't touch the wallpaper!" My whining about poor model railroading conditions in the garage hadn't fallen on deaf ears.



This aerial view of the north side of downtown Spokane taken in September 1967 shows Union Station in the center, the Milwaukee Road freight house to its right, and the Great Northern/Spokane, Portland & Seattle depot across the Spokane River on Havermale Island. Robert T. McCoy photo, courtesy Nate Molldrem and Mike Schafer

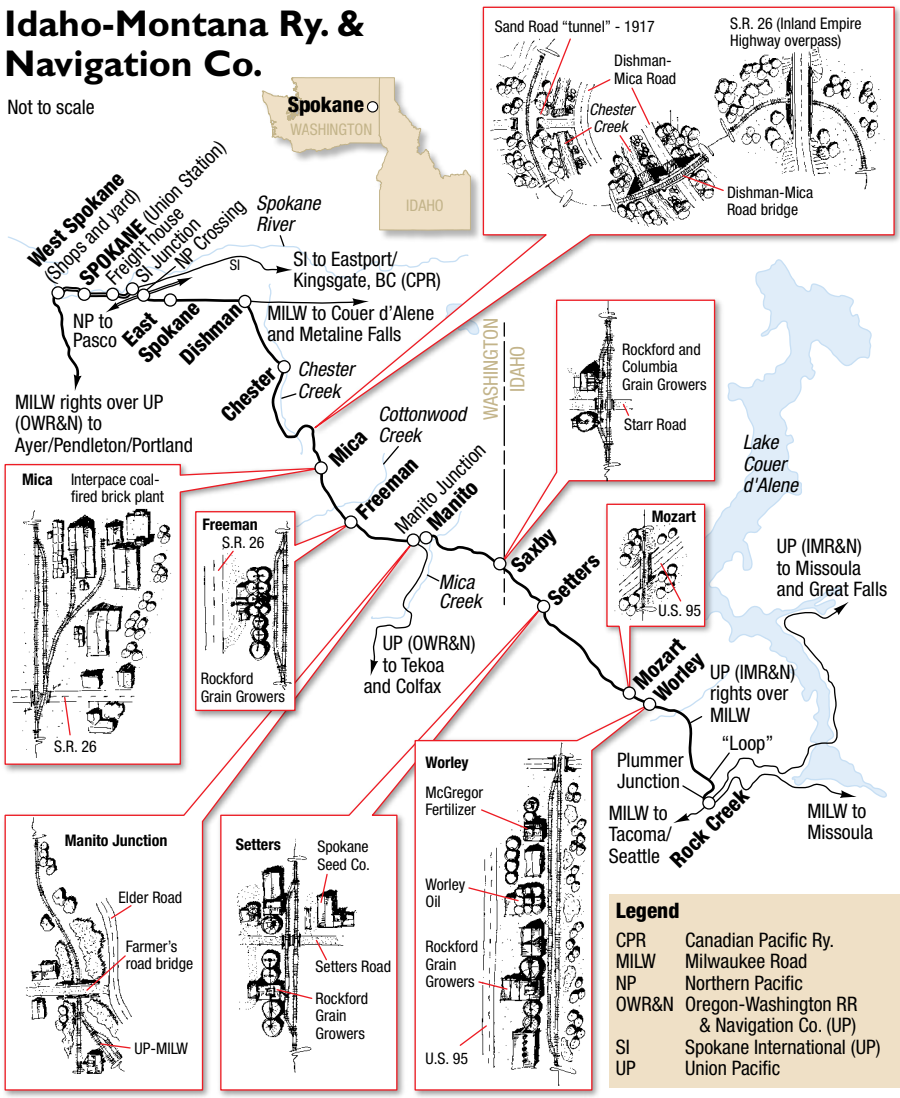
The CSP was open for tours during the National Model Railroad Association's (NMRA) National Convention in 2000. Feedback inspired me to think about expanding the railroad's traffic density, but limited operations on the full-size CSP didn't support that. I considered resurrecting my old freelanced Montana Pacific, but among the lessons I learned on the CSP was that I enjoyed prototype modeling and being faithful to a full-size railroad's look and feel.

Then fate intervened again, but in a different way. I took a vacation through the Palouse Plateau region of northeast Washington. I was inspired by the spider web of former and current railroad lines scattered through the country towns. In short order I sketched several track plans for a potential UP-based model railroad that intertwined with the Northern Pacific Ry. (NP) and Great Northern (GN) subsidiary Spokane, Coeur d'Alene & Eastern.

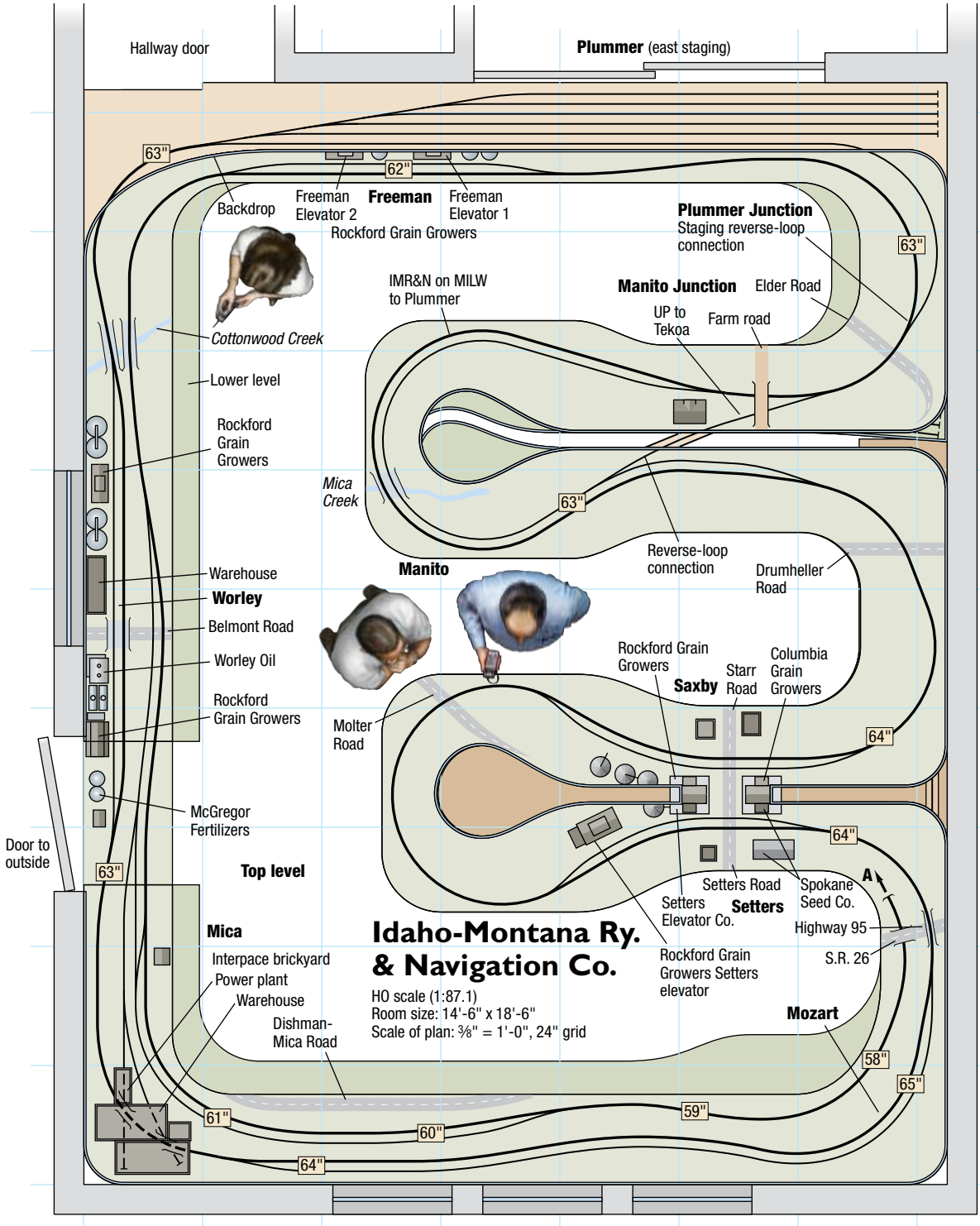
Retirement planning

With retirement looming, however, we put our home on the market to test the waters. Within two weeks, we had a full-asking-price offer and were soon effectively homeless. Fortunately, we found a new house in an area we had long admired. It had an 11'-0" by 14'-6" spare bedroom, so my track-planning efforts again rolled into high gear.

I discussed the trade-offs of Montana Pacific-like freelancing versus Palouse Plateau area prototype modeling with my friend and mentor, Mike McLaughlin,



Illustrations by Rick Johnson, town sketches by Dave Clemens

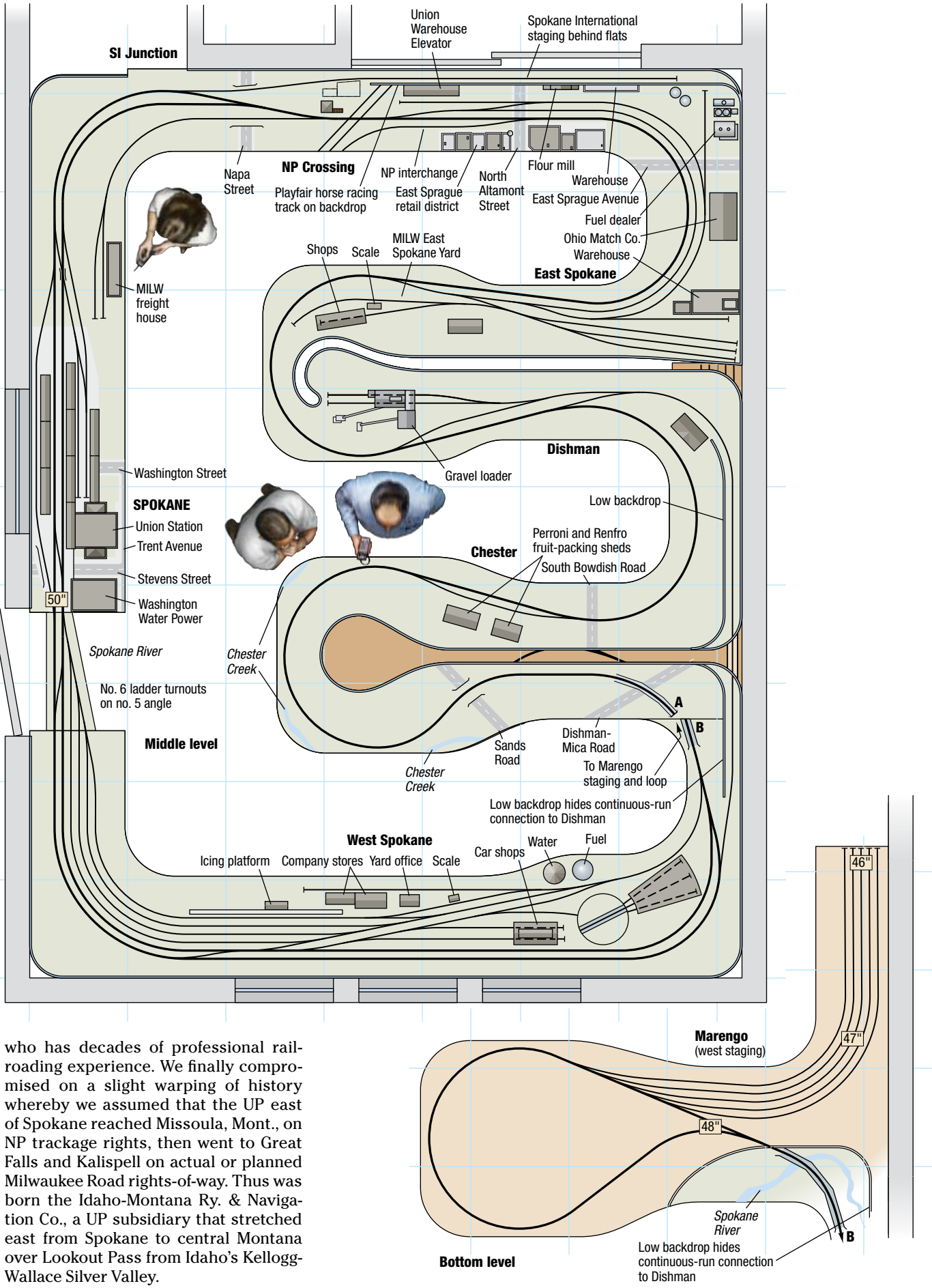


//The layout at a glance

Name: Idaho-Montana Ry. & Navigation Co.
Scale: HO (1:87.1)
Size: 14'-6" x 18'-6"
Prototype or theme: Union Pacific and Milwaukee Road plus freelanced UP eastward extension
Locale: Spokane, Wash., region

Era: fall 1951
Layout style: multi-deck walkaround
Layout heights: 48" to 65"
Benchwork: "doormino" sectional made from hollow-core doors
Roadbed: 1/8" cork over Styrofoam
Track: code 83 main, code 70 industrial sidings

Mainline run: 210 feet
Turnout minimum: no. 6
Minimum curve radius: 22"
Maximum grade: 2 percent
Scenery construction: Styrofoam
Backdrop construction: hardboard and styrene
Control system: Digitrax Digital Command Control



who has decades of professional railroading experience. We finally compromised on a slight warping of history whereby we assumed that the UP east of Spokane reached Missoula, Mont., on NP trackage rights, then went to Great Falls and Kalispell on actual or planned Milwaukee Road rights-of-way. Thus was born the Idaho-Montana Ry. & Navigation Co., a UP subsidiary that stretched east from Spokane to central Montana over Lookout Pass from Idaho's Kellogg-Wallace Silver Valley.

Doorminoes – hollow-core doors used as benchwork – have long been Dave's favorite approach to layout construction. Mocking up the plan prior to setting final dimensions was easy, thanks to this modular approach. The numbers denote linear feet of main line or aisle widths.

Dave made a 1"-scale cardboard mock-up of the final plan to share with Layout Design and Operations Special Interest Group (SIG) members at a local meet.

Riding Amtrak's design studio

Although retired, I continued working part time, riding Amtrak's Capital Corridor trains to work from our new home. The train rides were a perfect environment for layout design. My backpack was crammed with manila envelopes filled with prototype information and sketches of layout schemes based on UP's main line through Spokane.

The decision to model the UP and Milwaukee Road was an outgrowth of 30 years of interest in these two railroads. I became interested in the Spokane railroad scene during visits to my in-laws and chose the city as the focal point of my new layout. Moreover, steam-era UP rolling stock from the CSP layout could be reused, as could MILW equipment from the Montana Pacific, my old freelanced layout.

A bit of background

The map on page 61 shows that there are lots of bits and pieces to the UP around Spokane. In 1889, the Oregon-Washington Ry. & Navigation Co. (OWR&N), a UP subsidiary, reached Spokane from the east via Tekoa down Chester Creek from the main line to Kellogg and Wallace, Idaho, mines. Around 1910, with NP- and GN-backed Spokane, Portland & Seattle (SP&S) racing up the Columbia River from Portland and surveying across the Palouse Plateau, the OWR&N countered with a parallel route to Spokane directly from the west.

By 1914, the OWR&N and the Milwaukee Road agreed to trackage rights from Manito, Wash., 20 miles to the east, through Spokane to Marengo, 60 miles to the west. The centerpiece of the agreement was a new joint Union Station in Spokane. In nearly 40 years of model railroading, I'd never embraced mainline passenger service, but modeling Spokane gave me the opportunity to run UP and MILW name trains of the 1950s.

Union Pacific's *Spokane* ran overnight in both directions between Spokane and Portland, Ore. Trains 19 and 20 were a maid-of-all-work service that connected Portland head-end traffic and a through coach and sleepers with the web of eastern Washington branches to Yakima and Walla-Walla as well as Lewiston, Pullman, and Moscow, Idaho. The Milwaukee Road contributed the *Olympian Hiawatha* and heavyweight *Columbian*. I added the Idaho-Montana Ry. & Navigation Co.'s trains 39 and 40, the *Great Falls Special*, which connected with the *Spokane*.

Layout Design Elements

Once I settled on modeling the railroads in and around Spokane, I made a list of Layout Design Element (recognizable models of scenes, yards, towns, or junctions) must-haves. Top on the list was Union Station (see prototype photo on page 61) with its large express mail and less-than-carload-lot (LCL) freight house. I also wanted to model the east and west Spokane Yards, the sand and gravel quarries between East Spokane and Dishman, fruit-packing sheds and orchards between Dishman and Chester, the coal-fired brick plant at Mica, and the towering grain elevator at Freeman, to name just a few.

Since my previous layouts were based on the Spokane area, I had a large collection of photos and drawings from the area. All I was missing was information on the UP structures that were demolished in the 1970s to make way for World Expo '74, including both Union Station and the adjacent GN station.

By good fortune, Kathy and I found aerial photos from three different eras at Clinkerdaggers, our favorite Spokane restaurant. I took digital photos of these images, which have served as valuable modeling aides.

The quest for more space

We spent most of 2003 landscaping the backyard of our new home and thinking about ways to expand the spare bedroom to create a larger space for the layout. A year passed as I developed the concept, had architectural drawings prepared, got building permits, and hired a contractor. (See "Addition lessons" on page 66.)

I made numerous sketches to help me understand how much railroad I could expect to get in the expanded space and what the approximate track elevations would be. By the time the NMRA's Layout Design and Operations Special Interest Groups (SIGs) met in Santa Clara in February 2004, I was comfortable enough with the basic plan to build and display a 6" x 16" x 22" mock-up of the layout.

Peninsula options

During the design phase, I considered using a long center peninsula with a U-shaped aisle around it, a serpentine peninsula that created a G-shaped aisle, and two short peninsulas with an E-shaped aisle. Having my old favorite modular "doorminoes" – hollow-core doors serving as layout sections, or

At Dishman, Dave has a small workbench where he can fill out paperwork and do minor repairs.

Dave used temporary staging at Chester Creek to get the railroad operating as soon as possible.

Dave turned studs sideways to form a narrow spine to support the hardboard and styrene backdrops.

Inexpensive L-shaped shelf brackets support the lightweight upper deck above West Spokane.

dominoes – on hand helped me visualize the peninsulas in actual size.

The basic doormino section for the new railroad is 24" x 80". The CSP was on 15" and 18" doors, so the old CSP parts became the middle pieces of the peninsulas on my new layout.

Every design required some compromises. The U-shaped-aisle scheme was the simplest, with aisles at least 36" wide, but it had the shortest main line per level – about 77 feet. The G-aisle scheme had a longer run (about 89 feet) with adequate space for operators. The E-aisle scheme had tight aisle widths in several places, with a 24" separation between the paired peninsulas. But in return it yielded mainline runs of roughly 93 feet per level. Moreover, town locations were visually separated from their neighbors by being on the other side of a peninsula.

Final adjustments

I finally settled on the twin-peninsula plan with an E-shaped aisle. It's a two-deck layout, but one peninsula has three decks, with the staging reverse loops on the lowest deck and two decks of visible railroad above it.

By adjusting the locations of the doormino benchwork sections, I was able to obtain a 36" aisle between the bottom peninsula and entry door and a 32" aisle at the other end of the peninsula by Union Station. Cutting the width of a doormino for the Chester Creek climb and for Setters expanded the yard/shops aisle to 34". Being able to move actual benchwork sections around during the planning phase proved to be a major advantage.

//Learning points

- As the scope of one's goals expands, the prototype (or base prototype for a freelanced railroad) may need to be changed to match these new ambitions.
- Superimposing a freelanced railroad on a busy metropolitan area, complete with shared trackage, offers modeling flexibility without glaring historical distortions.
- Doorminoes (benchwork constructed from standard hollow-core doors) speed construction and allow sections to be moved around during the planning process.
- When planning new construction for a railroad room, allow 10 to 15 percent above budget for contingencies.

Union Pacific subsidiary Idaho-Montana Ry. & Navigation Co.'s no. 40, the *Great Falls Special*, races through the snow east of Spokane, Wash., in this oil painting by Julie Kavanaugh presented to Dave as a retirement gift.

Setting a high standard

When I retired, my colleagues gave me a painting called "The Route of the Great Falls Special" by friend and colleague Julie Kavanaugh. The painting was based on a Christmas story I'd written that embodied my current model railroading interests. It shows train 40, the *Great Falls Special*, racing up Chester Creek out of the Spokane River Valley.

It takes only a modicum of imagination to translate the action captured in this painting to future operations of my new HO layout. Julie's artwork thus serves as an inspiration as the Idaho-Montana Ry. & Navigation Co. assumes a three-dimensional form. **MRP**

//Addition lessons

When we extended the bedroom into the front yard, we quickly learned lesson one about building, which is to shoot for the sky but expect the unexpected. Things will go wrong, and there will be delays. The most important part of the entire process is to maintain a sense of humor. Here are some lessons I learned while we added on to our house:

Cost. Building costs have skyrocketed, especially in California. I took 75 percent of the value of the home (the other 25 percent being the value of the land) and divided that by the house's square footage. This suggested a cost of about $135 per square foot for an addition, which I rounded up to $150. A 120-square-foot addition to a bedroom was thus estimated at $18,000 to $20,000.

Homework. My professional experience with expanding a city hall and building a new library gave me an edge. Consider a course in basic building construction at a local college and talk to knowledgeable friends. Meet with the local building authority about regulations and permit costs. Find out how far the building has to be set back from property lines and how much of the land area the addition can cover.

Plans. Contractors can prepare the required plans for you or direct you to an architect they've worked with. A local architect walked us through the process and suggested several configuration alternatives. The cost of preparing plans will be 10 to 15 percent of the estimated construction cost. Ours cost $2,500.

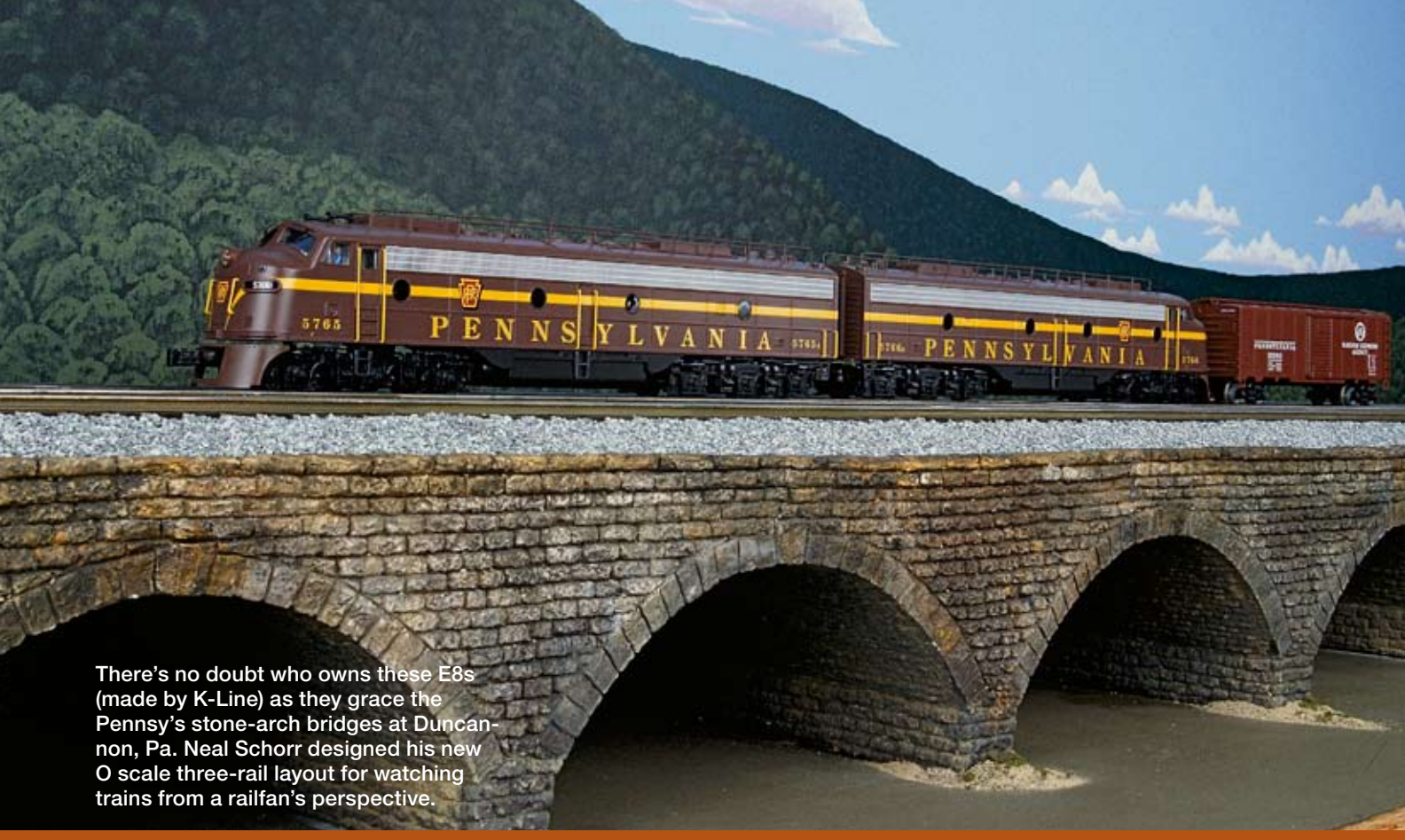
Permits. The local building authority will issue the required permits after reviewing the plans, and inspectors will make periodic visits to ensure that the contractor follows the plans and local regulations. Our plans had to be revised to meet earthquake regulations, which added another $1,000.

Bids. The architect suggested two builders, and our neighbors suggested two others. We sent plans to each and scheduled a walk-through. Surprise! Initial bids ranged from $40,000 to $50,000, more than twice my estimates. The third came in at a barely acceptable $27,000. Fortunately, he had done work for a neighbor, so we could check the quality first-hand. Two other homeowners vouched for his work, but we also checked for complaints with the California State Contractors License Board and local Better Business Bureau.

Contracts. The contractor will hand you a contract looking out for his best interests, not necessarily yours. Be sure the contract specifies the total cost and terms of payment (don't pay for work not performed or materials not delivered), schedule with end date, penalties and incentives, employees and subcontractors, taxes, insurance, and how changes will be agreed to (in writing) and billed.

For peace of mind, we allowed for a 15 percent cost increase in a contingency budget. We paid about $1,000 for changes we wanted and split some unforeseen costs with the contractor (which added another $1,000). We're very pleased with the result. – *D.C.*

Dave Clemens recently retired from a 30-year career in public service. Before starting work on the Idaho-Montana Ry. & Navigation Co., Dave modeled the Camas Prairie RR's (CSP) Second Subdivision in HO scale. The track plan and several prototype photos of the CSP, jointly owned by Burlington Northern and Union Pacific, can be found in Model Railroad Planning 1998. *Dave and his wife Kathy have added a minivan to their "motive power roster" and plan to use it "touring the country in search of trains, friends, and other riches."*



There's no doubt who owns these E8s (made by K-Line) as they grace the Pennsy's stone-arch bridges at Duncannon, Pa. Neal Schorr designed his new O scale three-rail layout for watching trains from a railfan's perspective.

Three-rail tribute to the PRR

O semi-scale offers an attractive alternative

By Neal Schorr//Photos by the author

Some of you may recall my old HO layout, the South Pennsylvania, which was featured in the April 1997 *Model Railroader*. In that article I'd written that "It's time for me to model in a different scale and era." And so I did.

I'm happy to report that the process of designing my new layout offered an exciting journey that stretched over the next several years. It began in 1990 with the purchase of a five-acre parcel of land not far from the home that housed the South Penn. Not being in a hurry to start construction, I had more than five years to consider how to plan a layout that would incorporate everything I wanted and a house that was suited to hold the new model railroad.

The change to a different scale that I mentioned in the 1997 article involved not only a shift up to O scale but also to three-rail. Many three-rail "O gauge" trains have evolved into near-scale models over the past decade and a half. Often, only the wheels and couplers are visibly different from their scale counterparts. As a result, these models have attracted an increasing number of two-rail HO modelers.

Though I'm using three-rail trains, my new railroad is built to the parameters generally associated with a scale layout, which is somewhat rare. In fact, this is the first three-rail layout to be featured in *Model Railroad Planning*. I hope to show you how my approach to layout planning can be used by hobbyists operating three-rail trains as well as those operating scale two-rail trains to create a credible model of a prototype railroad.

Choosing a railroad to model

My old South Penn was based on a real railroad that was never completed and therefore can best be described as "quasi-prototypical." When the time came to plan the new layout, however, I was ready for the challenges of building a prototypical railroad.

Two factors weighed heavily in my choice of prototype. My favorite part of the hobby is building scenery, and I wanted my layout to be set in the beau-

tiful Appalachians of central Pennsylvania. I also had gained considerable knowledge of the former Pennsylvania RR during frequent railfan trips to Conrail's main line between Harrisburg and Altoona, Pa., from 1985 through 1995. This was the famed Middle Division, the so-called "Heart of the Pennsy."

That was the first section of the PRR to be constructed in the 19th century, and it epitomized everything the Pennsy was about: four-track main line, heavy traffic, signature position-light signals, massive stone-arch bridges, – in short, everything I loved about the Pennsy.

Beyond the obvious appeal of these classic PRR elements, the Middle Division offered one additional subtle feature. Though it traversed difficult mountainous territory, the line was a water-level route that followed the Juniata River. The steepest grade was no more than .5 percent, and most grades were far less, if not level.

Though I wanted the layout to be scenically interesting, I also wanted it to be operationally simple. The grades with their attendant helper service on the HO South Penn seemed to be an appealing feature when I designed that layout, but they never played out as I had hoped in actual practice. Since my preference is to operate the layout more as a railfan than anything else, the grades proved to be an annoyance. I was more than happy to eliminate them on the new layout.

I'd considered modeling a different Pennsy water-level route, the Buffalo line between Harrisburg and Northumberland, Pa. While traversing similarly fabulous scenery, its atypical (for the PRR) two-track main line, and lack of stone-arch bridges ultimately led me to reject it. Therefore, I set my sights on modeling the Middle Division.

Even lengthy Electro-Motive Division E units look stubby compared to these Baldwin Centipedes (by MTH) at the point of a long train of empty hoppers. The train is on Sherman's Creek Bridge and View Tower is in the background.

Old and new Alco road switchers (Atlas) bracket EMD Fs (MTH) at the East Altoona yard throat. Neal worked with several manufacturers to supply the PRR line poles he needed. The poles are now offered by Weaver Models.

Aisles and entryways

I'm not the first person to construct a new home with the intention of building a great layout room. Those fortunate enough to have such an opportunity almost always try to make the room as large as possible. Other features typically incorporated into such a project are provisions for a high finished ceiling and extra electrical circuits.

However, I attempted to take things further than this. An important factor in making efficient use of the available space is to design a layout such that all the aisles do double-duty – there should be layout on both sides of all aisles. An aisle with layout built along only one side squanders half of its utility.

To have the model railroad on both sides of every aisle, I would need an around-the-walls layout with a center peninsula. But such linear layouts need access to the center, often by a lift-out section, hinged gate, or duckunder, and I wanted to avoid those.

One option is to have the stairs from the first floor drop directly into the middle of the layout room. But this approach still prevents easy access from the layout room to the adjacent workshop or crew lounge, and I didn't want to give up the floor space in the layout room for a stairway.

My solution was to build the basement with two stairways. One serves as the normal entrance, landing in the crew lounge. The second is a stair pit that allows access to the train room by dropping the entry corridor's floor 32" below the surrounding basement floor. There are four steps at each end of the pit, and I used pipe railings salvaged from a PRR fence to prevent anyone from tumbling into the pit while operating a train.

I also included an outward-opening access door so construction materials could be brought into the layout room. Though the door was later blocked by benchwork, I still use it to slide bulky construction materials under the layout and into the room.

Holding up the house

Though the stair pit gets a lot of attention from visitors interested in layout design, there are other design features worth mentioning. The most important is the placement of two support posts. I had hoped to eliminate all such columns, but the cost of doing so was prohibitive. By designing the layout at the same time as the house, I was able to locate the posts so they could be concealed within the structure of the double-sided backdrop.

My contractor's engineer specified an extra heavy girder and posts, allowing me to place the two posts as much as 24 feet apart. As it turned out, I just made it, with the final post centers set at 23'-2".

Three-rail O scale need not be associated with the abrupt, sharp curves of sectional track. This view looking toward Duncannon shows the extremely broad curves Neal employed on much of the railroad.

Neal built sturdy benchwork, supporting it in many places by knee braces. Painting the backdrop before building scenery makes the job much easier.

//The layout at a glance

Name: Pennsylvania RR
Scale: O (1:48)
Size: 38 x 45 feet
Prototype or theme: PRR's Middle Division
Locale: Pennsylvania
Period/era: 1950s-'60s
Layout style: walkaround
Layout height: 52"
Benchwork: open grid
Roadbed: ½" Homasote on ¾" plywood
Track: three-rail Atlas code 215 flextrack, Atlas and Ross turnouts
Length of mainline run: 300 feet
Turnout minimums: no. 7½ main, no. 5 sidings
Minimum curve radius: 60" main, 52" elsewhere
Maximum grade: none
Scenery construction: extruded foam and hardshell
Backdrop construction: painted drywall and Masonite hardboard
Control: Lionel TrainMaster Command Control

A word of caution: Check all measurements yourself during construction. As it turned out, the footing for one of the columns was off by four feet, placing it squarely in the middle of an aisle. Fortunately, I had an outstanding contractor who corrected the problem before erecting the girder and posts.

One story about the design of the layout and house that gives visitors a laugh is that of the breakfast nook. Located above the far end of the layout room, the nook is perfectly situated to accommodate a large turn-back curve. Originally, the space was to be 12 feet wide, but that would have required a curve tighter than my 60" minimum mainline radius. So I simply added two feet to the breakfast nook, which expanded the kitchen and gave me the curve I wanted.

Finally, I took extra care in designing the heating and air-conditioning system. As luck would have it, the subcontractor had installed an HVAC system at the nearby Western Pennsylvania Model Railroad Museum and had a good idea about what I needed.

Crew lounge and workshop

I designed the rest of the basement to complement the layout, including a crew lounge with a retractable screen for slide shows. The adjacent workshop has an exhaust fan to vent my painting booth. I used cabinets salvaged from my old medical office to create a workbench, and I had electrical outlets strategically placed at all work areas.

Just outside the basement is a covered patio where I can cut lumber in all but the coldest weather, rain or shine. This keeps sawdust from getting all over the workshop and layout room.

I even put the basement hallway to good use. I designed it a foot wider than necessary, and a few years after we moved into the house, I had the contractor come back and build three display cases for my train collection.

Water-level route

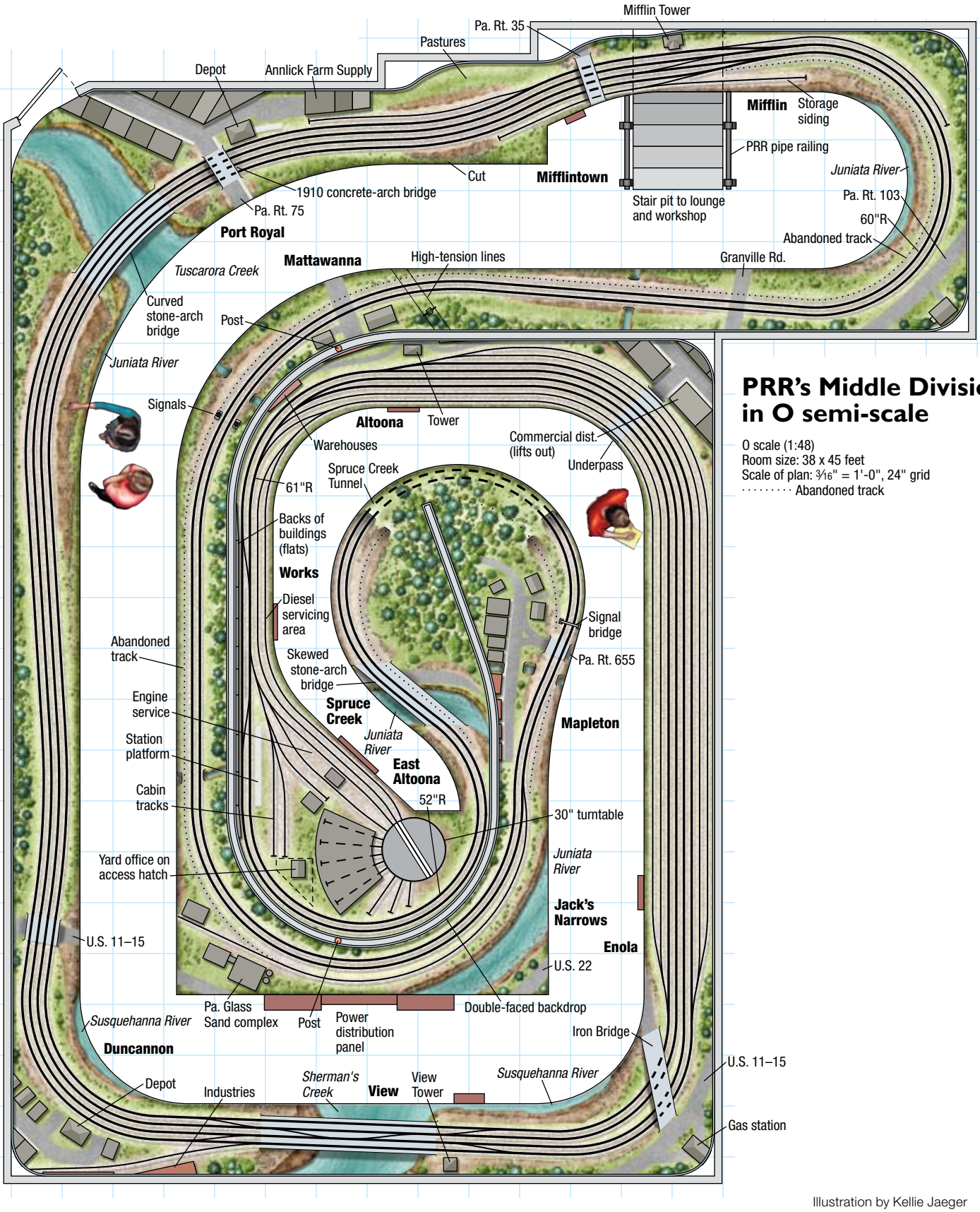
With the house designed and the prototype selected, it was time to flesh out the layout's details. I considered two basic designs for the layout. One option was a loop-to-loop design, with the loops, serving as staging yards, stacked atop one another. However, this plan required a nearly continuous climb from east to west, which flew in the face of the Middle Division's water-level route.

My other option, the one I eventually settled on, was to build a continuous loop layout with a through staging yard and operate it as a point-to-point railroad. This avoided the need to turn trains between runs and ensured that loaded coal trains were always headed east and empties west. In fact, this same type of staging yard had served me well on my HO South Penn.

I also liked this arrangement because the track never doubles back on itself, so operators can walk along with their trains over the entire route. The plan also avoided hidden complex trackwork, and nearly all the track is within arm's reach. I also included wide aisles for operator comfort.

Scenic elements

Building the layout to accommodate realistic scenery proved to be anything but simple. The biggest single factor in achieving this goal was to construct the layout so roughly half of the right-of-way would appear to be built on fill. This



PRR's Middle Division in O semi-scale

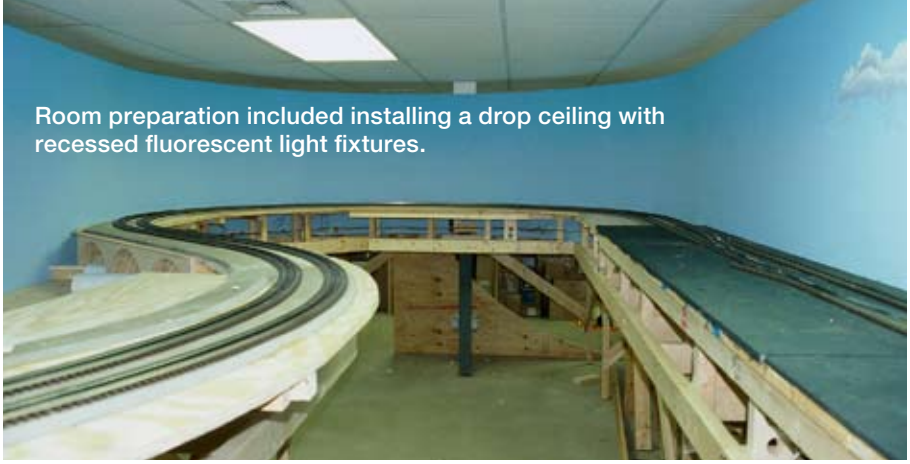
O scale (1:48)
Room size: 38 x 45 feet
Scale of plan: 3/16" = 1'-0", 24" grid
····· Abandoned track

Illustration by Kellie Jaeger

meant that I had to cut almost all subroadbed from sheets of ¾" plywood and mount it on risers. While this was time consuming, it added greatly to realism.

I constructed my right-of-way to have a prototypical appearance, eliminating the use of massive rock cuts and restricting the use of retaining walls to an absolute minimum. I also avoided spectacular wood trestles or steel arch bridges in favor of prototypical models of PRR's stone-arch bridges.

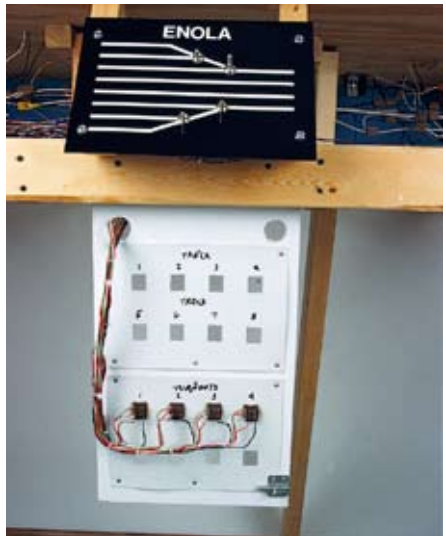
The entire main line is signaled with an authentic-looking PRR position-light system, along with the attendant relay cases and line poles. Because I couldn't find accurate PRR line poles, I had O scale line poles produced, which are



Room preparation included installing a drop ceiling with recessed fluorescent light fixtures.

Neal enjoys railfanning his O semi-scale railroad. When completing a scene, he paints the backdrop first, then adds the foreground scenery.

Neal used salvaged PRR station fence posts to support the railings at the stair pit. The pit provides standing access between the layout room and the crew lounge/workshop



Neal placed small control panels at each interlocking and yard throat. Operators can line turnouts themselves as they follow their trains around the layout.

now for sale by Weaver Models (www.weavermodels.com).

Prototypical track geometry is also critical to achieving a realistic right-of-way. The most obvious need was to construct the curves with the widest possible radius. With few exceptions, I was able to maintain a 60" radius, and most curves have spiral easements.

Operating the railroad

If you're interested in serious operations, there are probably better modeling choices than the Middle Division. The line lacked interchanges with any Class 1 railroads and had a relative dearth of online industry when compared to many of the Pennsy's other divisions. Although the Middle Division did see a lot of traffic, portraying those traffic levels accurately is difficult with a limited amount of staging.

The operating scheme on my layout is relatively unsophisticated, in keeping with my theme of simplicity. Operating sessions consist primarily of dispatching trains out of the staging yards onto the main line. Once there, the engineer runs his train according to the indication of the automatic lineside signals.

The layout does feature a few switching opportunities, and I'm planning to add a large industrial complex representing Pennsylvania Glass Sand.

A decade of enjoyment

In the ten years since I started my PRR Middle Division, many model railroaders have visited the layout during open houses and National Model Railroad Association layout tours. Those interested in scale modeling invariably comment that they've never seen a three-rail layout constructed like this one. Those from the three-rail world are often heard to say that my railroad is built "just like a scale layout."

Regardless of their background, all appear to enjoy the visit, and they seem to agree the layout has captured the essence of the Middle Division. It's not what kind of trains you use but what you do with them that counts. **MRP**

Neal Schorr is a family practice physician. He, his wife Kimberly, and their children Steven and Caroline live near Pittsburgh. Neal has been an active modeler since purchasing a Lionel set in 1972 and also enjoys photography and gardening.

//Learning points

- Setting well-defined goals increases the odds that they'll be realized.
- Prototype modeling doesn't preclude using semi-scale trains, particularly when the finished layout faithfully reflects its prototype's look and feel.
- Seek novel solutions to old problems, such as a stair pit to make a duckunder easier to use.
- Modeling signature scenes and structures, such as the Middle Division's stone-arch bridges and fills, helps to connect the model to its prototype.
- Contracted work must be checked regularly to ensure specs are met.
- "It's not what kind of trains you use but what you do with them."

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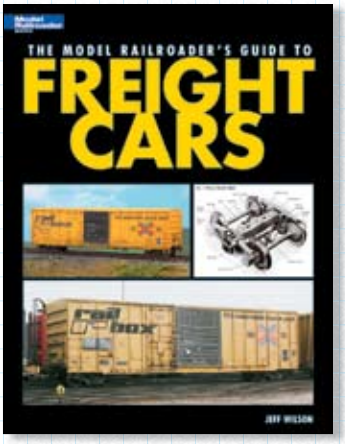

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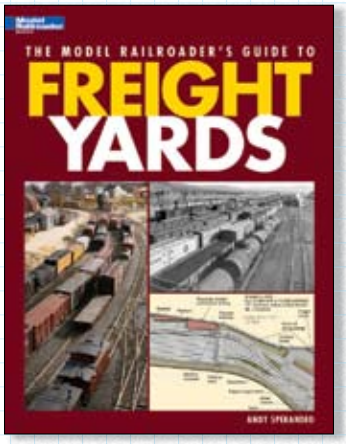

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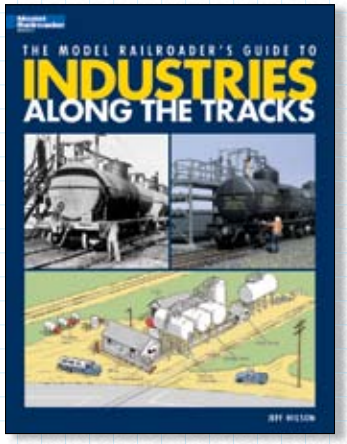

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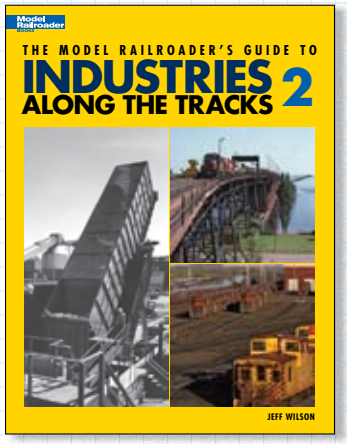

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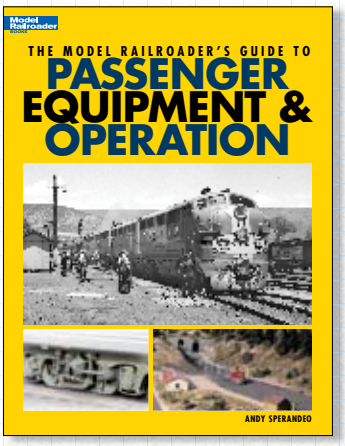

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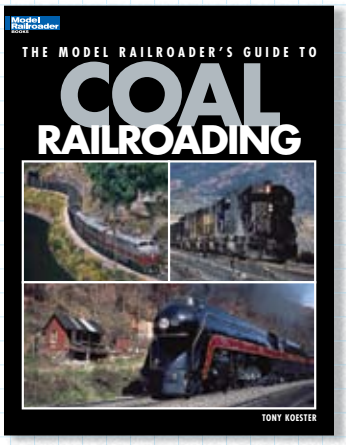

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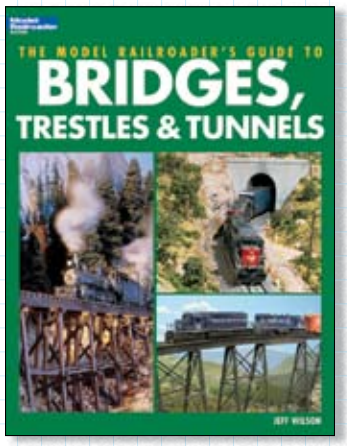

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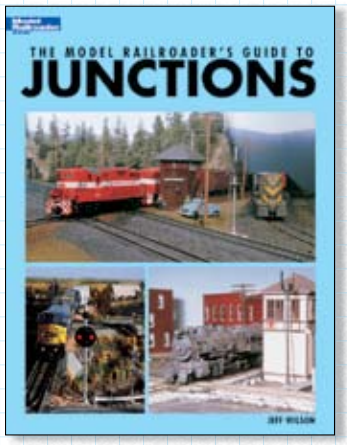

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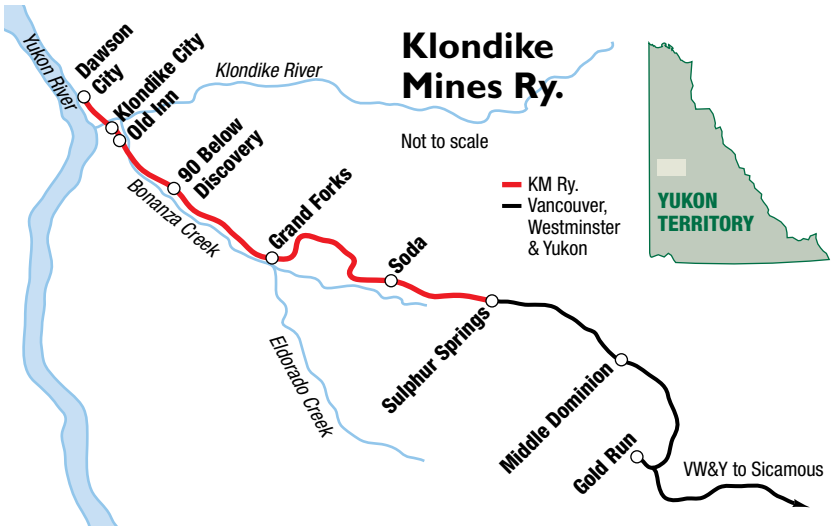
Yukon Territory railroading

Embellishing a bit of history adds a lot of operation to the Klondike Mines Ry.

A train crosses Homestake Gulch in this photo above from the early 1900s. Brian Pate captures this scene on his model railroad. Prototype photo courtesy Bancroft Library, University of California

By Brian Pate//Photos by the author with Carl Sparks



The Klondike gold rush of the 1890s gave Canada's Yukon Territory a brief economic boost and provided me with a distinctive theme for a model railroad. After visits to relatives living in Dawson City, Yukon Territory, I started researching the Klondike Mines Ry., a three-foot-gauge short line that ran during the mining boom.

More than 90 years after the KM Ry.'s demise, I could still find plenty of source material for an HOn3 model railroad. Wood doesn't rot that fast in the cold Yukon, and scrap metal has little value that far from its markets.

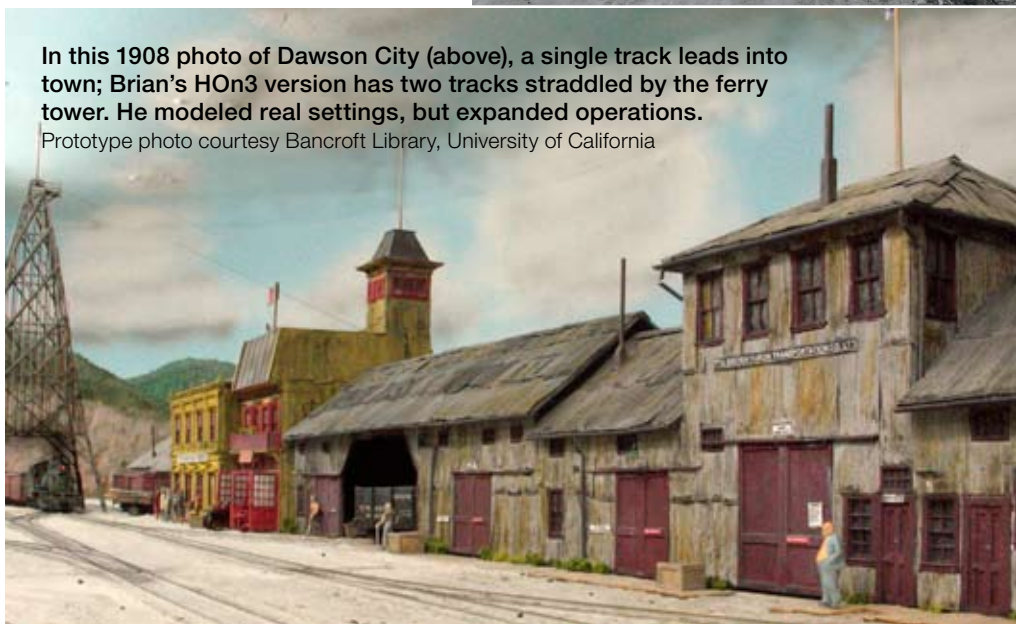
Three of the four KM Ry. steam locomotives are on display in Dawson City. Many other artifacts, including carbodies, mining equipment, building foundations, and track hardware still rest along the abandoned right-of-way.

I'd found my prototype and planned to model scenery, structures, and the right-of-way as accurately as possible. But I also wanted a layout with interesting operations. The real KM Ry. was a short-lived short line with limited traffic dedicated to the gold mining industry.

A brief history

A major gold strike on Bonanza Creek in the Canadian Yukon Territory brought 30,000 fortune seekers to the Klondike in 1898. Another group of entrepreneurs sought their fortune by serving the mining communities with the 31-mile-long Klondike Mines Ry. that ran through the middle of the goldfields from Dawson City to Sulphur Springs.

Continued on page 78



In this 1908 photo of Dawson City (above), a single track leads into town; Brian's HOn3 version has two tracks straddled by the ferry tower. He modeled real settings, but expanded operations.
Prototype photo courtesy Bancroft Library, University of California

Train No. 102 behind KM Ry. no. 1 is scheduled to depart Sulphur Springs at 8 a.m., requiring the train crew to stay overnight at the depot – an unpopular assignment, as accommodations are primitive at best.

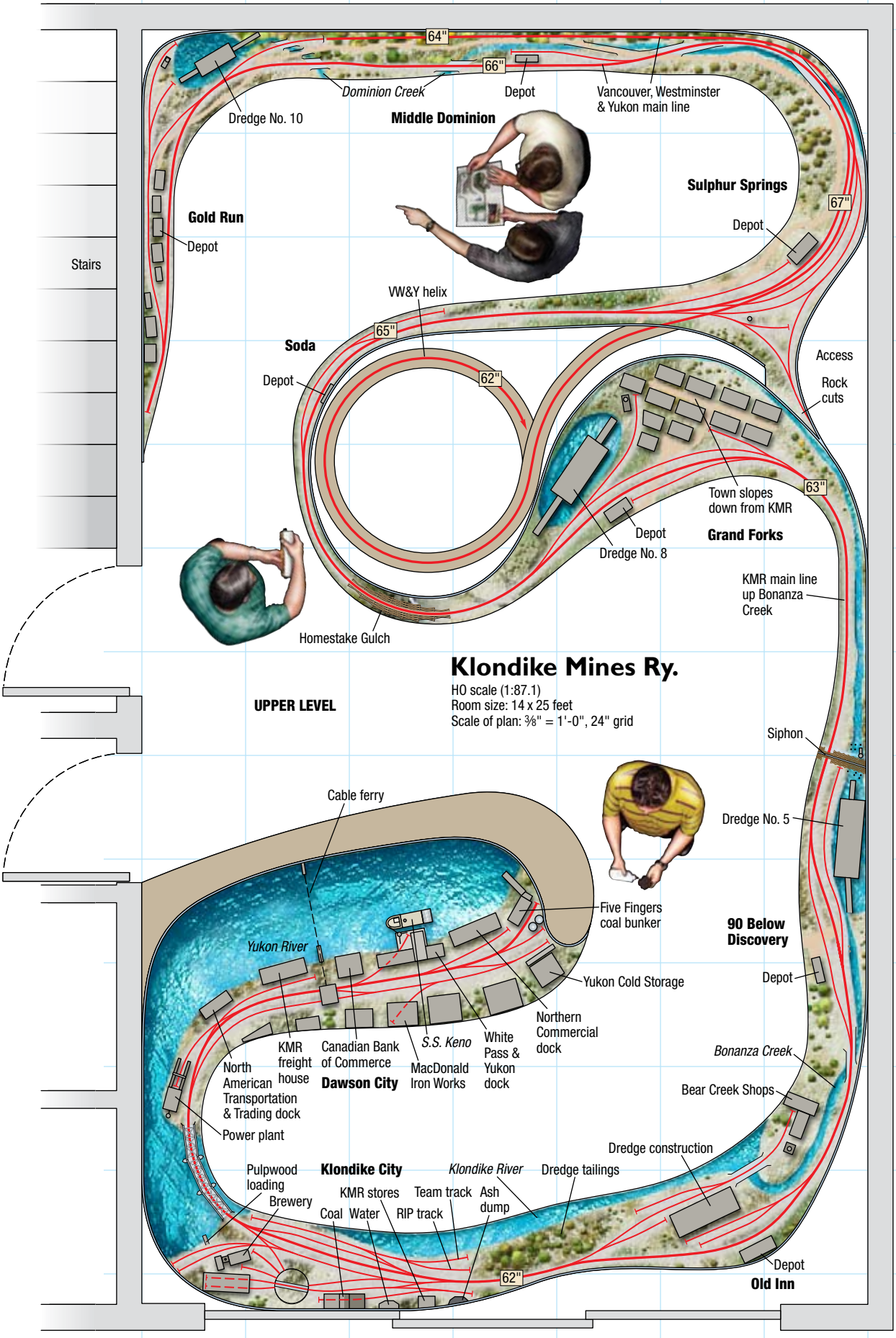
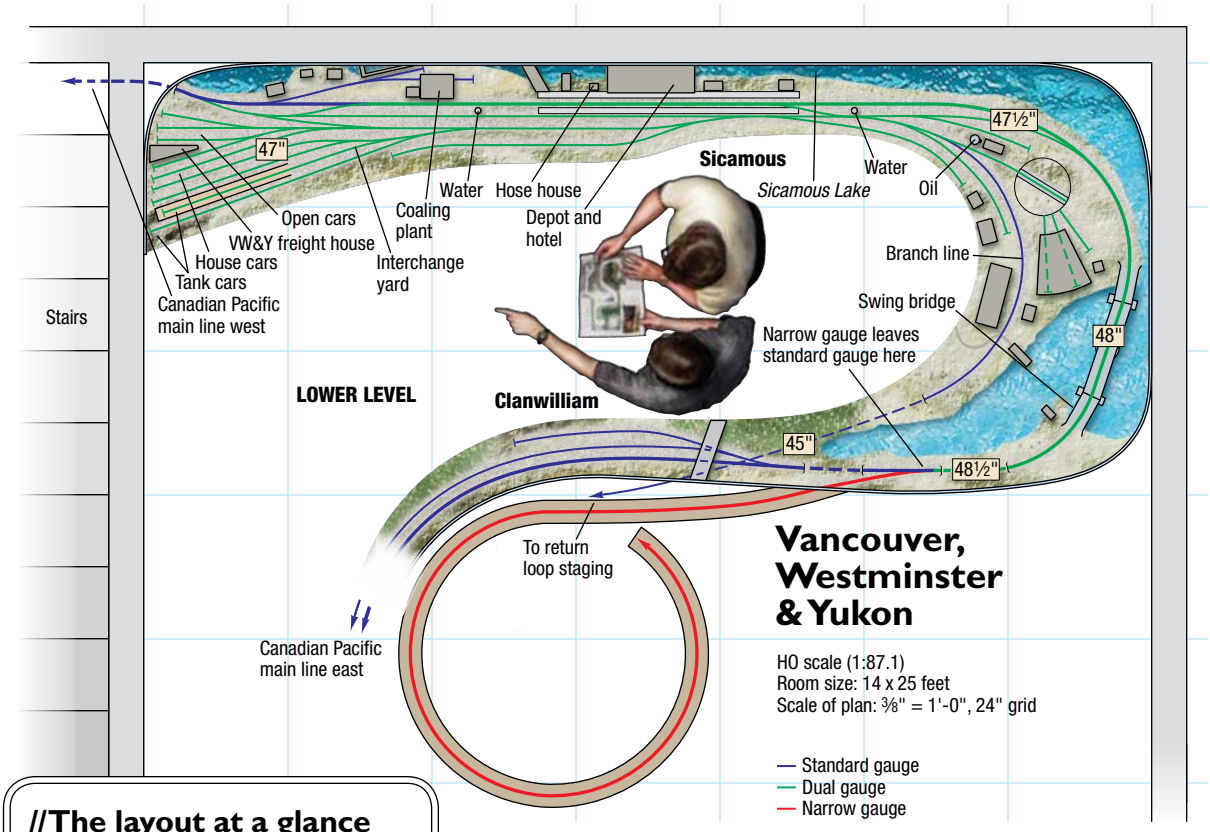
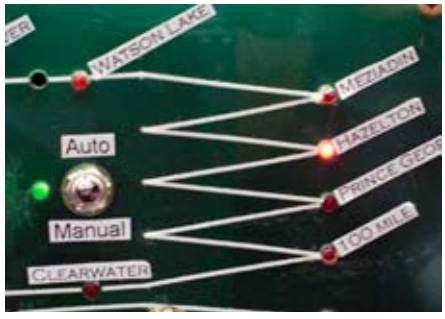


Illustration by Rick Johnson and Theo Cobb



//The layout at a glance

Name: Klondike Mines Ry. and Vancouver, Westminster & Yukon
Scale: HOn3 (1:87.1, three-foot gauge)
Size: 14 x 25 feet
Theme: gold mining
Locale: Yukon Territory, Canada
Era: 1949
Style: multi-deck walkaround
Mainline run: 200 feet (including helix)
Minimum radius: 24" narrow gauge, 30" standard gauge
Minimum turnout: no. 8
Maximum grade: 3 percent (1.5 percent in helix)
Benchwork: open grid cantilevered from wall studs
Height: 47" to 67"
Roadbed: ½" insulation board
Track: code 55 HOn3 main line, code 40 HOn3 industrial sidings, code 55 and 70 on the standard gauge line
Scenery: plaster gauze, texture paint, ground foam
Backdrop: hardboard
Control: Lenz Digital Command Control



Optical detectors in the helix keep crews abreast of train locations, which is doubly helpful as these "stations" are listed in the timetable.

It all comes together during an operating session. Carl Sparks (nearest to the camera) and Brian Pate plan a move at Klondike City's yard. At some top deck locations, crews often stand on step stools.

Train No. 102 pulls up to the Soda depot, built from the superstructure of one of the line's original boxcars. Brian based this model on the remains of the actual structure, which still stand after 90 years.

At the dual gauge yard in Sicamous, a standard gauge 0-6-0 makes up the narrow gauge passenger car consist of VW&Y train No. 2, the *Sourdough*. The switcher uses an idler car with both standard and narrow gauge couplers.

Continued from page 75

Railroad operations lasted until 1914, when the gold rush ended. Large dredging operations remained, but involved fewer people. With no economic base, the railroad folded. For more history of the KM Ry., see Eric L. Johnson's book *The Bonanza Narrow Gauge Railway.*

A fleet of stern-wheeled steamships on the Yukon River provided the main access to the rest of the world for the Yukon Territory. These stern-wheelers ran downstream from the White Pass & Yukon Ry. connections at Whitehorse, Y.T., and upstream from the ocean port at St. Michael, Alaska.

Approaching from the south other railroads, such as the Vancouver, Westminster & Yukon Ry., hoped to provide another link to Dawson City. Chartered in 1902, the VW&Y never made it farther than Vancouver, British Columbia.

An extended history

Operations on the real KM Ry. were limited to one active locomotive at a time. Although freight and passenger trains ran over the main line, most traffic was cordwood loads for heating and for thawing ice from the dredges' cables and sheaves.

I departed from actual history and imagined a more successful future for the KM Ry. I proposed that the railroad survived on limited traffic until 1939. After the outbreak of World War II, the railroad received a boost from wartime demand for gold.

In my layout's setting, the VW&Y also survived and fulfilled its charter, providing a rail link from the south via an end-to-end connection with the KM Ry. at Sulphur Springs. In Sicamous, a dual gauge yard at the other end of the VW&Y allows the narrow gauge railroad to interchange traffic with the standard gauge Canadian Pacific Ry.

I ended up with a model railroad that has more track and traffic than the real KM Ry. or VW&Y ever had, but now I had many more operating possibilities.

Expanded operations

Veteran layout designer and *Model Railroad Planning* author Don Mitchell collaborated with me on the track plan. I ended up with a 14 x 25-foot double-deck layout with the HOn3 KM Ry. on the top deck, the HO standard gauge Canadian Pacific main line on the bottom deck, and the HOn3 VW&Y in the helix connecting the two.

Rail heights range from 47" on the bottom deck to 67" on the top deck. Since trains running on the top deck are at my eye level, all of my cars have complete underframe brake rigging. During switching moves, crews often stand on step stools to manually uncouple cars.

Most of my layout follows a narrow gauge prototype, so trains are shorter and travel more slowly than on most standard gauge main lines. An HOn3 layout requires about the same space as N scale for a given operating scheme. As an additional benefit, the reporting marks on HOn3 rolling stock are easier to read than on N scale cars.

The layout handles enough traffic to keep eight to ten operators busy. The KM Ry. operates by timetable and train order rules using a 6:1 fast clock. Operators don't get a break from the timetable when their trains enter the helix. Optical detectors inside the helix let crews know when their trains have reached unseen station stops along the VW&Y.

The layout is operated using Lenz Digital Command Control. Locomotives are equipped with Zimo motor decoders and SoundTraxx sound decoders.

I control car forwarding with switch lists generated by a computer program that I designed. I based the switch lists on the format used by Canadian and U.S. railways in the 1940s.

Enhanced traffic flow

While rough Yukon roads support limited automobile traffic by the late 1940s, railroads still carry most of the freight and passengers. At Dawson City, three shippers maintain docks along the riverfront. Klondike Mines Ry. spurs serve each one. Reefers are iced at both Dawson City and Sicamous.

The railroad carries coal south from Dawson City, while refined oil is shipped north from Sicamous. Other freight and passenger traffic originates from both directions. At the dual gauge interchange yard in Sicamous, the VW&Y and the Canadian Pacific transfer freight destined to and from other Canadian provinces.

This circa 1910 view in the Bonanza Creek Valley (top) shows the Fox Creek siphon, which carried water for sluicing, being dismantled so a gold dredge can move forward. Brian reproduced this scene on his layout (bottom). Prototype photo courtesy Library and Archives of Canada/Consolidated Gold Corporation collection

(Dual gauge track has three rails. The outside rails are standard gauge, and the third rail between them allows narrow gauge equipment to operate on the same track.)

Track and structures

Scratchbuilding structures and handlaying track are two of my favorite aspects of the hobby. I especially enjoy building complicated trackwork, such as the dual gauge interchange yard.

The standard gauge main line is code 70, while secondary tracks are code 55. For the narrow gauge main line and all dual gauge track, I used code 55 rail, while secondary tracks are code 40, including Klondike City's yard and the spurs in Dawson City. Code 40 rail looks good and trains run over it reliably.

Industries provide interesting modeling projects as well as work for crews during operating sessions. Receiving coal via barge and oil via rail, the Five Fingers Coal and Oil Co. Ltd. is a busy industry in Dawson City, especially with the increased use of automobiles in the goldfields after World War II.

The author performs switching moves at Gold Run on the top deck. The west end of the interchange yard at Sicamous is visible on the bottom deck. Connected by a helix, the double-deck arrangement lengthens the mainline run.

//Learning points

- A physically appealing railroad with limited operation can have its traffic base enhanced without losing sight of what made the line appealing in the first place.
- Assuming a railroad survived into more prosperous times may create new traffic sources.
- HOn3 fits in roughly the same space as N scale but features slower speeds, shorter trains, and larger equipment with easier-to-read reporting marks.
- Adding a second deck typically doubles the amount of railroad that can be built over a given footprint, allowing longer runs with more time between stations.

I handlaid each turnout, soldering the rails to printed-circuit (PC) board ties. All turnouts have operating switch stands, lighted for night operations.

Using historical photos from various archives and my own photos of existing buildings, I scratchbuilt all of the structures on the layout. I also used drawings of a number of KM Ry. and Dawson City structures prepared by Bob Mitchell.

I previously built a model of the largest dredge that worked in the area. [It won Best-in-Show at the National Model Railroad Association's 1994 national convention. – *Ed.*] The model was so large that it overwhelmed my scenery. I donated the model to Parks Canada at Dawson City where it's on display at the visitor reception center.

Challenges ahead

Although much of the track, scenery, and backdrop are finished, my layout remains a work in progress. The east end of the CPR standard gauge main line on the lower level is under construction. I still have many structures to build, notably two more smaller gold dredges. You can follow my progress on my Web site at http://www3.telus.net/KMR and see the history of the Klondike Mines Ry. and other railroads of Canada's Yukon Territory continue *after* the gold rush. **MRP**

Brian Pate is a two-time Gold Award winner in NMRA national model contests and an enthusiastic member of the NMRA Layout Design and Operations Special Interest Groups. He has lived for 42 years in North Vancouver, B.C., Canada, with wife Margaret, and is a retired faculty member of the University of British Columbia's School of Medicine.

//Planning Tip

Lapped sidings

Two "lapped" sidings offer an advantage over one long one

When designing passing sidings for your model railroad, consider using a pair of "lapped" sidings instead of one longer siding. As shown in the illustration below, lapped sidings have two passing tracks that overlap, allowing heavily traveled single-track railroads greater flexibility when it comes to moving trains around each other in either direction. Some advantages include:

- A long train can easily meet two shorter trains, or two long trains can meet each other.
- One train can make setouts in one siding and pickups from another.
- A long train can set out and pick up from one siding while leaving part of its train clear in the other siding to meet another train.
- Longer trains can get clear in one siding while another train switches out of the other one.
- A long train can leave a portion of its train in one siding and use the other as a runaround. – *Dave Husman*

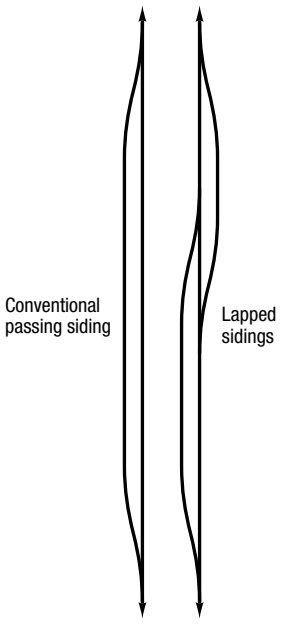
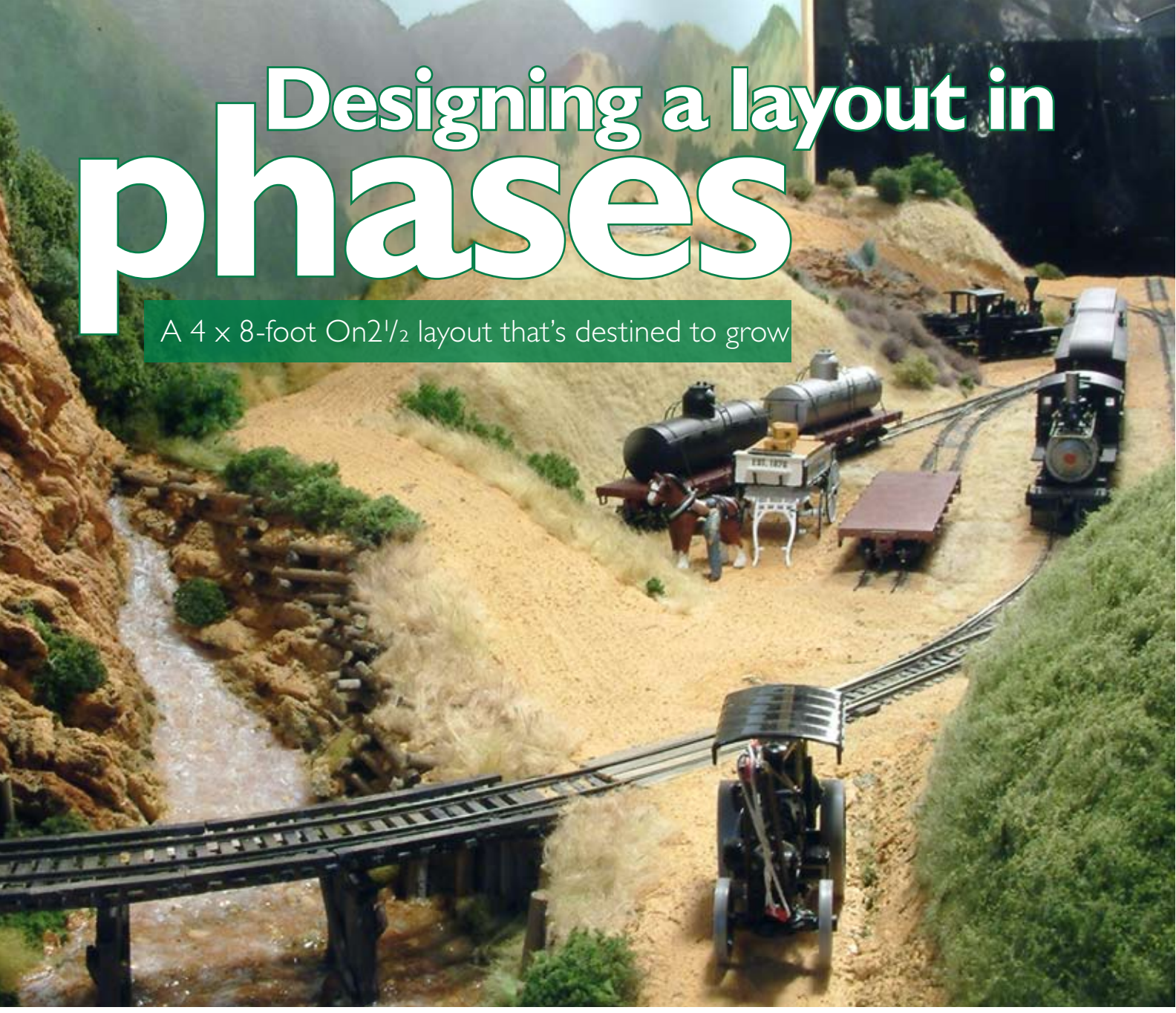


Illustration Rick Johnson

Designing a layout in phases

A 4 x 8-foot On2½ layout that's destined to grow



To get trains running quickly and keep his interest high, Harold Minkwitz is building his On2½ layout in stages. Shown is Harold's 4 x 8-foot first phase, with tank cars at the future oil transfer facility at center and, just beyond, the spur into the quarry.

By Harold Minkwitz//Photos by the author

I've been enamored with early 20th century railroading since the 1960s, inspired by examples I saw in *Model Railroader* magazine. Recently, my interest was rekindled by Bachmann's release of vintage narrow gauge rolling stock in On2½ (also known as On30). These are 1:48 proportion (O scale) narrow gauge models that ride on HO scale track.

I've built car kits in HOn3, Sn3, and On3, and the thought of building up a large roster for a future basement-size layout was mind numbing. I'm sure that other modelers share similar concerns.

A key virtue of the Bachmann models is that, unlike most O scale narrow gauge models, they're both ready-to-run and fairly inexpensive. With these products, Bachmann and, more recently, Broadway Limited Imports, have ushered in an exciting new era for modelers interested in O scale narrow gauge.

The average modeler can now build a narrow gauge empire with ready-to-use equipment. Indeed, these products may expand interest in slim-gauge modeling.

California narrow gauge

To keep the project manageable, and to enjoy it in the short term, I decided to build my layout in phases. I'll start a new phase when the previous phase is about 90 percent complete.

With that decision made, I began looking for a narrow gauge railroad to model that wasn't in Colorado, something a little off the beaten path. The prototype had to have been successful enough to support a lot of traffic, and it had to have scenic points of interest. When I saw a copy of Kenneth E. Westcott and Curtiss H. Johnson's book, *The Pacific Coast Railway* (1998 Benchmark Publications Ltd.), I knew I'd found a great prototype for my freelanced railroad.

The PCR's rolling stock was much like the models made by Bachmann, mainly flatcars and low-side gondolas. The railroad had a scenic gem in the Harford Pier at Port San Luis, Calif. The terrain, though

A Broadway Limited Imports class C-16 2-8-0 pauses at Wagon Road Creek. The author trims and dyes various types of faux fur to model tall Golden State grasses.

less than spectacular, was modelgenic. And, back in 1905, the Pacific Coast Ry. had enough traffic to make modeling its operations interesting.

I'm not the only modeler to discover the virtues of the Pacific Coast Ry., of course. Tom Knapp described how he modeled PCR's San Luis Obispo facilities as an Nn3 Layout Design Element in *Model Railroad Planning 2003*. A system map appeared on page 21 of that issue.

Narrow gauge heyday

My interest in 19th century railroading stems from the classy lines of the equipment, something like the automobiles of the 1930s. Narrow gauge was very popular during the boom years of railroad construction (the 1870s through the '90s), and there were many thriving railroads that had yet to be standard-gauged or abandoned.

The discovery of oil deposits in California toward the end of the 19th century provided a great deal of traffic for some of these narrow gauge railroads. There were other sources of traffic as well. Construction projects required shipments of sand and gravel, and farmers needed a reliable way to get sugar beets and other farm products to market.

Access to the California coast made narrow gauge railroads a viable way to ship local products and to bring in goods from elsewhere. The slim-gauge railroads also offered a way to bypass the price-gouging monopolies of the major standard gauge carriers.

The PCR brought prosperity to the communities it served, but it was hauling the seeds of its own demise. As it carried construction materials into rural areas, it enabled contractors to build highways that offered shippers more alternatives and passengers a more personal means of transportation. Oil pipelines similarly ended the petroleum traffic.

By the 1920s, the good times were in the past for the Pacific Coast Ry., but my On2½ Pacific Coast Air Line Ry., replicates the PCR of 1905, back when prosperity was in the air.

Building in phases

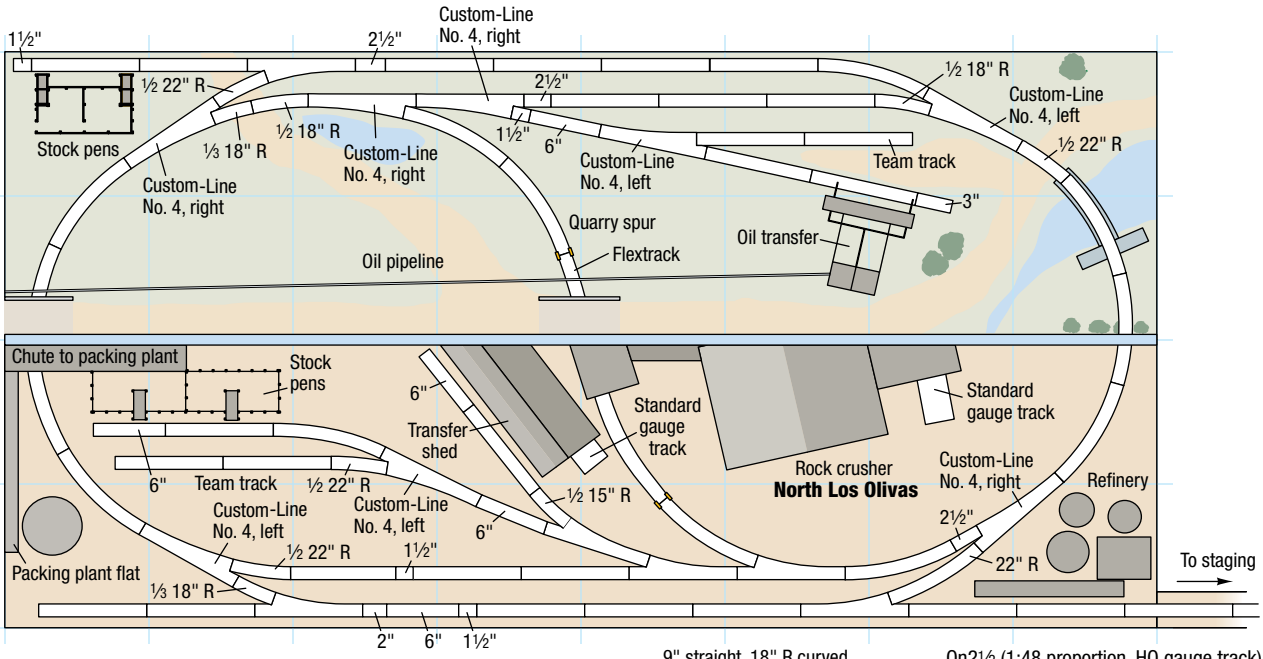
I based the first phase of my layout on Chris Webster's 4 x 8-foot On2½ track plan that appeared in MRP 2002. I liked his use of the loads-in/empties-out operating scheme, which involves connecting related industries with hidden track, in my case, a rock quarry and a rock crusher on opposite sides of the backdrop. My local picks up loaded rock cars from the quarry, then shoves empty cars through a hole in the backdrop, where they appear under the crusher, ready to be switched from the other side of the layout.

//Learning points

- On2½ allows relatively inexpensive "close enough" narrow gauge-modeling in O scale (1:48 proportion) in a space usually considered adequate only for an HO (1:87) layout.
- Some lesser-known railroads make excellent prototypes to model or to use as inspiration for freelancing, and they help to avoid the feeling that you're simply following other modelers' well-worn path.
- Building a small test-bed layout makes it easier to get something-running quickly while developing scenery and lighting techniques for a larger layout.

I modified the plan so I could use Atlas code 100 sectional track, and I was able to lengthen the sidings to hold four freight cars or three passenger cars. I use HO track for my layout, rather than special On2½ track. That means the ties are too short and are spaced too closely, but I'm happy with the result.

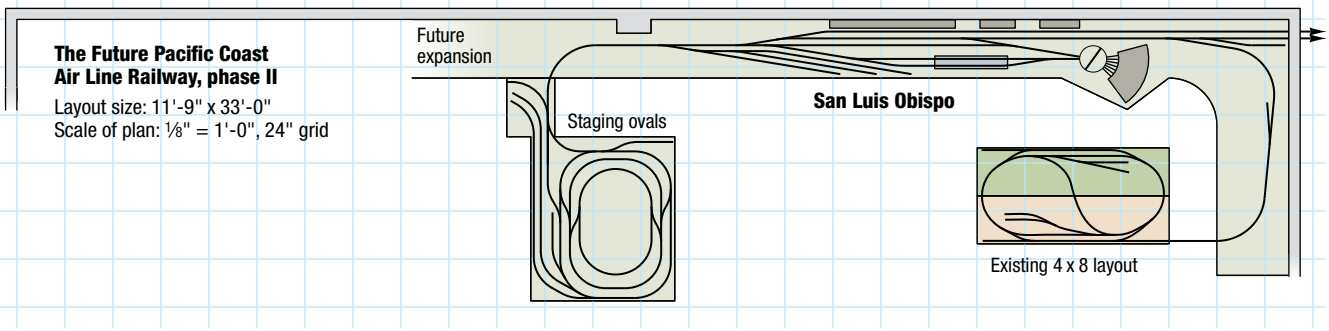
I built the rural half of my layout in the first phase, with an urban setting on the other side of the central sky backdrop to be developed as the second phase. The third phase will be the terminal yard at



Pacific Coast Air Line Ry.

9" straight, 18" R curved
except where noted

On2½ (1:48 proportion, HO gauge track)
Layout size: 4 x 8 feet
Scale of plan: ¾" = 1'-0", 12" grid



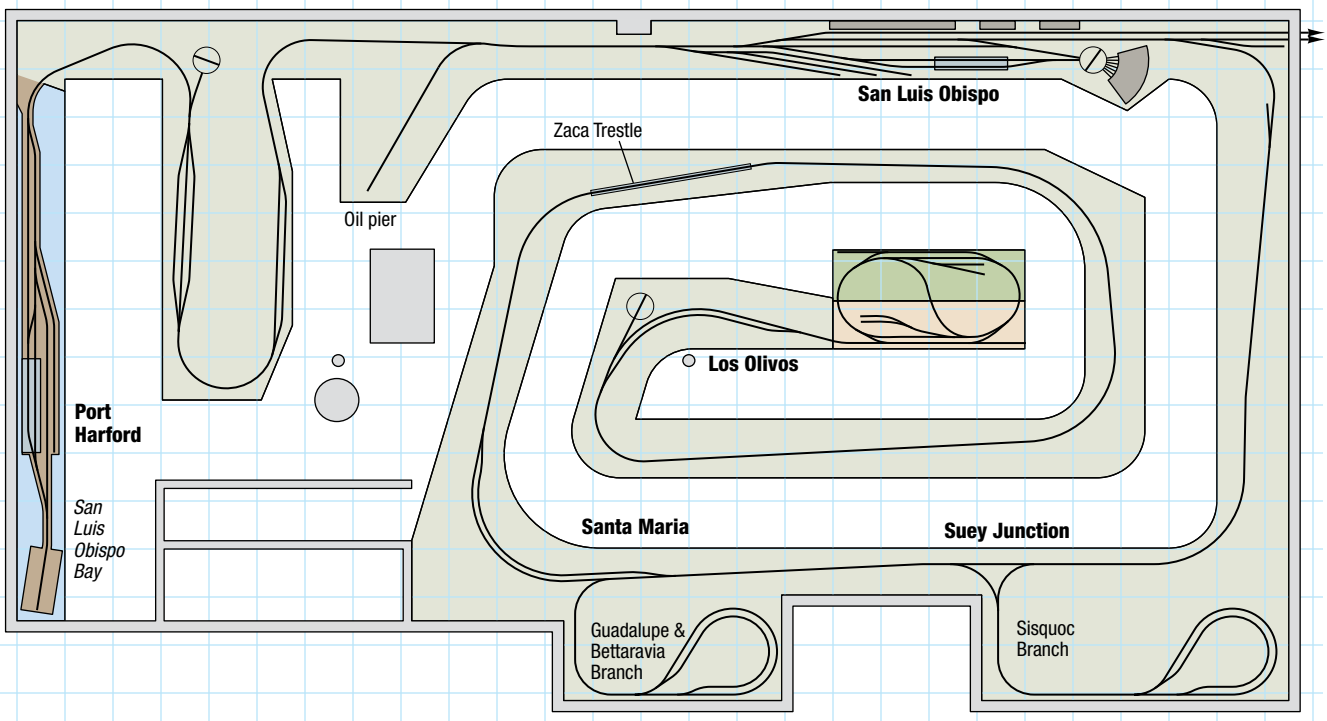
The Future Pacific Coast Air Line Railway, phase II

Layout size: 11'-9" x 33'-0"
Scale of plan: ⅛" = 1'-0", 24" grid

Illustration by Harold Minkwitz

The Future Pacific Coast Air Line Railway, phase III

Room size: 28'-6" x 53'-0"
Scale of plan: ⅛" = 1'-0", 24" grid



//The layout at a glance

Name: Pacific Coast Air Line Ry.
Scale: On2½ (1:48 proportion)
Size: 4 x 8 feet
Prototype: Pacific Coast Ry.
Locale: California
Era: 1905
Style: island
Mainline run: 17 feet
Minimum radius: 18"
Minimum turnout: no. 4
Maximum grade: none
Benchwork: 7/16" oriented-strand board (OSB) on 1 x 4 frame
Height: 50"
Roadbed: cork
Track: Atlas HO gauge code 100 sectional
Scenery: plaster-soaked paper towels over cardboard lattice
Backdrop: painted hardboard
Control: Digitrax Digital Command Control (DCC)

Gons loaded with gravel are ready to be picked up at the quarry. These loads had been shoved into the rock crusher (a "paired industry") on the other side of the backdrop to replace empties that had been shoved into the quarry.

San Luis Obispo, Calif.. I have a 24 x 53-foot basement, so the railroad will gradually grow, as shown on the larger track plan. The 4 x 8 will be a featured part of the expanded railroad, much as John Allen kept his original 4 x 7-foot Gorre & Daphetid layout as the GD Line expanded to basement size.

Phase 1 as a test bed

I used the front half of the 4 x 8 plan to test my scenery and lighting techniques. In the March 2005 *Railroad Model Craftsman*, I described how I make grass from faux fur purchased at Jo-Ann Fabrics. I colored the material with Dye-Na-Flow liquid fabric dyes, which are available at craft stores, including Dharma Trading Co. (www.dharmatrading.com) and Dick Blick Art Materials (www.dickblick.com).

I've been experimenting with lighting techniques that can be applied to the larger layout. I wanted directional lighting that approximates sunlight's strong shadows. I rigged serrated light modulators to eliminate realism-killing multiple shadows. This has been a worthwhile process because I've learned what my lighting requirements will be for the large layout, and I'll be able to add 120-volt circuits accordingly.

My 4 x 8-foot test bed has been a lot of fun to build. It represents my first attempt at scenery, as my primary interest has been in operating trains in a prototypical fashion. So far, the techniques I've tried have worked out well.

You can see more photos of the railroad on my Web site, www.pacificcoastairlinerr.com, which I created to promote

Twisted fluorescent bulbs and serrated light baffles help to create a sunny California look without realism-killing multiple shadows.

On2½ as well as to cover all aspects of the PCAL's construction and equipment. Please drop by for a virtual visit. **MRP**

Harold Minkwitz, a semi-retired mechanical designer, has been a model railroader since 1958. He and his wife, Ellen, live in Dover, Del. Harold's other hobbies include playing computer games, weight lifting, and writing articles for his railroad's Web site, He enjoys receiving feedback from modelers who visit his site.

A separate staging area provides a handy place for trains to be stored and turned between runs.

Smoothly flowing track

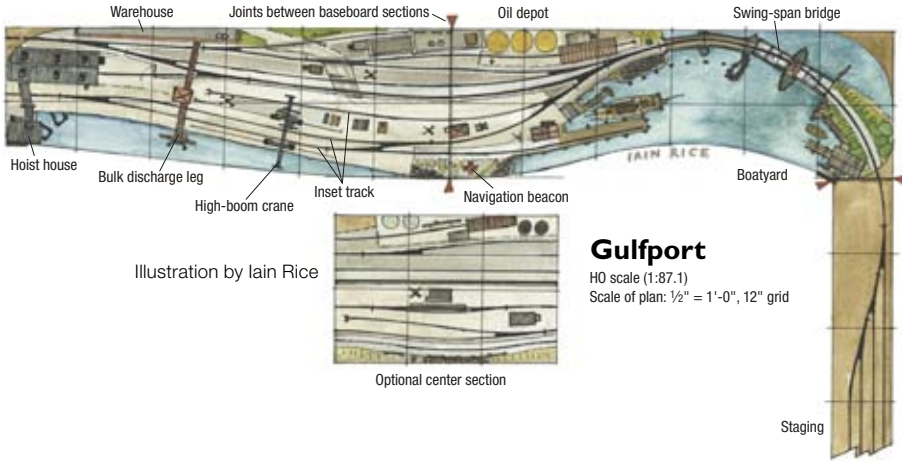


Illustration by Iain Rice

Thank you for publishing Iain Rice's track plan for a small harbor cove and rail line in MRP 2006. I was intrigued by the smooth flow of the track and benchwork as well as by the scenic possibilities. I'll be using his idea, in simplified form, for one terminal on my new layout. I hope you continue to publish his creative work.

Ervin Rohr

[We will (see page 14), as we share your fascination with the "smooth flow of track" that's typical of Iain's plans. – *Tony Koester, editor*]

Out of the comfy chair

I've been enjoying *Model Railroad Planning* since the first issue. Until now, I've been "armchairing it," but this past year I finally constructed a building for my dream layout and shop. The layout room measures 29 x 37 feet, and I'm modeling Chama, N.M., and the Rio Grande's narrow gauge climb up to Cumbres Pass, as well as some of the line west of Chama, in On3.

Glenn Joesten
Yreka, Calif.

[Inspiring you to build a layout is Job One here at MRP. Congratulations on getting started, Glenn! – *Ed.*]

Industrial shelf layout

Linda Sand's article, "Industrial railroad on a shelf," in MRP 2006 was extremely helpful to me. About two years ago, a move to a townhouse forced me to downsize my layout. I reassembled two sections into a shelf-style switching pike with two stub-ended yards joined by a passing track, but something was missing when it came time to operate it. Then I read Linda's article.

My track plan was nearly identical to hers but had a couple of key improvements. A dummy crossing, tower, and interchange track would link my layout to the off-stage world while providing a rationale for moving cars on and off the layout. I'm even planning to run an interurban on the "old main" to add an operating complication.

Thanks for the inspiration!

Christopher J. Palermo
San Jose, Calif.

Feedback

As the editor requested, here's some feedback about MRP's first decade. I really like the concept of Layout Design Elements, which are excellent planning vignettes that could be used on almost any layout.

Chris Webster

The Planning Tips, such as "Hiding the hole in the wall" (page 88, MRP 2006) and "Visualizing layout elevations (page 89), are simple but useful ideas. "Choosing layout height" on page 92 is fantastic! I'll bet few people have really thought about how modeling scale affects layout height. [For more on determining layout height, see this issue's cover story on page 8. – *Ed.*] And Jack Burgess's YV plan was very innovative. I also use David Barrow's dominoes, not to mention Steve King's C clamps and alligator clips, on my layout.

As for things I didn't find as useful were the numerous small plans designed to fit atop bookcases in the 2003 issue. If that were all the space I had, I'd build a diorama. Even the designers of these layouts found ingenious ways to extend their plans beyond that limited area. Warehouse-size model railroads are too big and overwhelming, so I don't bother to read about them. I don't care for the return of spaghetti-bowl plans from the 1980s either, after which time modelers began to realize that cramming as much track as possible into a small space is not the most realistic way to build a model railroad.

Maybe, just maybe, we're starting to take our hobby too seriously. Is this hobby really worth redesigning a new home to allow the railroad to extend under the garage?

Jason Arnot
Calgary, Alberta

More feedback

I like track plans and schematics of plans. The evolving Cat Mountain & Santa Fe is a concept I like – the focus is on the planning, yet secondary but important construction concepts and techniques are covered.

Over the past ten years of MRP, the fine efforts evident in the first (1995) issue seem to have drifted away from my particular likes in favor of major "construction projects" – an edifice in a huge basement to house the seemingly secondary track plan.

But I still intend to buy MRP because it offers me something different; predictability is seldom a virtue.

Jim Bauer
Garden City, N.Y.

Second time around

I read MRP cover to cover, but after reading the Reader Forum column in MRP 2006, I realized I had overlooked

some things in the 2005 issue. I went back through that issue and discovered a wealth of information I had either missed or forgotten about. In my opinion, MRP is one of the best ideas to come from Kalmbach since *Model Railroader* debuted in 1934.

Matt Laverani
Ely, Nev.

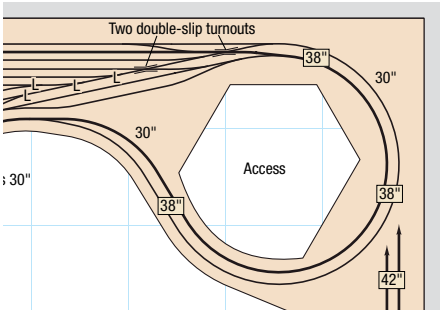


Illustration by Don Mitchell and Dick Skover

Building the impossible

I bought MRP 2006 looking for ideas and quality modeling photos, which I found. But I always wonder when I see a plan with no photos of an actual layout. Case in point: Don Mitchell's multi-deck UP concept "Main line in a bedroom," which seems impossible to build. With levels stacked 8" apart and allowing 3" to 4" for roadbed and track structure, switch motors, etc., that leaves little clearance. And no access is shown to either deck in the center of the helix.

Steve Sandifer
Meadows Place, Tex.

[This layout would be difficult to construct, but it's not impossible! Actually, the benchwork can be as thin as 1" – think steel or steel plus wood. I've seen ½"- to ¾"-square steel tubing used to make welded benchwork. Even wood 1 x 2s used as outside girders would work for supporting the decks.

The plan should have shown access in the middle of the helix (see the corrected illustration). And, on page 33, the helix operation is described backwards; the inner helix runs all the way from bottom to top, the outer from bottom to mid and mid to top. – *Don Mitchell*]

[It's also worth mentioning that layout designs have for a long time been presented as just that – designs. Expecting that only layouts actually built will be covered in MRP cuts off a lot of interesting possibilities. – *Ed.*]

Visiting old friends

One of the benefits of MRP is that each issue is great to revisit and reread over and over again. I've noticed that a lot of articles seem to jump out at me when I'm ready for them – when I'm at that particular stage in layout design or construction. Lately I've struggled with a drop-leaf door entrance, crossing at grade with an interchange, track center concerns, making hidden staging more accessible, hiding a staging-access hole in the backdrop, even redesigning a town. *Model Railroad Planning*'s articles covering those very topics have come in mighty handy lately!

Phil Brooks
Knoxville, Tenn.

[For a look at the results Phil Brooks achieved, see page 20. – *Ed.*]

How things fit together

I know they aren't necessarily pretty, but I like to see photos showing how owners fit their layouts into their available space – around stairs and posts – and how upper decks are supported.

Sam Fell
Birmingham, Ala.

[We think you'll enjoy seeing some of those in this issue, and we encourage contributors to submit such photos. We tend to run more construction photos in MRP as a rule anyway, as by the time a layout is fully scenicked, it's a candidate for coverage in *Model Railroader* or *Great Model Railroads*. – *Ed.*]


Mike Schafer

The *Atlantic Limited*

Judging by the shadows and consist of the Canadian Pacific passenger train in the photo of Windsor Station that accompanied Bob Chapman's D&H track plan in MRP 2006, the train is the *Atlantic Limited*. The switcher is about to take the train to the passenger yard in Westmount to turn it for its evening departure to St. John, N.B. The photo brought back fond memories of getting a cognac and watching the aurora borealis from the dome on a bitterly cold night.

Huges Fortin
Sherbrooke, Quebec

Photo credit

[The photo on page 89 of MRP 2006 credited to Steve King was actually taken by Bill Miller. – *Ed.*]

//Planning Tip

Layout section templates

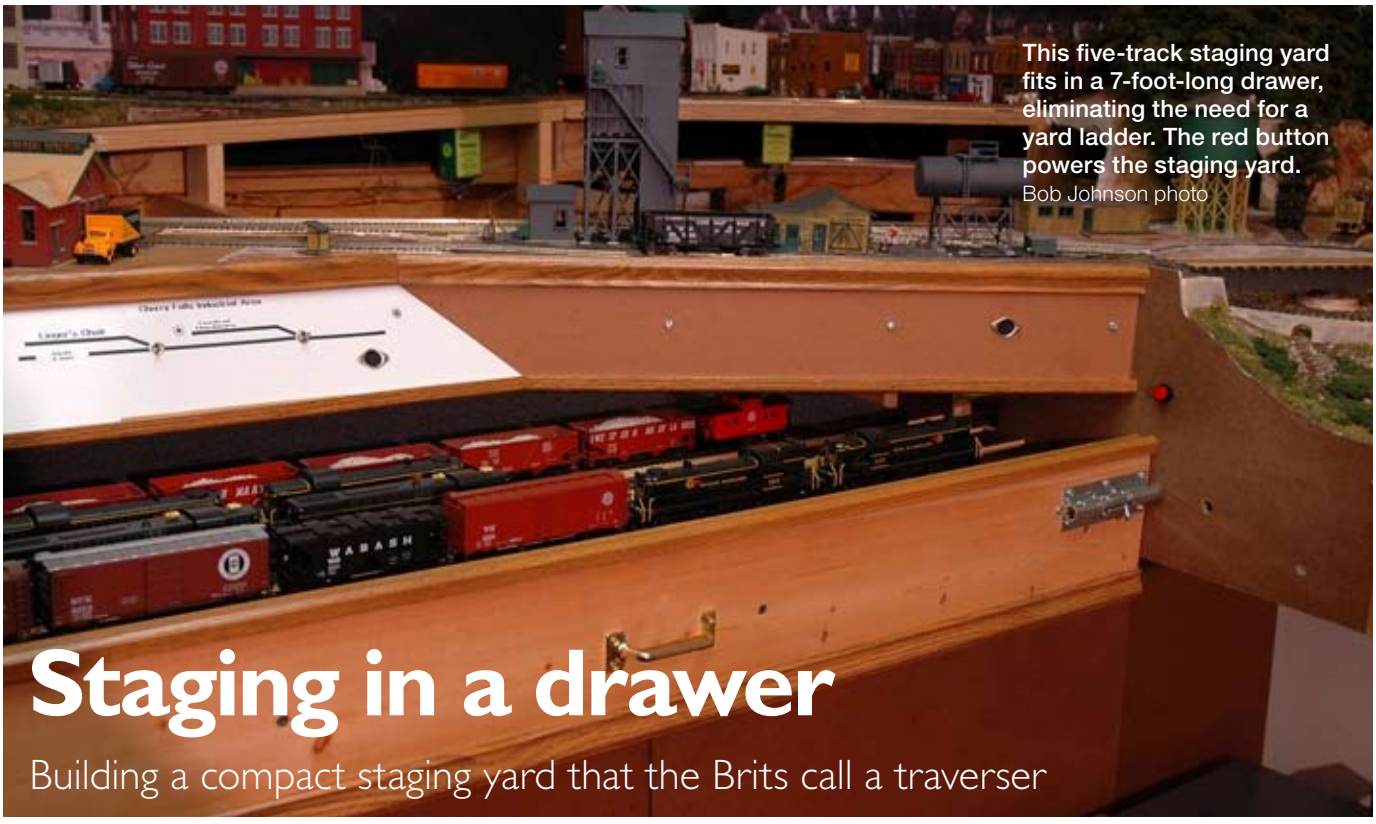
Trace "puzzle pieces" and fit them into your space

Making a scale template of your available railroad space to lay over existing track plans is a good way to see if the track arrangement will fit. Jim Forbes photo

Much in the same way that one or more prototype-based Layout Design Elements can be drawn as layout-design aids, I make simple templates based on interesting track arrangements found in published model track plans. In both cases, the goal is the same: find a track arrangement that works. Almost always, track plans derived from the prototype (LDEs) must undergo some selective compression to fit into a model world. The advantage of working from layout plans is that experienced modelers have already done the selective compression work for me.

My particular challenge was to find a track plan that would fit into the 2 x 5-foot area. To expedite the process, I drew an outline of my available space on a sheet of graph paper in the scales commonly used for published track plans. I then traced the various outlines onto a sheet of clear acetate with a fine-tip permanent marker.

With the template completed, it's now a simple process to determine the scale of an existing track plan and move the corresponding scale footprint over that plan. If the track arrangement is a close fit, I then make my own drawing in a larger scale to my exact layout dimensions. – *Barry Abisch*



This five-track staging yard fits in a 7-foot-long drawer, eliminating the need for a yard ladder. The red button powers the staging yard. Bob Johnson photo

Staging in a drawer

Building a compact staging yard that the Brits call a traverser

I'd planned to put a staging yard at each end of my West Virginia Midland HO layout, one representing the Baltimore & Ohio (see *Model Railroad Planning 1997*), the other the Western Maryland at Laurel Bank, W. Va. But by the time I'd built to the WM site, I'd used the staging space for other features.

I really needed a second staging yard and considered several designs, but owing to space and access limitations, none of them looked practical. Then I saw an article in *Model Railroader* about a British design for a small "traverser" yard. It shifted from side to side to align the storage tracks with a single feeder line. That gave me an idea: a staging yard in a drawer.

I built my drawer 7 feet long and 22" deep. It holds five tracks, and part of it is used for storing extra cars that I swap in and out of trains in staging between operating sessions.

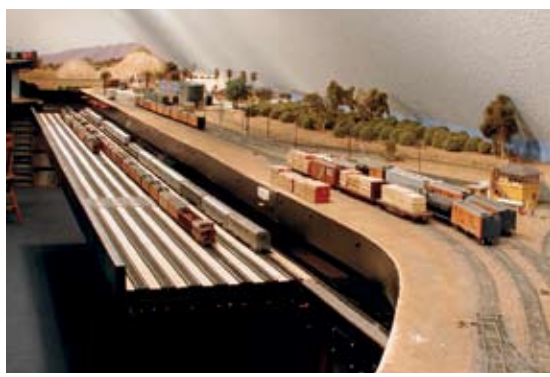
Drawer construction. The drawer's base is ¾" AC fir plywood. I glued and screwed 1 x 3s to the underside as a frame and inset the end pieces ⅜" to provide clearance for mounting drawer slides. The drawer has a 1 x 6 front, and I used 1 x 4s on the back and end.

The track that feeds the drawer exits the layout 9" outboard of the first track position in the drawer when it's closed. With the five tracks on 2¼" centers and the drawer inset from the front of the layout, my drawer needed 24" of travel. So I bought a pair of industrial-grade, ball-bearing 24" drawer slides rated at 300 pounds per pair.

My track indexing system is a barrel bolt attached to the front of the drawer. I drilled holes the diameter of the bolt on 2¼" centers in a piece of flat steel stock using a drill press. I then cut a recess for the steel in the benchwork frame with a router. I screwed the plate in place and drilled through the indexing holes into the frame.

Next, I installed the fascia, drilling holes for the barrel bolt from the benchwork side to create properly aligned indexing holes. Finally, I extended the drawer to the last indexing position, leveled the drawer with shims, and attached the barrel bolt to the front. The indexing bolt supports the drawer and ensures that each track lines up with the feeder track. I ground a slight taper on the end of the bolt so it would easily fit into the holes.

Tracks in the drawer. I started the trackwork by cutting off one end of a commercial rerailer track and installing it at the end of the feeder track. Before mounting the staging tracks in the drawer, I laid them on 7-foot strips of ¼" x 1¼" lattice stock. I put a cut-down rerailer at the active end of each track and a second (complete) rerailer about two feet from the end. Next, I set the drawer in each of the five positions and installed the lattice track sections.



This staging drawer was built by John Signor for his HO scale layout. For more on this technique, see John's construction article "Railroading in a drawer" in the December 2000 *Model Railroader*. John Signor photo

Since I use DCC, I installed a single pair of feeder wires with a slack loop to allow the drawer to open and close freely. I isolated the last four feet of each track and wired those sections to a push-button switch to keep trains on tracks not lined up with the feeder track from running. – *Bob Johnson*

Hiding support posts

Pay no attention to the posts inside the buildings

Our basement has a number of support posts that interfere with the track plan of my HO scale Dixon, Wyanette & Lake Superior. I wanted to minimize their visual impact in two towns and in one other part of the railroad.

The accompanying photos show my current thinking about hiding the posts by painting them sky blue and fitting structure walls around them. They're still "percolating;" that is, I like to try things and let them sit for a while to see how well they "wear." I remain open to other ideas. – *John Swanson*

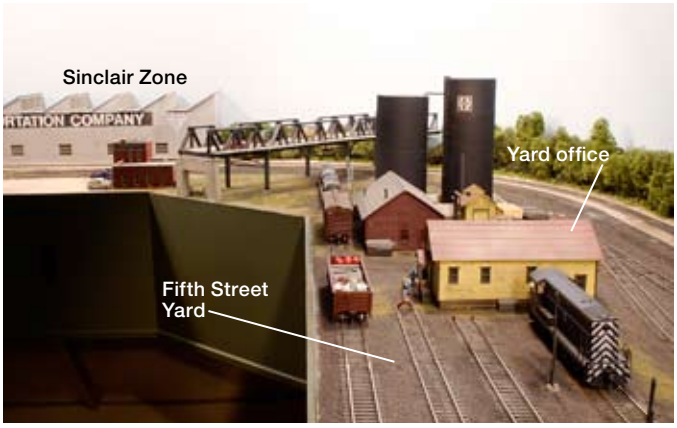
These photos show several examples of how John has attempted to hide the intrusion of support posts. He painted the posts a sky color and used structure walls to reduce the supports' visual impact. Photos by John Swanson

//Planning tip

Bridges as scene separators

Look to the prototype for inspiration

When Chuck Hitchcock wanted to separate Fifth Street Yard from the Elevator "A" scene on his HO scale layout, he turned to the prototype to find the answer – a highway bridge. Since then, Chuck has used bridges in several different styles to separate scenes on his Kansas City industrial railroad. Photos by Paul J. Dolkos



In this corner of his layout, Chuck installed a pony truss roadway bridge to divide the scene between the Sinclair Zone to the left and Fifth Street Yard in the foreground.

This bridge, made with some parts from several Rix vintage highway overpass kits, is used to separate the Freight House Zone (to the left) from the Sinclair Zone.

Separating scenes on our always-compressed model railroads can be a challenge. On my Argentine Industrial District Ry. (February 2007 *Model Railroader*), I wanted some visual separation between Fifth Street Yard and Elevator "A." It eventually dawned on me to look to the prototype to solve my problem.

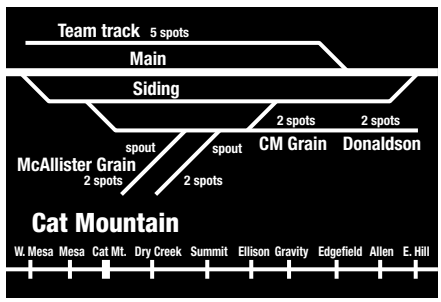
Armed with a camera, measuring tape, and note pad, I drove over to the 42nd Street bridge in Kansas City, Kans. This 1948 structure is located just east of the elevator, precisely where it would be needed on my HO layout.

A month later, I'd finished the model. It did the job quite nicely, so I used another bridge to separate the freight house area from Sinclair, and yet another one to separate Sinclair from Fifth Street Yard. I built them to prototypical designs but varied the styles somewhat. The idea worked so well that I now have a total of five bridges serving as scene separators. – *Chuck Hitchcock*

//Planning Tip

Where am I?

Operators see where they are in a diagram on the layout fascia



After years of operating sessions on my old HO scale Cat Mountain & Santa Fe layouts and a number of other model railroads, I've compiled a fairly complete checklist of "operations paraphernalia" that can make operating sessions easier and more enjoyable. One visual aid that I used on a previous CMSF layout is a town diagram like the example shown above.

I mounted these diagrams on the layout front (fascia). Each diagram labeled every track and gave the number of spots (car positions) at each industry as an aid to way freight crews spotting and picking up cars. In this respect the diagrams functioned like the full-size Atchison, Topeka & Santa Fe Ry's. "CLIC Books." (Those pocket-sized guides for train and switching crews provided diagrams of stations, yards, and industrial areas identifying every track, car spot, and industry. "CLIC" was an acronym for Car Location Identification Code.)

A special feature of my diagrams was a bar graph across the bottom to help crews know where they were in relation to other towns on the railroad. It showed all the stations in order from west to east, with a heavier vertical tick at the current location. This helped the crews know which cars they should pick up; for example, at Cat Mountain a westbound way freight would pick up cars for Mesa, West Mesa, and beyond.

And if the dispatcher told a crew at Cat Mountain to go to, say, Ellison for a meet, a glance at the diagram showed them that Ellison was three towns to the east, or to the right along the layout's aisleway. – *David Barrow*

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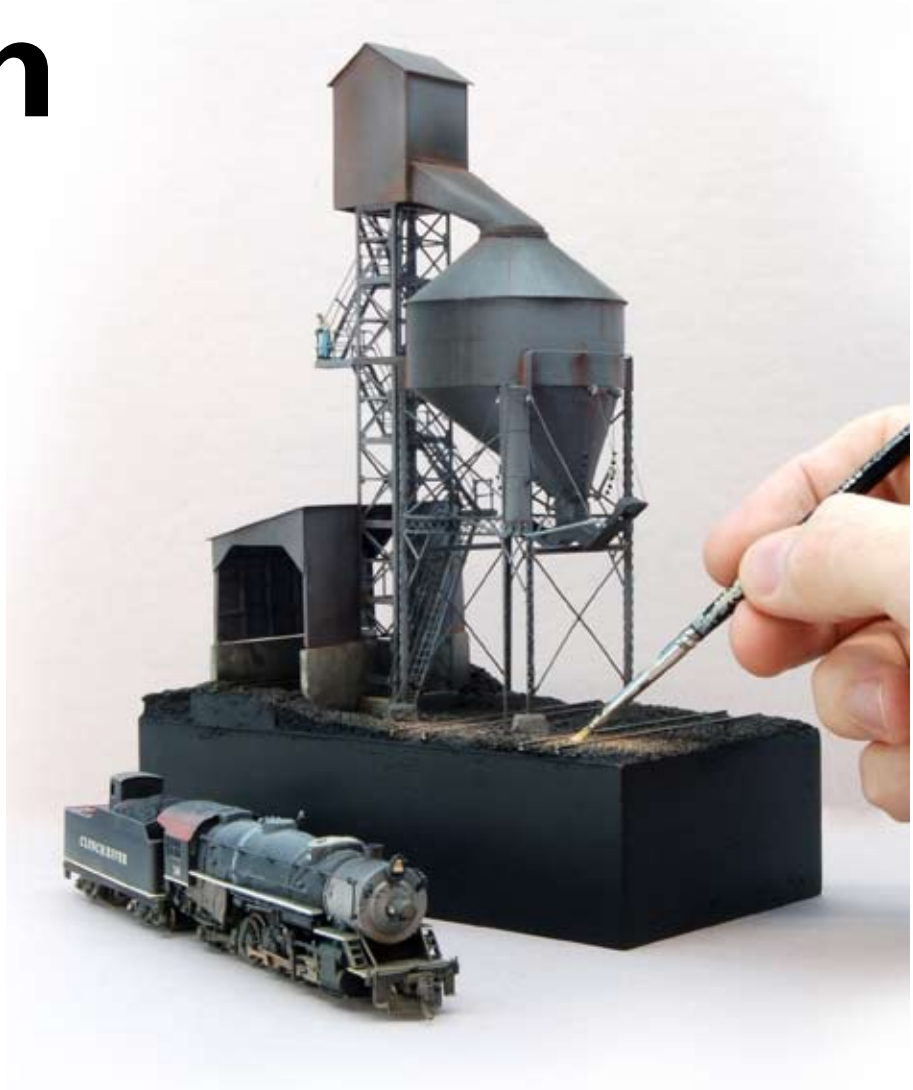
From contest room to train room

Why not build models for both purposes?

By Phil Brooks



Phil Brooks' scratchbuilt N scale coaling tower won the Best In Show award in the model contest at the 2005 National Model Railroad Association convention in Cincinnati. It's now the centerpiece of the engine terminal on his Clinch River RR (page 20). Phil Brooks photo

I was floored at the National Model Railroad Association's 2005 national convention in Cincinnati when my N scale model of an Ogle steel coal dock won Best in Show in the model contest. My entry wasn't originally planned as a contest-quality model; I initially intended for it simply to fill a spot in the Clinch River's [See page 20. – *Ed.*] long list of needed structures.

As fabrication began, however, I decided to up the ante and build to contest standards. I usually model only the front, or visible portions, of a model, but entering a contest meant detailing hidden areas. Detail invisible at normal viewing distances, such as interior bracing for the tower legs or etched stair tread detail, had to be laboriously applied, and I did all the fabrication under magnification to ensure that those details held up under close scrutiny. Documenting the process with notes, drawings, and templates helps to flesh out the entry paperwork, and it helps the contest judges understand any unique features or techniques. (More-specific contest information can be found on the NMRA Web site: www.nmra.org.)

My coal dock's contest journey took it through competition at a regional convention and on to the national. Winning the top award is an achievement I'll always remember, but ultimately the real winner is my model railroad.

There's an opportunity here. Many contest models end their days on some dusty shelf, much like the trophies or plaques they win. On the other hand, numerous operations-oriented layouts have generic, shake-the-box models for cars and structures. But contest modeling or building for use on a layout doesn't have to be an either/or proposition. Why not combine the two and thus expand your skills and knowledge, and the personal satisfaction they provide, while improving your model railroad?

By working toward the dual goals of building a contest-quality model while filling a structure or rolling-stock requirement for your railroad, you'll improve your modeling and have a better model for your layout.

Placing delicate models in an operating environment might at first appear hazardous to their health. However, careful model placement or clear barriers [See Tommy Holt's sidebar on acrylic signal shields on page 40. – *Ed.*] can protect against errant elbows and hands.

Building models simultaneously for contests and for later use on the railroad ensures that those models will serve a purpose beyond collecting dust on a shelf. Some extra time and effort will be required, but the results will be on permanent display where others can truly appreciate them. And best of all, it's double the fun! **MRP**

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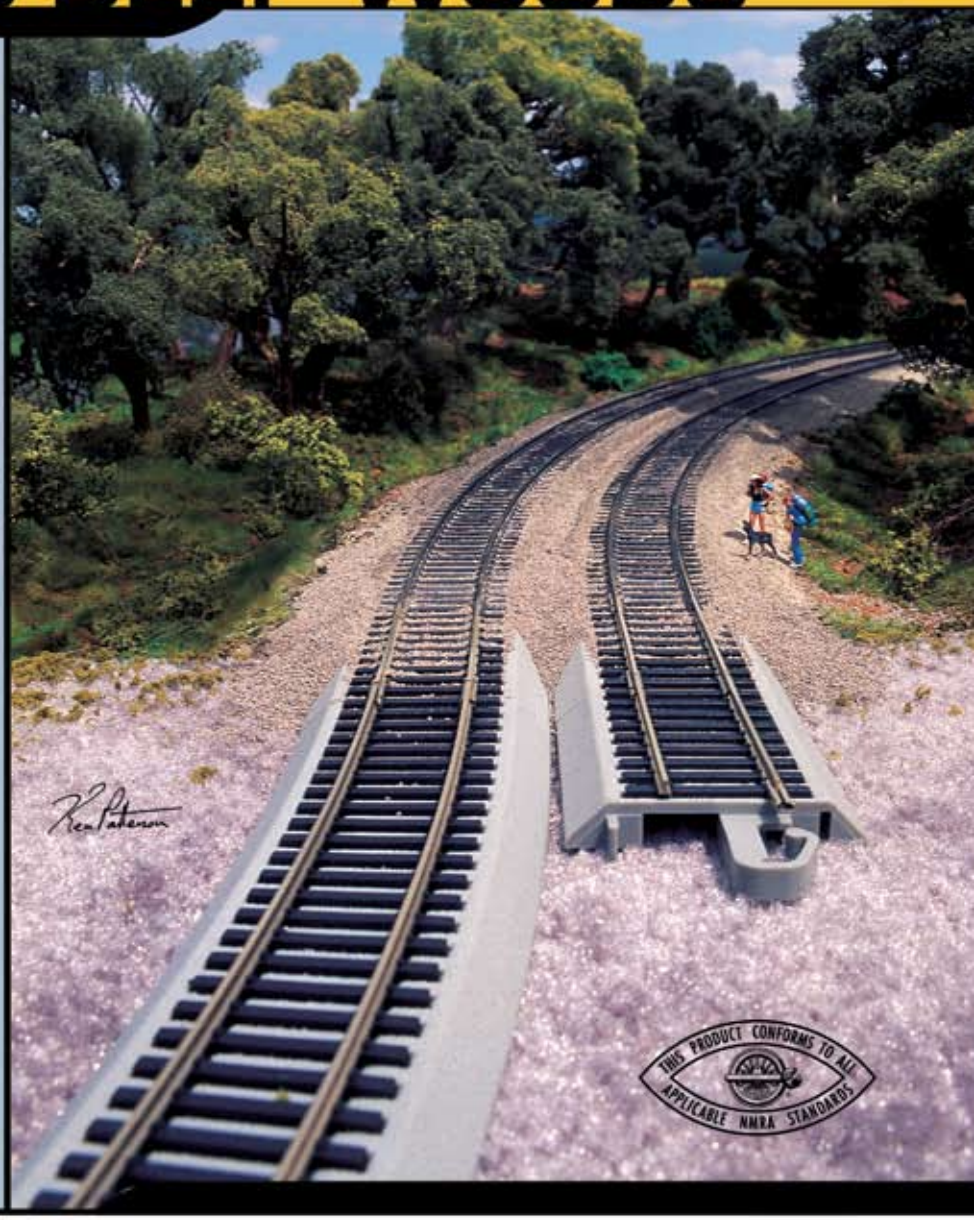

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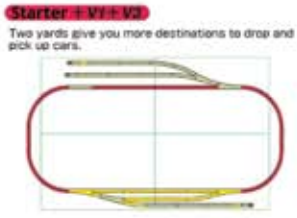

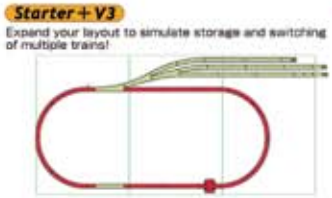

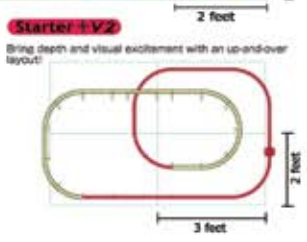

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