1. Chesapeake & Ohio on the left, and Clinchfield on the right – the two railroads on this layout plan.

One Module Challenge

First Prize winner

Model Railroad Hobbyist | July 2018 | #101

PETER VASSALLO designs a TOMA layout to move coal loads and empties across two railroads ...

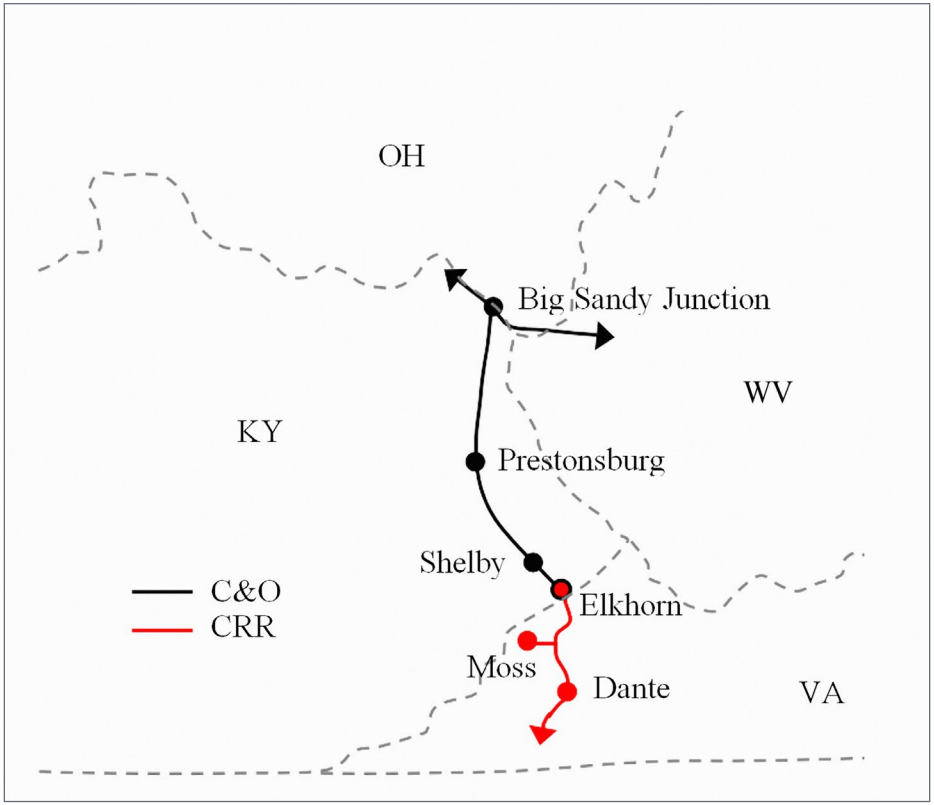
MOST MODELERS ARE FAMILIAR WITH THE CONCEPT OF interchange, whereby cars are traded between railroads on connecting tracks. This is often accomplished on model railroads using sidings extending to the layout's edge to simulate connections "beyond" the layout. For those who favor operation, a single interchange track can provide more variety and volume of traffic than any other track.

Most interchange is implicitly modeled, involving manual transfer of cars to and from the interchange track. Elkhorn Yard explicitly models the transfer across railroads, with provision for both Clinchfield and C&O trains to enter and leave the yard.

In the real 1:1 world, Elkhorn Yard in Elkhorn City, KY, was the Clinchfield's northern terminus and the southern end of C&O's

Big Sandy subdivision [2]. All northbound traffic from the Clinchfield was transferred to the C&O at Elkhorn. Coal in hopper cars was the bulk of the traffic, with loads and empties moving both north and south along the two railroads.

The Moss mine complex, about 30 miles southwest of Elkhorn, provided a steady stream of coal well into the 1980s. These coal loads were destined for several power plants and mills, one example being Kentucky Power at the northern end of the line near Big Sandy Junction.



2. Simplified map of the Clinchfield and C&O routes from Elkhorn City, KY.

Beyond function, there are other features that make Elkhorn attractive to model. Because most cars were swapped expeditiously, an extensive array of yard tracks was not necessary, in contrast to nearby classification yards at Shelby, KY or Dante, VA. There were also numerous coal loaders within Elkhorn to provide some local switching.

These loaders accepted coal dumped from trucks. The coal was crushed and cleaned before being transferred to hoppers. Finally, the yard lay snugly between the banks of the Russell Fork River and the east Kentucky hills in a picturesque setting that helps frame the scene [3].

3. Picture of Elkhorn Yard, looking south from the C&O end of the yard. Numerous features to model are evident: weathered track and ballast/dirt mixture in yard, caboose track and spur for hoppers next to the coal loaders at left, shed in lower right corner, line poles and the Russell Fork river at right, and tree-covered hills. *David Wilson photo.*

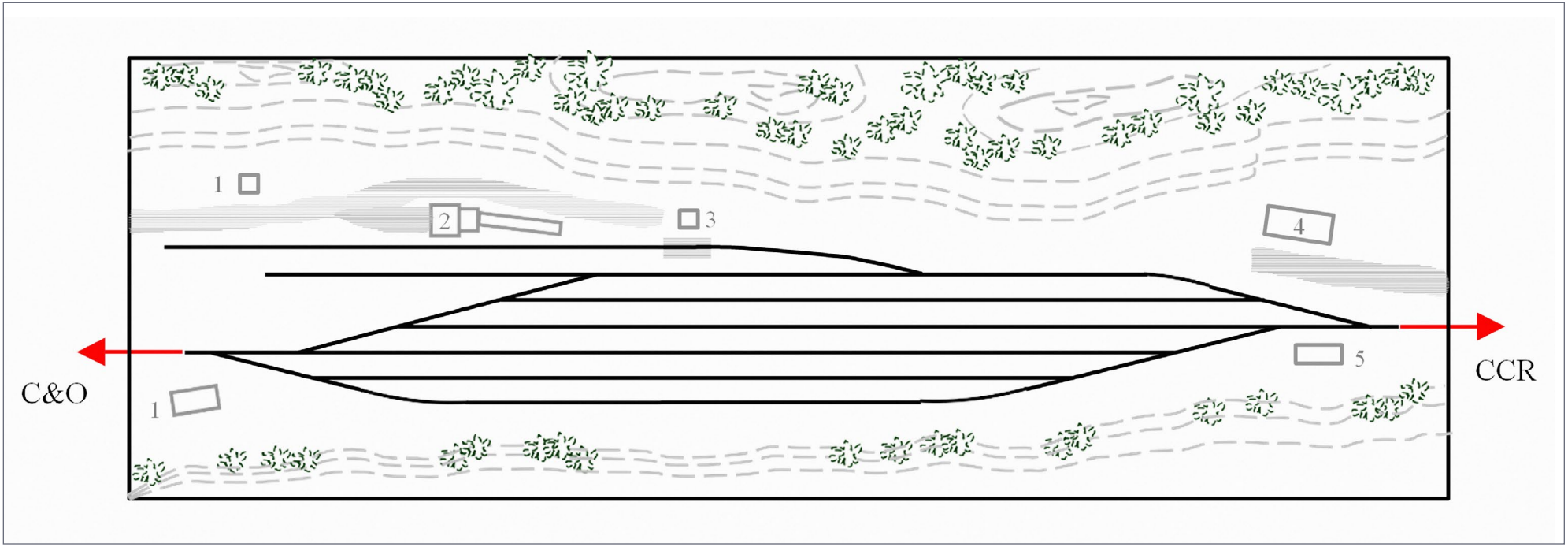
Module designs

My Elkhorn module design is provided in [4]. I did not attempt to reproduce the yard precisely but wanted to capture the yard's basic function and character. I chose N scale because I think it is well suited to long unit trains and the switching of those trains.

When switching a coal mine, for example, I like to see the entire train in my field of view as the hopper cars are moved into place. Also, switching longer cuts reduces the need to frequently uncouple individual cars, lessening the chances of mechanical failure.

For this *TOMA with a Twist* contest, I chose to design two modules with continuous running between them. Since Elkhorn Yard provides a means of exchanging loaded and empty hopper trains, I thought it would be nice to have a companion module where loads and empties can also be exchanged, completing the cycle.

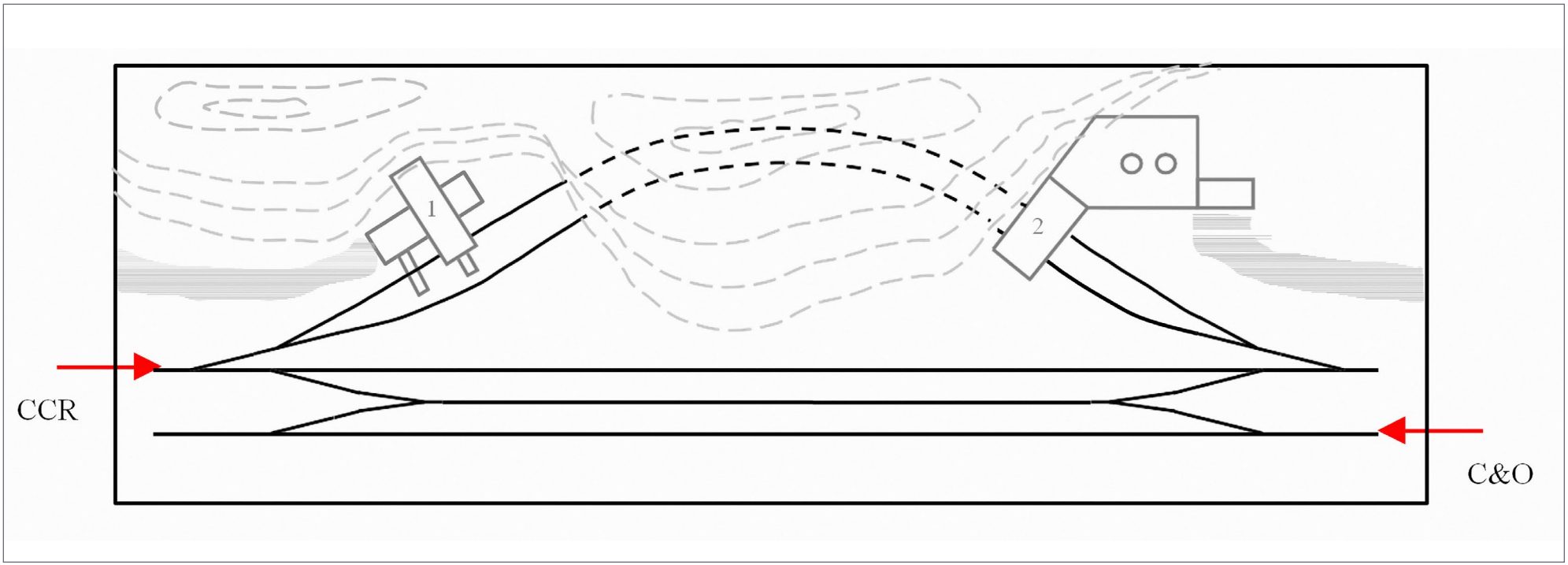
For the second module, I used the classic John Armstrong *loads-empties* exchange between a coal mine and power plant [5]. The mine and power plant are loosely based on Clinchfield's Moss mine and Kentucky Power on the C&O. The sidings in front of the module allow trains from either railroad to run around and



4. Elkhorn yard module, 2 x 6-feet, N scale. Structure key: (1) shed, (2) coal loader, (3) track scale, (4) office, and (5) fuel tank.

switch their respective industries. For example, an empty hopper train entering from the left represents a Clinchfield train entering the Moss mine facility.

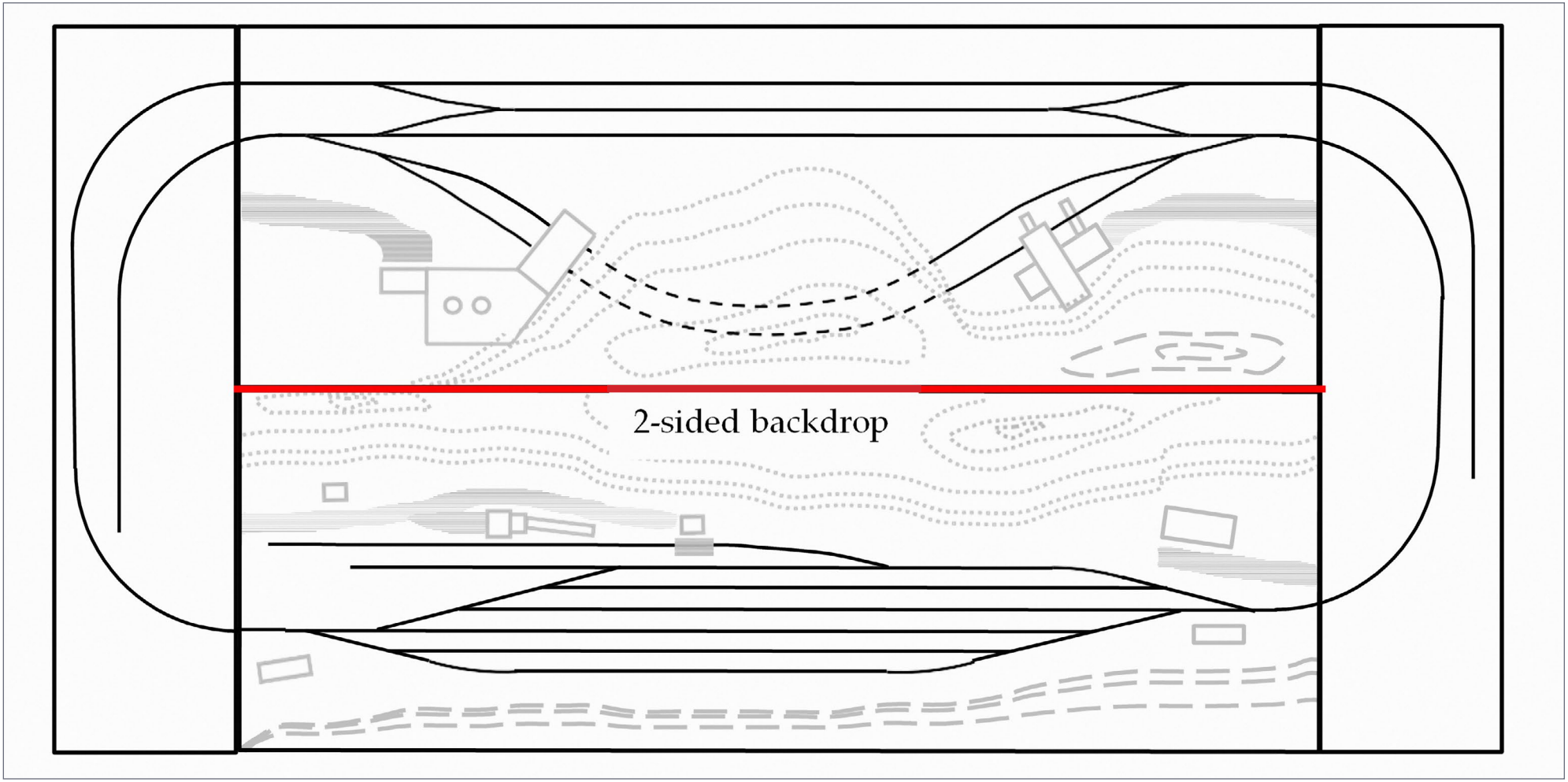
After running around the train, the empties are pushed into the loading track underneath the mine, through the tunnel, and out the power plant on the right side. The loaded hopper cars — which were previously pushed into the power plant receiving track and out to the mine by a C&O train — are pulled and the Clinchfield train of loaded hopper cars is ready to depart.



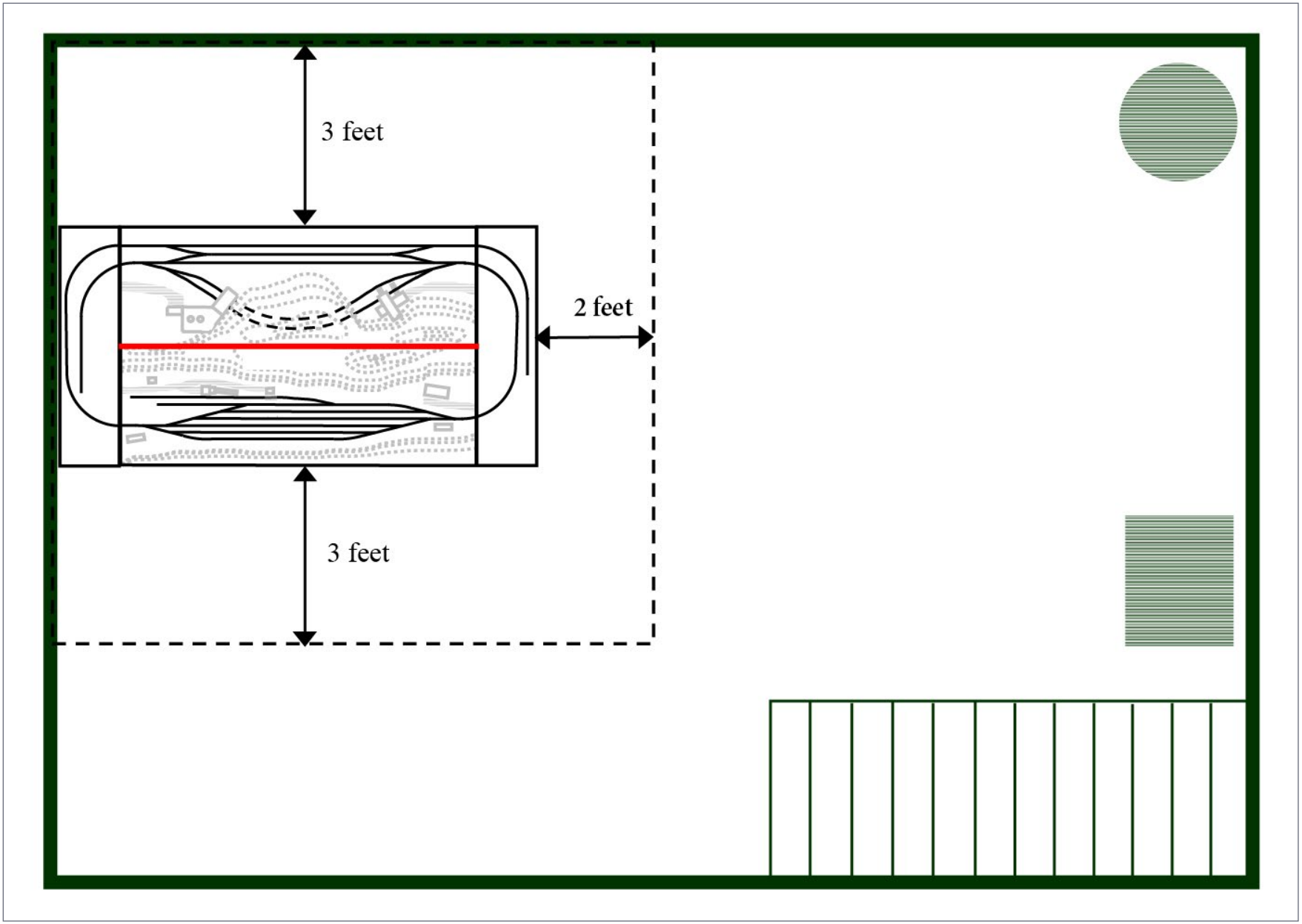
5. Mine module, 2 x 6-feet, N scale. Structure key: (1) coal mine, (2) power plant.

Stage 1 configuration

Initially, the two modules could be placed back to back, as described by Joe Fugate in the September 2017 issue of *Model Railroad Hobbyist*. A pair of 1 x 4-foot modules on either end would form a loop for continuous running [6-7]. This would be the quickest, most compact set-up for initial operations but it lacks mainline running distance and does not allow for staging between modules. However, this is an ideal set-up for display purposes.



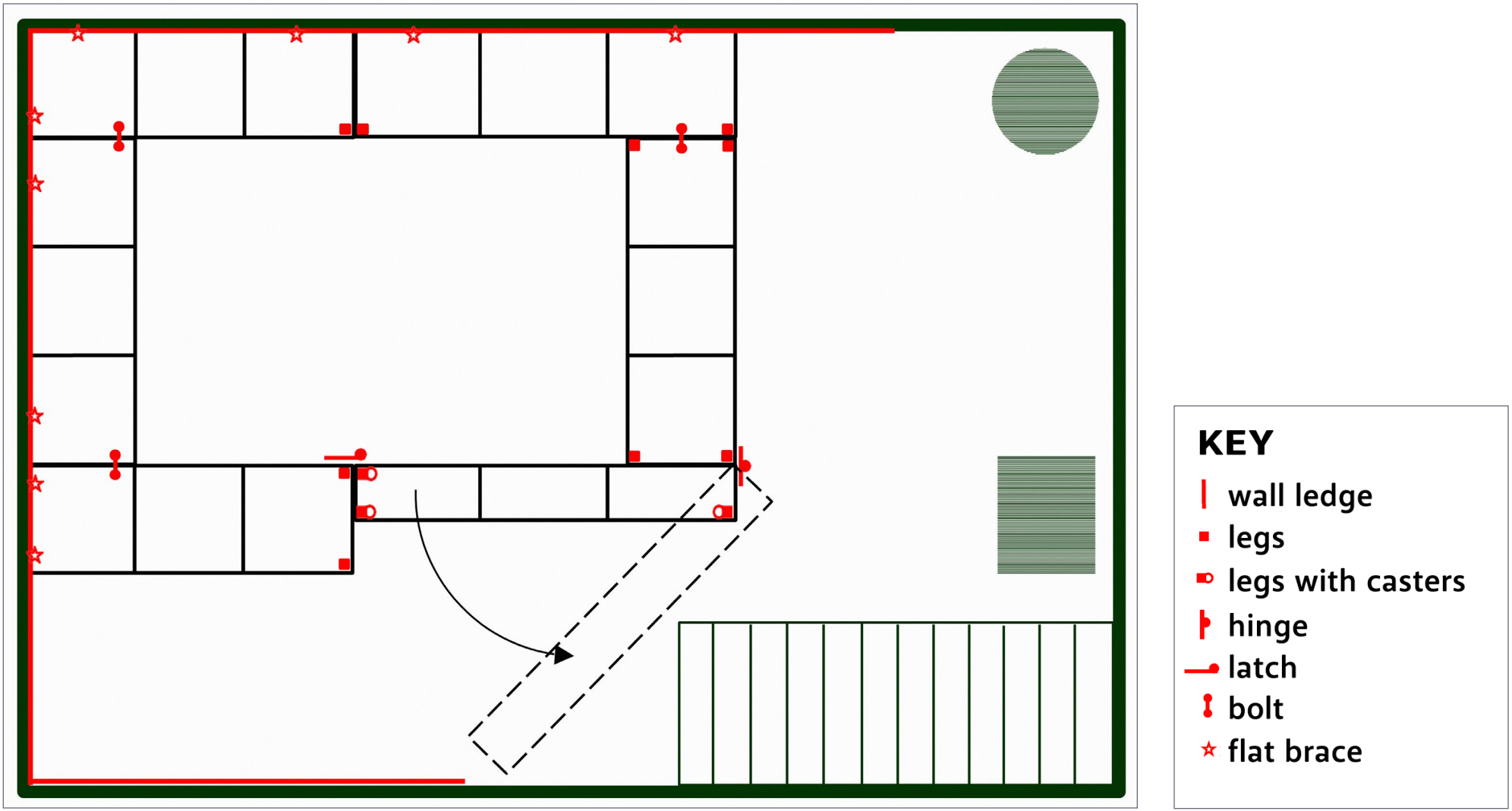
6. Island layout configuration, 4 x 8-foot overall size. The yard and mine modules are placed back to back and two end modules are added.



7. Island layout positioned in basement. Required footprint for layout and crew access is about 10 x 10 feet.

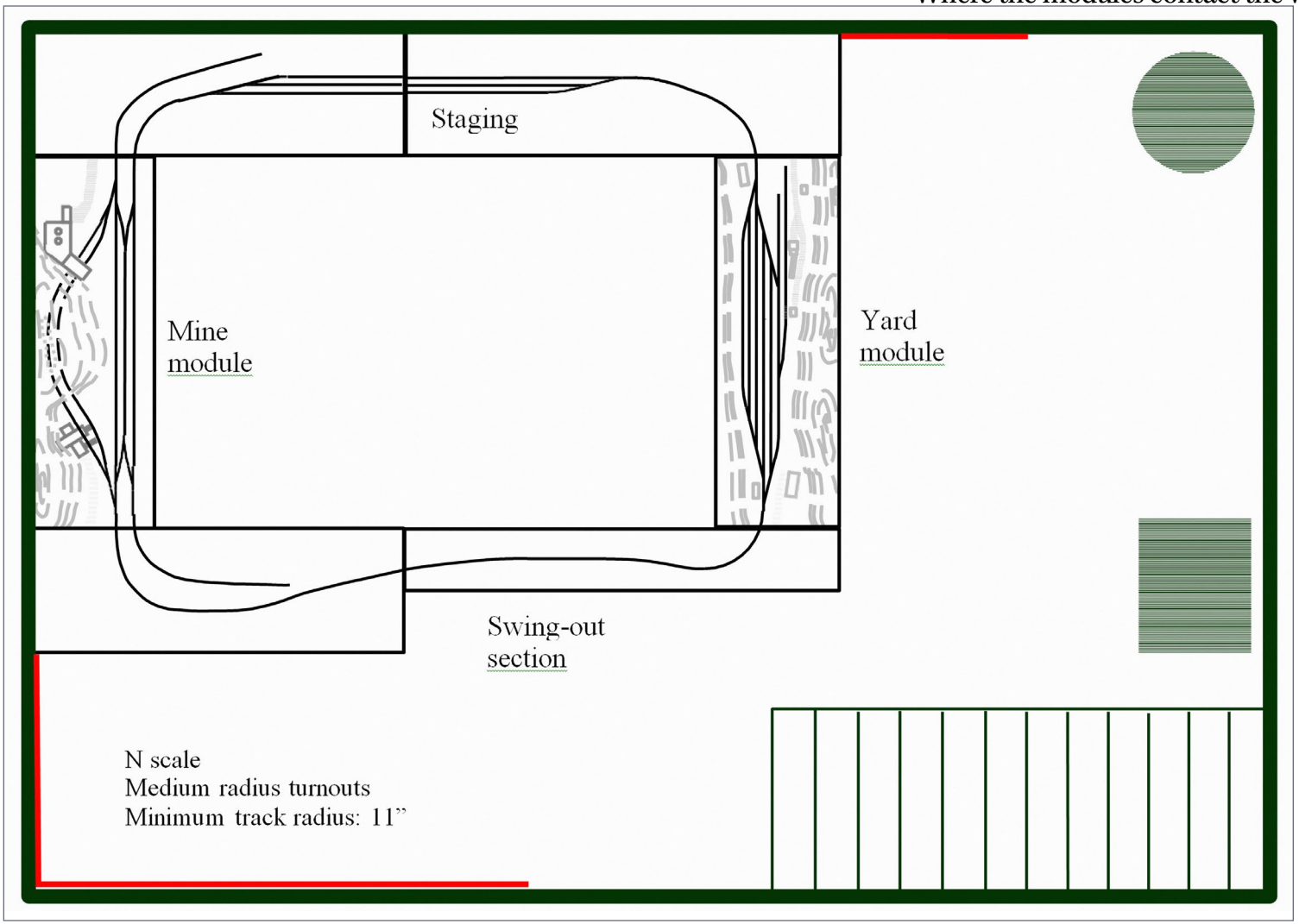
Given the operational drawbacks of [6] and my longer range plans for the layout, I elected to begin this *TOMA with a Twist* configuration as shown in [8-9]. There would be six modules, each between one to two feet wide and six to seven feet long,

built using open grid benchwork. The grids are constructed of three-inch-wide plywood pieces, cut from a 4 x 8-foot sheet of ¾" thick plywood. The pieces are glued and screwed together with ½" plywood sheet attached on top.



8. Stage 1 benchwork construction: module benchwork in black, supporting structure in red.

To support the modules, a wooden ledge is screwed into place along the three basement walls at the desired height, approximately 48" from the floor. Depending on how the wall is made,



9. Stage 1 module layout and track plan. Overall layout dimensions are 8 x 13-feet. A 6 x 9-foot inside area is available for the operators, accessed via the swing-out section.

screws into the wall studs or self-tapping screws designed for concrete will hold the ledge firmly in place.

Where the modules contact the walls, they sit on the ledge and are secured using flat braces screwed to both ledge and module.

For other locations, legs bolted to the modules, or modules bolted together, provide the support structure. For those who don't like to "duck under," I've shown how a swing-out section could be incorporated using a hinge. Casters on the legs supporting the section allow for rotation, opening a space for the operators to enter. A simple latch holds the swing-out section in its closed position when operating.

I've provided an estimate of the materials needed to build Stage 1 in Tables [1-3]. Table 1 provides details on building the benchwork. Table 2 summarizes the track and electrical components. I've specified Peco Insulfrog turnouts, which will simplify the wiring, but Electrofrog turnouts could be substituted for those who prefer live frogs. Both types of turnouts are the same price.

Table 1. Component list for Stage 1 supporting structure and benchwork.

Component	Quantity	Function	Comments	Cost
4 x 8-foot plywood, ¾" thick	1	Module benchwork structure	Cut plywood into 3" wide strips: 8 strips 6' long, 4 strips 7' long, 20 strips 22.5" long, 4 strips 10.5" long	$35.00
4 x 8-foot plywood, ½" thick	3	Module subroadbed	Cut plywood into sections: 4 pieces 2 x 6', 1 piece 2 x 7' and 1 piece 1' x 7'	$70.00
1 x 4-inch pine, 8 ft. long	5	Ledge on walls	Cut two of the boards to 7' long	$40.00
2 x 2-inch pine, 8' long	6	Legs	Cut each in half to form 12 pieces 4' long; later adjust lengths as necessary	$40.00
1 x 2-inch pine, 8' long	4	Bracing for legs	Cut to length as required	$30.00
3/16 " self tapping screws 2¾" long	25	Fastening ledge to walls	Tapcon brand, white steel	$7.50
Flat braces 5/8" wide x 4" long	12	Fastening modules to ledge		$7.50
¾" wood screws	1 pkg.	Securing flat braces		$5.00
1½" wood screws	1 pkg.	Fastening module benchwork		$10.00
Wood glue	1 bottle	Fastening module benchwork		$5.00
¼" bolts, 3" long with nuts and washers	24	Module and leg connections		$20.00
2" swivel casters	3	Swing-out section movement	Made by Everbilt	$10.50
2½" black barrel bolt	1	Swing-out section locking	Made by Everbilt	$3.00
2½" oil-rubbed hinge	1	Swing-out section rotation	Made by Everbilt	$4.00
			Total:	$287.50

Table 2. Component list for Stage 1 track and electrical. All track is N scale Code 80.

Component	Manufacturer	Quantity	Cost
RH medium radius turnout	Peco SL-395	11	$180.00
LH medium radius turnout	Peco SL-396	11	$180.00
Medium radius wye turnout	Peco SL-397	2	$32.00
Flextrack, 3-foot sections	Peco SL-300	32	$170.00
Cork roadbed, 3-foot sections	Midwest Products	40	$35.00
Bus wire	14AWG, 25'	2	$14.00
Feeder wire	24AWG, 25'	2	$8.00
Rail Joiners	Peco		$10.00
Track nails	Atlas		$4.00
		Total:	$633.00

There are several options for tackling the project: build all benchwork sections first and then lay track, or work on a subset of modules. I suggest building and installing the three benchwork sections on the left side first. The cork roadbed and track would be laid in place. The mine module could be rotated on the connecting bolts to provide easy access for the wiring. In short order, trains would be running back and forth.

Next, the yard module could be built. The front of the benchwork should be notched one to two inches to allow a hill to be formed in front, using foam scenery. The rear hills, also made out of foam, would sit on the plywood top. The module could be set on a table and flipped on its side for ease of track laying and wiring.

Note that Peco turnouts have built-in springs so that ground throws are not necessary. Once the track is laid and checks out,

Table 3. Component list for Stage 1 scenery materials.

Item	Details	Quantity	Cost
Ballast	Woodland Scenics fine gray, 57.7 in3	2 pkgs.	$26.00
Dirt	For ground cover and roads	As necessary	
Crushed coal	Woodland Scenics mine run coal, 10.8 in3	1 pkg.	$5.00
Foam	DOW Foamular, 2′ x 8′ sheet, 2″ thick	2	$42.00
Paint	Acrylic spray paint: brown, gray		$20.00
Trees	Woodland Scenics fine leaf foliage, light green	1 pkg.	$18.00
Bushes	Woodland Scenics foliage clusters, light green	45 in3	$12.00
Fixative	Woodland Scenics scenic cement		$10.00
Grass	Woodland Scenics fine turf, burnt grass	18 in3	$4.00
	Woodland Scenics coarse turf, burnt grass	18 in3	$4.00
		Total:	$141.00

the yard section would be connected to the benchwork along the wall and the final swing-out section could be built and added. Then, after connecting all the tracks, trains would be able to run around the circuit, from yard to industries and back.

With the track and wiring installed and debugged, it would be time for detailing the yard and mine modules, as well as building structures. I have several comments regarding some of the recommended structures:

Coal mine: Coal mines came in all shapes and sizes. For the module, a mine that extends out from the hill over the loading tracks would be optimal [10]. The best available N scale kit is probably the classic Model Power Coal Mine kit, which I believe is based on a Jack Work original design. With careful painting and weathering, this plastic kit could be made to look like dilapidated wood, with lots of character. The upper shaft house should be cut so that the main body sits closer to the hill. The two outermost loading tracks — those with the most visual interest — would be used on the module.

Power plant: Consistent with the *loads in, empties out* approach, I was looking for a structure that resembled a power plant, but had two tracks entering the structure. While browsing through the Walthers monthly flier, I happened upon a structure that fit the bill:

LOADS IN, EMPTIES OUT

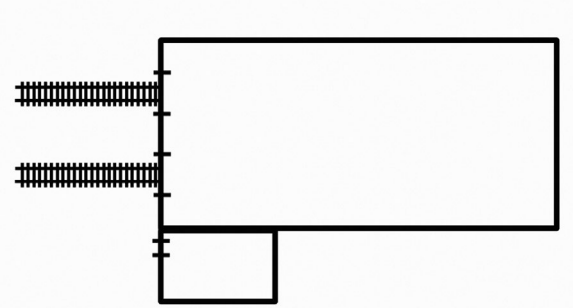
How can we make it easier to deal with open top cars where it's obvious they're not really loaded when we pull them from the industry? The famed late Dean of track planning, John Armstrong, suggested a loads-in/empties out pair of industries placed back-to-back, separated by a backdrop.

You model a shipping industry (eg., coal mine) on one side of a backdrop and on the opposite side you model a receiver (eg., power plant). Loads entering the power plant pass through the backdrop and reappear as coal loads at the mine. Conversely, empties going under the coal tipple reappear on the other side as empties at the power plant. It's self-maintaining!

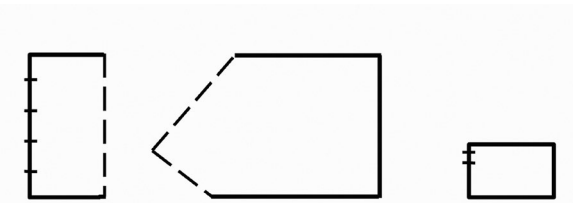
This allows loaded hoppers to go in one direction and empties in the other without needing to manually load and unload the hoppers.

10. Example of a coal loader suitable for modeling. This building could be connected to a mineshaft, but it's equally possible it is connected to a conveyor belt or a truck dump. There is probably a space for sorting and grading coal in the structure, with different sizes loaded on different tracks. This mine was part of the PV&K coal company in eastern Kentucky.

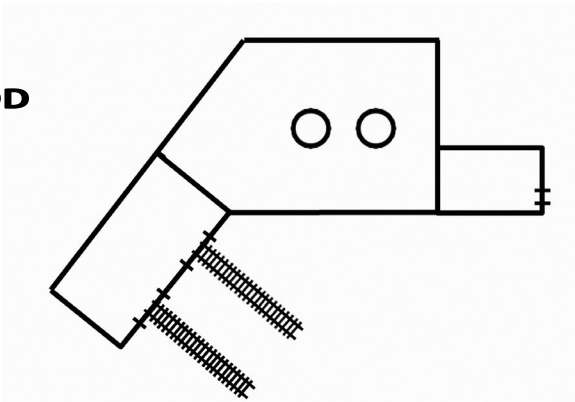
TOP VIEW OF DIESEL HOUSE, WITH TRACKS ENTERING STRUCTURE



CUT SECTIONS AS SHOWN AND SEPARATE SIDE BUILDING



REASSEMBLE PARTS AND ADD SMOKESTACKS



11. Kitbashing steps to convert the Walthers Diesel House to a power plant for use on the mine module.

the Walthers Brick Diesel House. A few simple cuts and rearrangement of this structure would yield a fine model. The steps in [11] show how this could be done.

Coal Loader: There were several coal loaders at Elkhorn City — modeling one would be sufficient for our purposes. The December 2012 and January 2013 issues of *MRH* featured construction articles by Tom Patterson on a coal loader that would work well here. He based his on a Clinchfield design. Tom's model was HO scale, but it could be built in N scale without too much difficulty. Or, you could build your own from a suitable array of kits and components. The Walthers Cinder Conveyor and Ash Pit is one such possible kit.

Other small structures at Elkhorn Yard included a track scale to weigh the coal loads, a yard office, utility sheds, and a fuel tank. Table 4 is one possible structure list.

Don't forget the telephone poles!

Table 4. Recommended structure list

Structure	Model	Cost
Coal mine	Model Power Old Coal Mine	$30.00
Power plant	Walthers Brick Diesel House	$45.00
Large shed	GC Laser Shim Shed	$8.00
Small shed	Wooodland Scenics Built-up Wood Shack	$16.00
Office	BLMA Yard Office	$17.00
Fuel tank	NGINEER Fuel Storage Tank	$10.00
Track scale house	Woodland Scenics Built-up Work Shed	$16.00
Coal loader	Sctratchbuilt or Walthers Cinder Converyor and Ash Pit	$26.00
Telephone poles (12)	Atlas	$4.00
	Total:	$172.00

Operations

Over the years, both the Clinchfield and the C&O used several different types of hoppers to move coal [12], including capacities of 55, 70 and 100 tons. These models are available from Atlas, Bachmann and Bowser, among others. The layout could support four main cuts of hopper cars; each cut would be about 40 inches long, which is the approximate length of the longest sidings on the yard and mine modules. Two of the cuts would always be loaded and the other two, always empty. These cuts would be traded between the yard and mine module in a regular sequence.

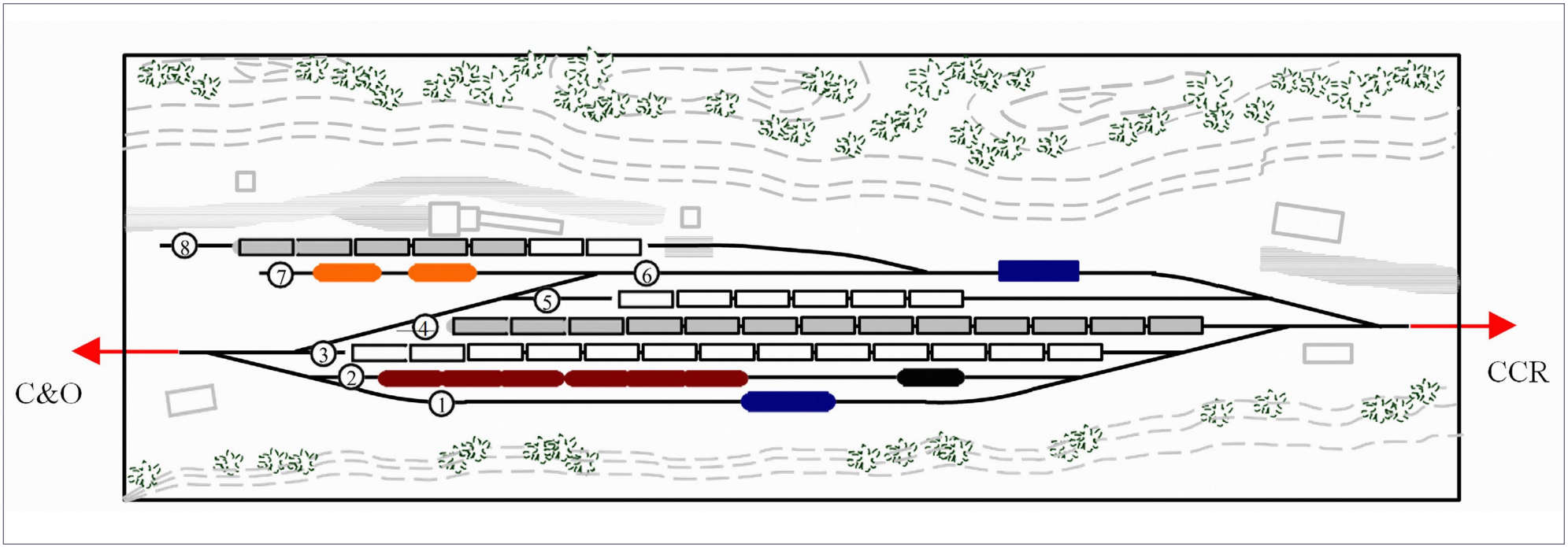
An additional set of hopper cars could be alternatively loaded or empty as they cycle between staging and the Elkhorn coal loader. These loads could be built to be removable using a magnet, as described by Mike Holly in the August 2016 issue of MRH. Mike also models in N scale; in the article, he describes how he weathers his hoppers and creates the removable loads.

12. Close-up of C&O engines and hopper cars loaded for shipment at the Danville train yard near Charleston, WV. In 1974, the date of this picture, this was one of the largest shipment points for coal in the world.

For variety, a few boxcars, flatcars, and tank cars could be inserted into the trains, carrying supplies to the yard, mine, and power plant as necessary. The actual sequence of operations would be up to you. Given the need to closely operate locomotives from both railroads on the layout, I recommend DCC control, but the layout could be wired for DC control as well.

The yard tracks are arranged simply to promote efficient transfer, storage and switching of cars while allowing engines from both railroads room to maneuver [13]. The two longest yard tracks are used primarily for train transfers while the adjacent tracks are used for storage and the thoroughfare tracks are kept open so

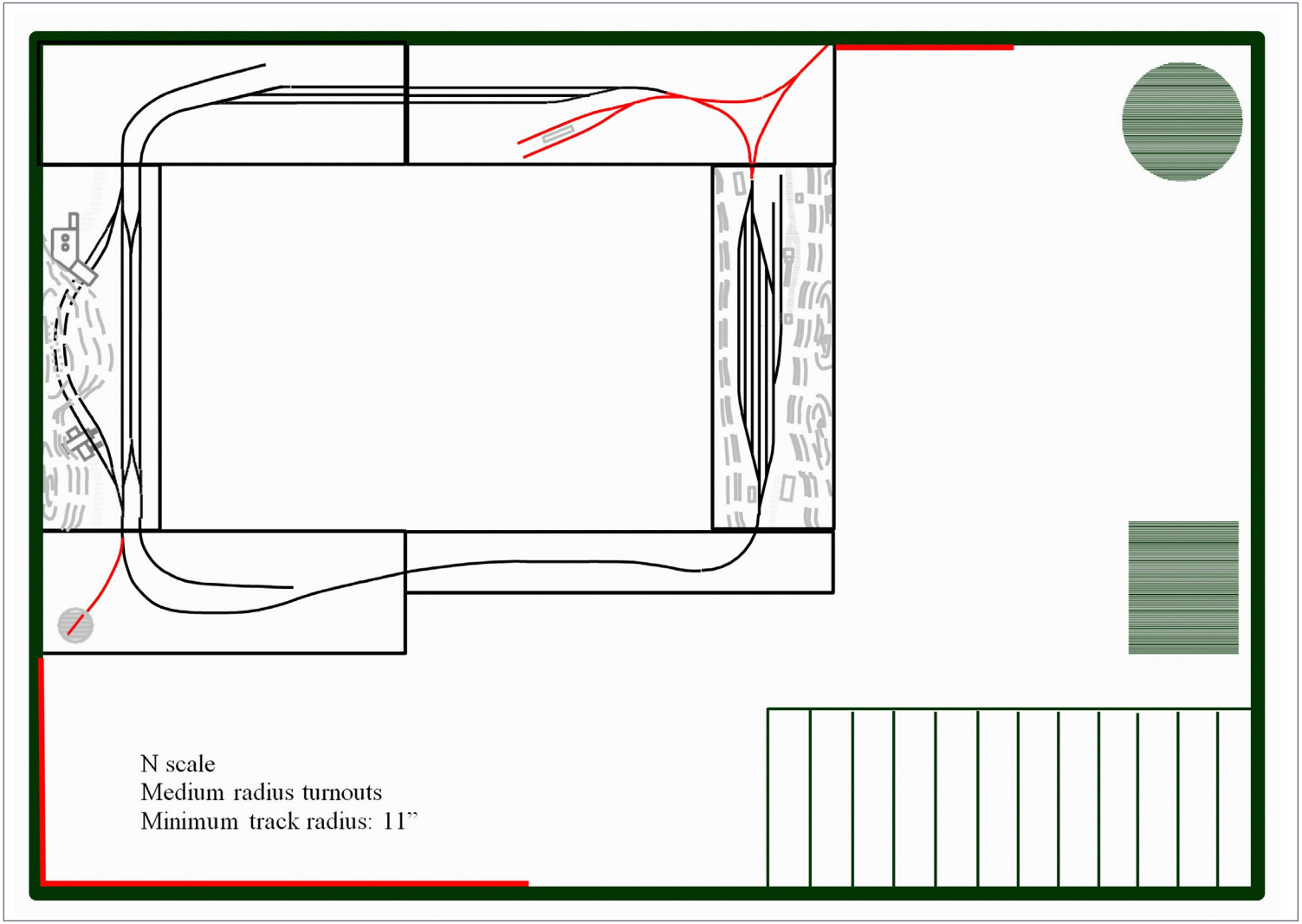
that engines can run around the trains. A local yard engine can switch the coal loading track during lulls in the transfer movements. Cabooses may be stored on the dedicated caboose track.



13. Elkhorn yard operations: (1) and (6) thoroughfare tracks; (2) and (5) storage tracks; (3) and (4) transfer tracks; (7) caboose track and (8) coal loading track. Engines are indicated in blue.

Stage 2 configuration

A wye and a small engine facility stood at the north end of the Elkhorn yard. For Stage 2, these features can be added [14]. Adding this track enhances operations as engines from either railroad can be turned and serviced prior to their return



14. Stage 2 module layout and track plan. Turning tracks and service facility are added, as indicated in red.

assignments. A small between-tracks diesel service station—including fuel, sand, and water—would work well here. Stewart’s Products offers some good choices for the service station.

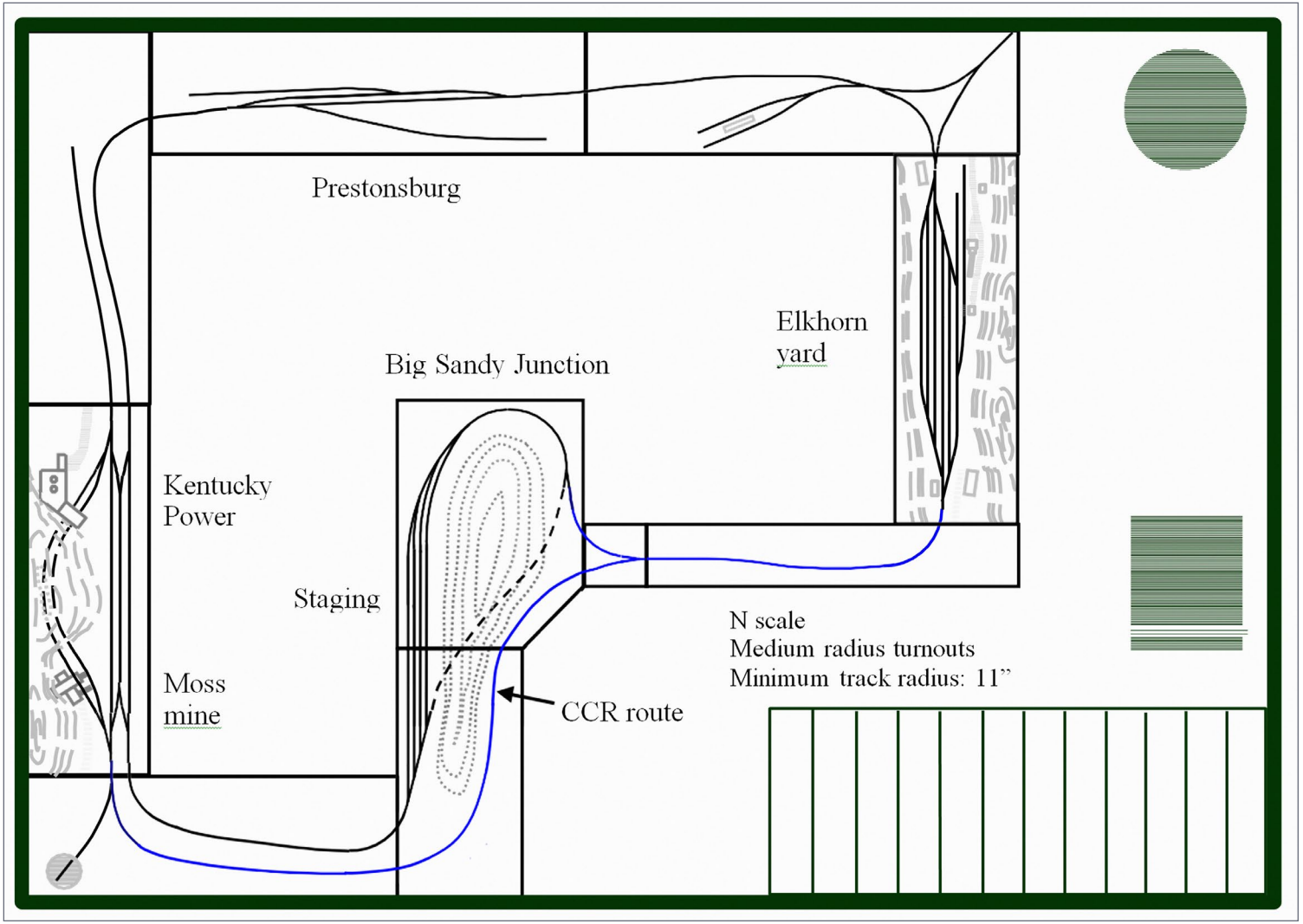
A turntable may also be added near the mine to turn the local engines. In this way, engines can be preferentially oriented for both north and south directions along either line. In most pictures I’ve seen, the locomotives ran short hood forward for improved visibility; however, for safety purposes, there might be a preference for running long hood forward. This would also allow for backdating to the steam era.

Final configuration

In the longer term, the layout can be expanded as shown in [15]. In this arrangement, Elkhorn and its connecting modules move to the upper right while the mine module and its neighbor move to the lower left. Three additional modules fill the gaps. The

swing-out section is shortened one foot to allow the wye and curved track to be permanently installed, making the track alignment easier.

The final arrangement increases the mainline running distance for both railroads and also provides staging for both railroads. Up to four people can comfortably operate the layout. The return loop (hidden under hills) allows northbound C&O trains to reverse direction and return as southbound trains. Or, southbound trains from staging could travel all the way through Elkhorn, along the Clinchfield line and back into staging for later use. Prestonsburg — midway between Elkhorn and Big Sandy Junction — allows for switching variety beyond the usual coal traffic. Industries here could include a lumber yard and a freight transfer station.



15. Final module layout and track plan.

Scenery

There are plenty of scenic opportunities. Tree-covered hills could be modeled at the rear of the modules, rising to meet backdrops along the walls; some of the front benchwork sections may be trimmed to better follow the track and create a free-flowing edge if desired. The track plan is flexible and may be altered to suit your needs.

I would avoid putting in too much track; having stretches of mainline between switching locations allows room for trains to breathe and improves the operating experience.

All the sections are portable and could be removed from the basement easily. The module designs allow flexibility in future layout arrangements if a move is required. The heart of the layout is the opposing set-up of the yard and mine modules; any number of modules could be fashioned between them to fit the available footprint at a new location. Even a room as small as 10 x 10-feet would work if the island layout design [6] was adopted.

I think this would be a fun layout to operate – switching cars and swapping trains with fellow operators. And fun, after all, is what this hobby is all about. ☑

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VIEW READER COMMENTS *click here*

PETER VASSALLO

Peter lives in Albany, NY and works as a mechanical engineer. This design project takes him back to his roots as he had an N scale layout as a boy growing up in Buffalo, NY. Now, he models mostly in HO scale and favors western railroads, particularly the narrow gauge lines of Colorado and California. An article on his HOn3 Alistair Road layout was published in the May/June 2017 issue of the *Narrow Gauge and Shortline Gazette.* He has had articles published in *Model Railroader* and *Model Railroad Hobbyist.* ■