

MODELING SMALL LAYOUTS



Amtrak No. 338 to Rockford crosses the Rock River on the *Model Railroader* and *Trains.com* staff's N scale Milwaukee, Racine & Troy State Line Route. This compact model railroad doesn't replace the HO scale MR&T; it extends it. Read how we built this project layout starting on page 8. Photo by Connor Bruesewitz/Saturn Lounge

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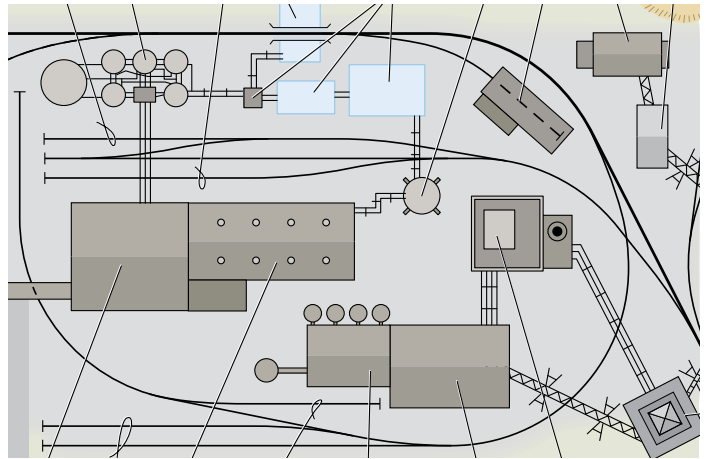
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Making mountains for MR's project layout with plaster gauze on a cardboard web/by Eric White



A boxcar of building supplies is spotted on the HO scale Winston-Salem Southbound, our 2018 project layout. See page 28. Bill Zuback photo



Looking for small track plan inspiration? Turn to page 51 to check out the 4 x 8 foot HO scale Buckeye Paper Co. and three other compact plans by the MR editors. Illustration by Kellie Jaeger



A ghost town in California that once served a sprawling iron mining complex inspired Eagle Mountain, our 4 x 6-foot HO scale 2016 project layout. See page 56. Bill Zuback photo

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ON THE COVER: Kaiser Steel No. 1037, a General Electric U30B, emerges from a tunnel on the HO scale Eagle Mountain layout. Bill Zuback photo



Think your small layout has no space for staging? Think again. Here are four compact ideas for bringing trains from the outside world onto your layout. Model Railroader staff photo



Meet the MR&T STATE LINE layout

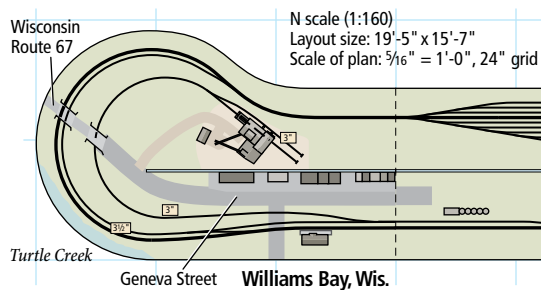
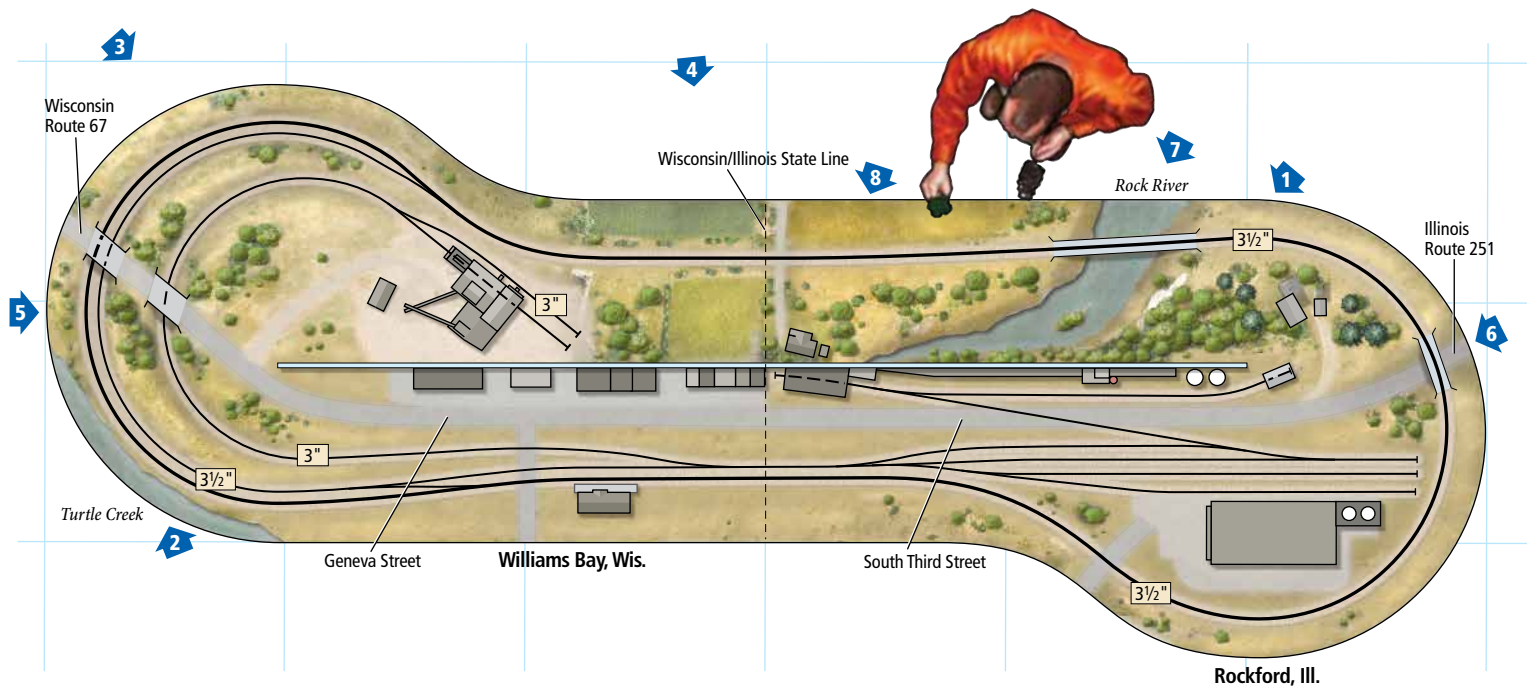
The Milwaukee, Racine & Troy
is now available in N scale

By Eric White

Photos by Connor Bruesewitz/Saturn Lounge

1 Amtrak No. 338 to Rockford crosses the Rock River on the *Model Railroader* and Trains.com staff's N scale MR&T State Line Route. Read how we built the layout.



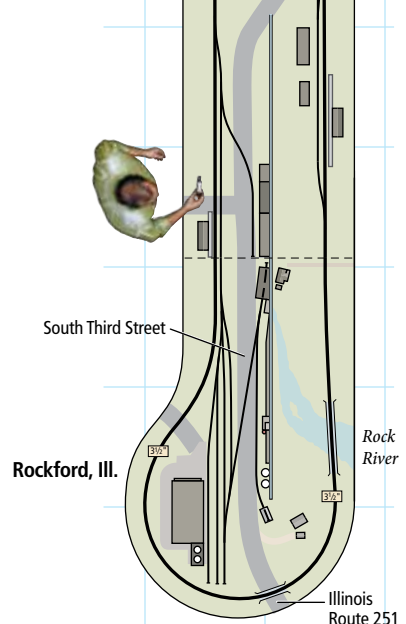


MR&T State Line

N scale (1:160)
 Layout size: 4'-0" x 12'-0"
 Scale of plan: 5/8" = 1'-0", 24" grid
 Numbered arrows indicate photo locations
 Illustration by Kellie Jaeger
 Find more plans online in the
 Trains.com Track Plan Database.

THE LAYOUT AT A GLANCE

Name: MR&T State Line Route
Scale: N (1:160)
Size: 4 x 12 feet
Prototype: Freelanced;
 Milwaukee, Racine & Troy
Era: 1980s
Style: island
Mainline run: 28 feet
Minimum radius: 18"
Minimum turnout: No. 6
Maximum grade: 1 percent
Benchwork: plywood subroadbed
 on L-girder
Height: 49"
Roadbed: cork
Track: Micro Engineering code 55
Scenery: Sculptamold over
 extruded-foam insulation board
Backdrop: SceniKing from BPH
 Enterprises printed scenes on
 painted tempered hardboard
Control: Digitrax DCS-210+ Digital
 Command Control

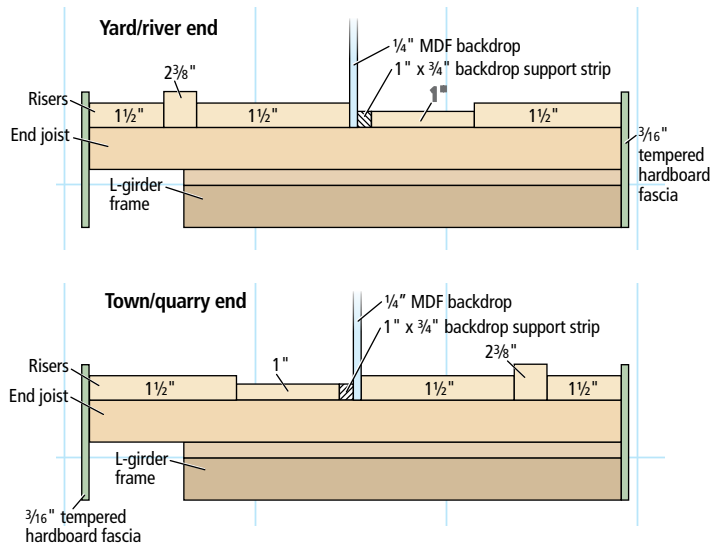


Plywood top

I used $\frac{1}{2}$ " plywood for the subroadbed on the layout, as well as to support all non-track areas. The diagram shown provides a basic idea of the cuts necessary to get the top to the layout. Again, don't forget the $\frac{1}{4}$ " slit that needs to be cut for the backdrop.

You'll notice that the two sheets of plywood shown have an extra 46" half-circle cut from each. This circle fits underneath the fan joists to support the fascia ($\frac{3}{16}$ " tempered hardboard), as it is bent to conform to the tight 23" radius curve at each end of the layout. The plywood is notched to fit around the L-girder frame and is screwed to the bottom side of the fan joists.

Layout Face Plates With All Risers Installed



Risers

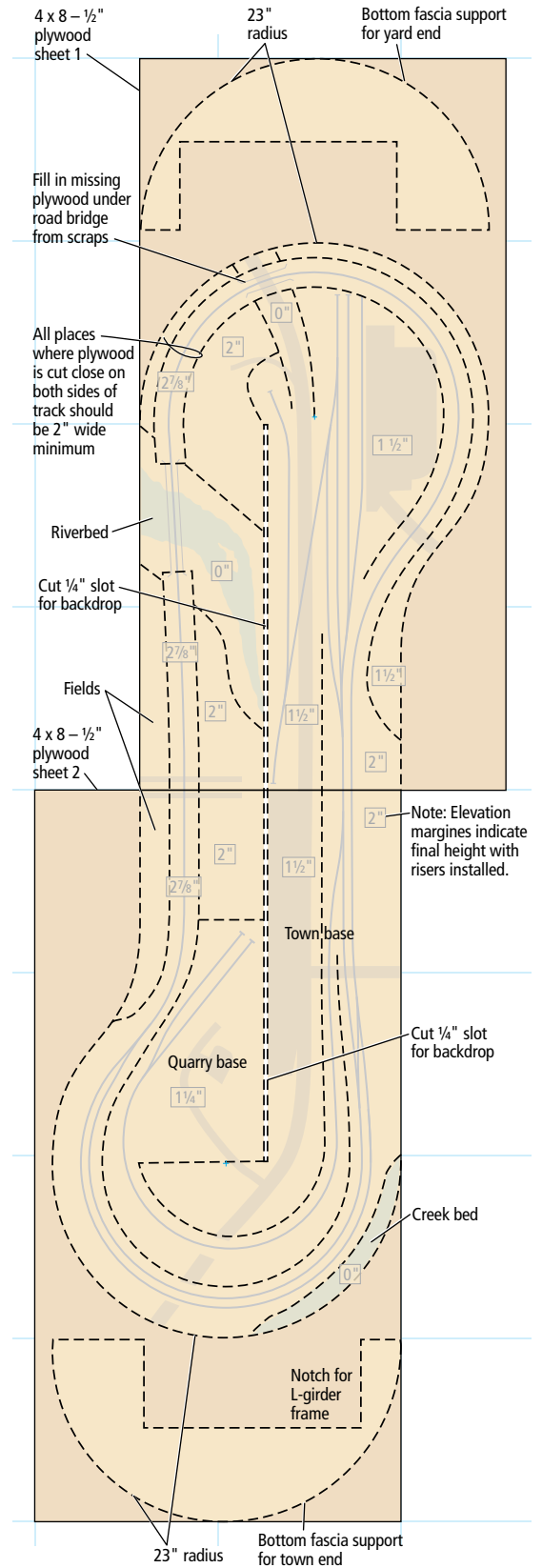
Thanks to the joist system, L-girder benchwork makes elevating sections of the layout easy. You can elevate the track by attaching risers to the joists, sliding them up and down until the track is at the correct height, then attaching the riser with screws to lock it in place.

Another option, and the one I used for our layout, was to cut support blocks of various thicknesses, then glue those to the tops of the risers to elevate the track. Once the glue set up, I installed the plywood top, using screws to lock it to the risers.

You can use the elevation markings on the plywood cutting diagram as a guide. Anything attached directly to the top of the joists, such as the river and the creek, has an elevation of 0". I've included a diagram showing the elevation blocks I installed at the face plates where the two sections of the layout join up, as this area covers nearly all of the main elevations I used on the railroad.

With the plywood installed, we're ready for the next step in the project – laying track and installing the Digital Command Control system. [MR](#)

Plywood Cutting Diagram



Smooth track and wiring THAT WORKS



David Popp shows his favorite techniques for laying and wiring track. He also installs a new Digitrax DCC system on the layout. Photo by Connor Bruesewitz/Saturn Lounge

Building a model railroad that operates reliably starts with the rails and how they are powered

By David Popp • Photos by the author unless noted

Want to learn the secret to building a model railroad you'll enjoy for years to come? Then this installment of our State Line Route N scale project railroad is for you! The key to a successful model railroad is in the track and wiring. If you take the time to build good track and wire it properly following time-tested techniques, your trains will run well every time you power up the layout.

Following are a few of my favorite layout-building tips. You can learn even more of them by watching the State Line Route video series on Trains.com. Regardless of scale, everything here will help you build a better model railroad.

Roadbed



Cork: As demonstrated by Rene Schweitzer in the photo, we used cork strips laid on top of 1/2" plywood subroadbed. The roadbed is N scale cork from Midwest Products. It's easy to work with and can be glued to the layout using a variety of adhesives. We used white glue, tacking curves with pins until the glue dried.



Sand the edges: The cork strips have a bevel cut into them to form the profile of the right-of-way. The top of the bevel usually has some rough edges left over from the cutting process. After the glue has dried, sand the edges of the bevel smooth. This tip will help the ballast sit properly on the shoulders later.

Track

Many manufacturers offer ready-to-use track components. For our project, we worked with Micro Engineering code 70 N scale track. This was my first experience using this brand for an entire railroad, and I am very happy with how it looks on the finished layout.

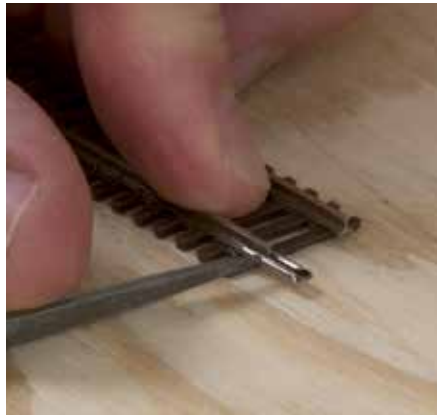
The track is easy to cut, can be attached with nails or glue (or both), and is robust enough to stand up to the layout building process well. There are also bridge track sections available. Following are some of my favorite tips for laying track in any scale.



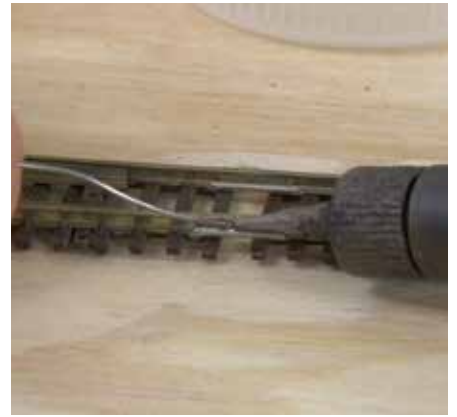
Starting point: I always begin with the most complex trackwork. In this case, I started in the yard. It's far easier to lay a complex set of turnouts and their connections first than it is to fit them later with surrounding track installed.



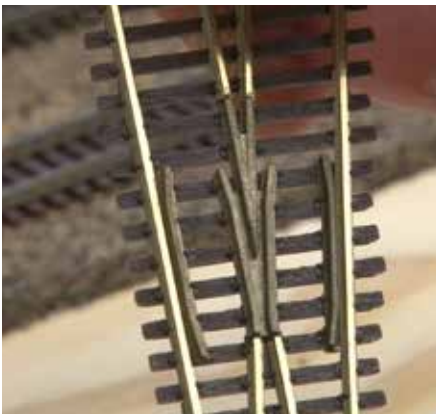
Quick cuts: Code 70 rail is easy to cut with flush-cutting pliers. I used a pair of Xuron rail cutters, sold in the Kalmbach Hobby Store. Two tips for using flush-cutting pliers: First, always face the smooth side of the track section you want to keep. Second, never use the pliers to cut anything other than rail.



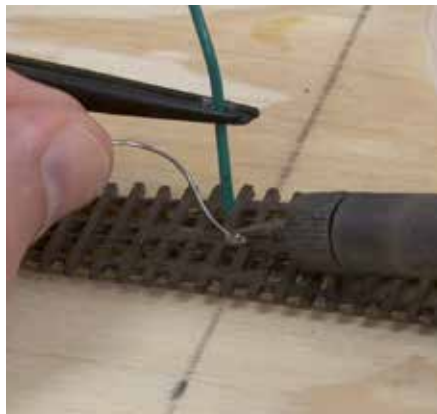
Fitting joiners: Although the pliers make smooth cuts, they often leave burrs on the bottom or top edge. I clean those up with a few passes with a needle file. I also use a chisel blade in my hobby knife to remove the tie plate detail on the first tie. Afterward, I install the rail joiners to make sure they slide on smoothly.



Solder rail joints: Before I install a group of track components, I solder the joiners to the rail. While you can do this after you lay the track, it's much easier to do at your workbench where everything is easy to see and reach. I leave an unsoldered joiner every 4-6 feet to accommodate seasonal layout expansion.



Unpowered frogs: Micro Engineering track is considered DCC friendly, meaning that the turnouts are built in such a way as to make it difficult for a locomotive running through them to cause a short. As shown in the photo above, the turnouts have a cast-metal frog that is isolated from the rest of the turnout.



Frog feeders: The turnouts will operate more reliably with powered frogs. On the bottom of the frog there's a wire socket with a solder pad. I used 22AWG wire to power the frogs, soldering the wire to the pad. As shown later, I connected the wires to Tam Valley Depot Frog Juicers when I installed the DCC system.



Roadbed paint: Turnouts have a lot of moving parts to them, and over the years I've learned that if you paint the roadbed under them black, you can use less ballast and glue around the points and switch rods – places that ballast can gum up. I used flat black latex paint, although acrylic craft paint will work just as well.

SCENERY TIPS

you can count on



A few short weeks earlier, this detailed urban setting was just bare plywood and track. Going from that to this is all just a matter of following some basic scenery construction steps. Conner Bruesewitz/Saturn Lounge photo

Simple steps to take your layout from bare plywood to showstopping scenes

By David Popp • Photos by the author unless noted

Scenery gives shape to the landscape and definition to the environment in which you run your trains. Without scenery, a layout is nothing more than a collection of track and trains. With scenery, a layout becomes a place as realistic as the world standing just outside your front door.

While the scenery process can seem complex, it really isn't difficult when taken as a series of smaller projects, each following basic construction steps like those shown here. It does, however, require a degree of patience, as you often need to wait for something to dry before you can work on the next step.

I find scenery work to be one of the most enjoyable and creative aspects of building a model railroad. It gives you a lot of room for personal expression, and when in doubt, you can always look to see how nature does it and try to replicate that. The best part is that your scenery doesn't need to be finished all at once. You can install a basic layer of scenery first to give your layout a finished appearance, but then continue adding scenic details to your model railroad for years to come as you have time and ideas.

Following are some of the scenery techniques we used on our State Line Route layout. These are just a starting point for layout scenery. But by mixing and matching the techniques and products shown here with others, the possibilities for your layout are endless.

Backdrop



Horizon only: Rene Schweitzer and I installed the backdrop on the layout before doing any other scenery. First, we painted the 1/4" medium density fiberboard (MDF) backdrop with sky blue latex paint and brushed a bit of white at the bottom to create a simple, hazy horizon. Next, we cut out trees, buildings, and fields from several N scale SceniKing (sceniking.com) paper backdrops and applied them to the layout using spray adhesive.

Landforms



Foam contours: The first step in adding the landscape is to build a structure to support it. Ours is made with extruded-foam insulation board strips around the outside edges and crumpled paper and packing peanuts in the middle. To begin, we framed in areas around the layout with strips of 1" foam. We used the contours of the fascia as a guide to mark where to cut the foam to make hills and valleys. The foam supports the scenery, so the fascia is still removable.



Quick cuts: Foam is easy to cut with a variety of tools. We used a Woodland Scenics hot-wire foam cutter. Simply plug it in and press the button. The wire heats up enough to slice cleanly through the foam without producing too many fumes. (Even so, be sure to use the tool only in a well-ventilated space.) As shown here, Rene is using the cutter to slice through one of the foam strips, following the contour lines traced from the fascia.



Gluing foam: The foam board can be attached using a variety of adhesives. One of my favorites is latex caulk. The caulk provides quick grab and has about 30 minutes of working time, allowing for easy repositioning of parts. If you change your mind later, it's easy to pry up the foam with a putty knife. When selecting a caulk, be sure to use one that is foam-safe, as some contain solvents that will damage foam. Acrylic latex caulk is almost always safe for foam.



Slopes and angles: The hot-wire foam cutter is great for making slopes and angles. Along the roadbed, we cut foam board to slope at an angle down and away from the subroadbed to represent places where the railroad built fills to support the right-of-way. We also cut angles into other sections of foam placed higher than the roadbed to simulate cuts through smaller hills. Even in the flattest sections of the countryside, the land still has some contours to it, and gentle fills and cuts are the easiest way to make your railroad's right-of-way look realistic.



Filling it in: Between the foam, you can use a variety of materials as filler. In some places we used wadded balls of kraft paper. The paper works well in any location that still can get some airflow, as it needs to dry out after the wet plaster cloth is applied. In confined locations where air flow can be a problem, we used foam packing peanuts. We held the paper filler and foam peanuts in place with masking tape. The tape also makes it easy to see the contours of your scenery, allowing you to make adjustments to places that seem low or high before you cover them with plaster cloth.



SCENERY THAT SPLITS

Since the layout is built in sections that can come apart, the scenery needs to be able to do so as well. Using the same technique as along the fascia and roadbed, we applied contoured foam strips on either side of the joint. The foam supports the scenery when the layout is separated. Before applying the plaster cloth, as shown on the next page, we slipped .010" sheet styrene into the joint to keep the sections of the layout from getting glued together. – David Popp

◆ L-GIRDER BENCHWORK

Developed by former *Model Rail-roader* editor Linn Westcott in the early 1960s, L-girder benchwork makes an extremely strong support system for small and large layouts alike. The girders can run up to 12 feet between legs without any additional support. David demonstrates the benchwork's sturdiness in the photo below.

As shown in the drawing on the previous page, two L girders provide the heart of the Southbound's benchwork. An 8'-2" girder runs along the front, while an 8'-3½" girder runs at a diagonal along the back. Each girder is

made of a 1 x 4 beam with a 1 x 2 flange glued to it. David used 1" brads to further secure the joint while the glue cured.

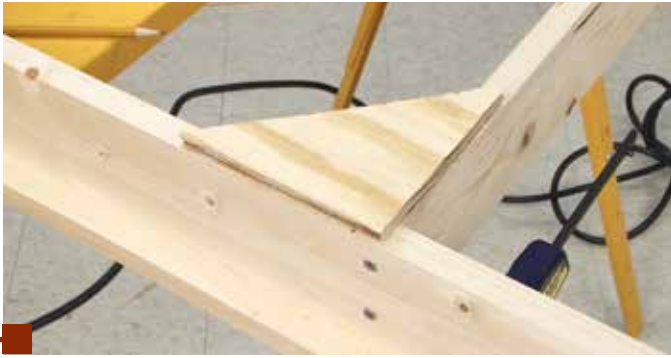
In addition to reinforcing the beam, the flange also provides a convenient attachment point for the joists that run perpendicular to the girders and support the subroadbed. With the joists resting on the flange, David screwed them in place from underneath with 2" screws. He didn't use glue, so the joists can be re-positioned as needed.



Casters. To make the layout easier to move, David attached 3" casters to the legs with 1" screws. He removed the caster prior to drilling the pilot holes. This avoided getting sawdust in the bearings, which could bind the caster's swivel action.

L girders. Trains.com director David Popp demonstrates one of the key benefits of L-girder benchwork. The engineered beams can be run for long distances and easily support the weight of a model railroad without sagging.

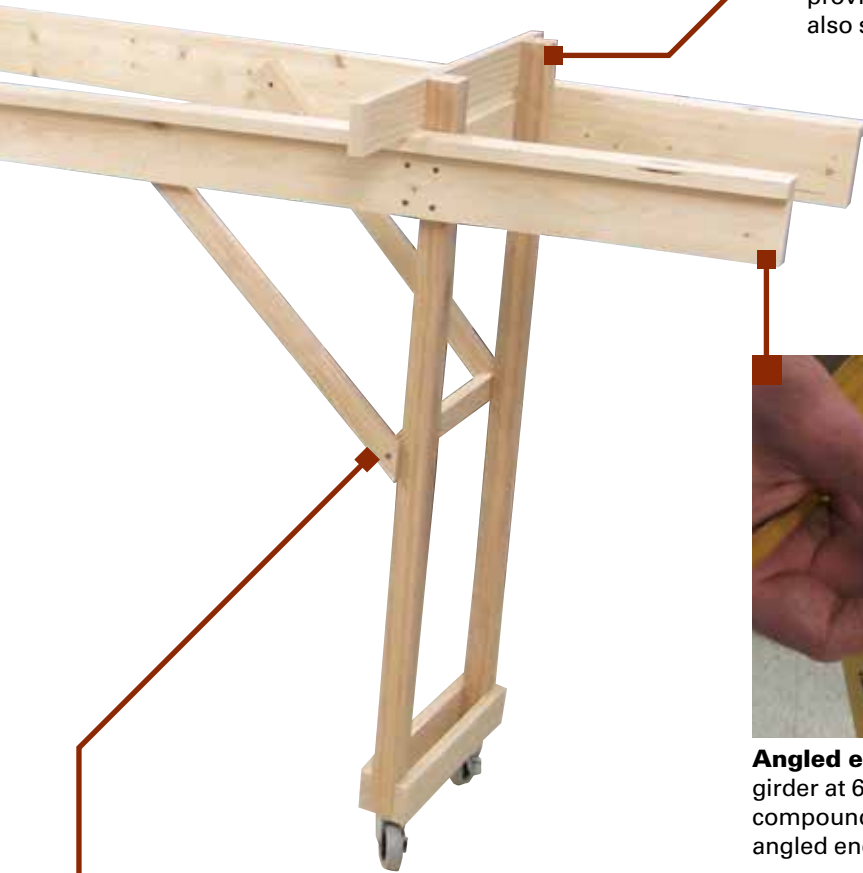




Crossbraces. With the L girders flipped upside down, David attached the 1 x 3 crossbraces with wood glue and 2" screws. He glued 5" square triangles made of scrap plywood to further strengthen the joint.



Joists. Using 2" screws, David attached the first two joists above the crossbraces between the girders. These joists provide another attachment point for the legs, which are also screwed into the crossbraces and sides of the L-girders.



Angled ends. David needed to cut the ends of the angled back girder at 6 degrees so the fascia would fit flush at each end. A compound miter saw proved the perfect tool to easily cut the angled ends.



Angle braces. Made of 24" lengths of 1 x 2, angle braces are screwed into the inside of the L girder and a 1 x 2 block. For a better fit, David cut a 6 degree angle into each end of the 1 x 2s that ran along the back diagonal L girder.