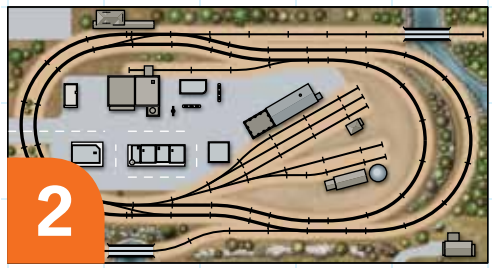
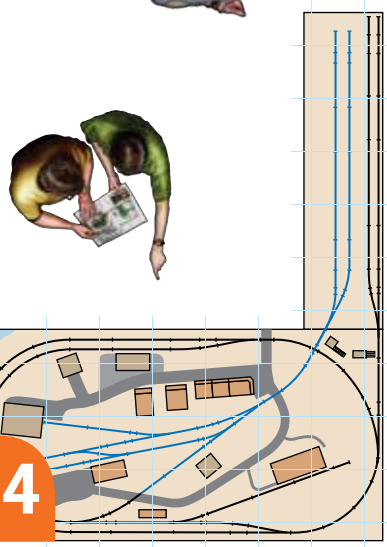
102 Realistic Track Plans

ON THE COVER: This compact locomotive terminal and several rail- and river barge-served industries are just a small part of David Popp's HO scale plan for the Grand River Ry., featured as plan 102 in this book. Illustration by Rick Johnson and Jay Smith



Page 11



Page 23

Page 41

Page 77

Even a small model railroad can have grand scenery. This HO scale bridge and river scene is on the 2 x 6 foot extension to plan no. 18, the Turtle Creek Central. Bill Zuback photo

4x8s and a little more

Track plans that start with a sheet of plywood

By David Popp

The traditional beginner model railroad is a layout built on a 4 x 8 foot sheet of plywood. The easiest explanation for this is that plywood, as well as foam insulation board, is sold in those dimensions. One can simply buy a sheet of ¾" plywood, set it on saw horses or an old table, and run trains.

For a more stable layout, try senior editor Jim Hediger's all-plywood benchwork plan shown at right. The plan calls for two sheets of ½" plywood. One is ripped into 13 strips 3½" x 96", which are used to make the legs and frame. The other is used for the layout top. From there, you can add the roadbed, track, and scenery materials of your choice.

Just because 4 x 8 plans are commonly used for beginner model railroads doesn't mean you should overlook them as a viable layout option. Depending upon the design, a 4 x 8 layout can offer great scenery and operation in a compact space.

Benchwork materials

- 4 x 8 sheet ½" plywood ripped into 13 strips 3½" x 96" (1)
- 4 x 8 sheet ½" plywood (1)
- 8 foot 2 x 2 (1)
- ¼" x 1" x 10'-0" molding for cross braces (2)
- ¼" x 1½" carriage bolts (16)
- ¼" washers (16)
- ¼" wing nuts (12)
- ¼" stop nuts (4)
- Small box 4d 1½" finishing nails
- Small box 1" panel board nails
- Adjustable furniture feet (4)
- Carpenter's wood glue

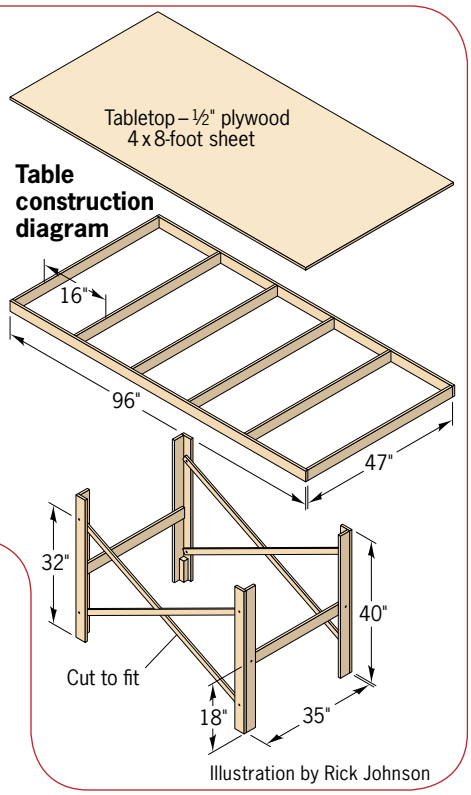


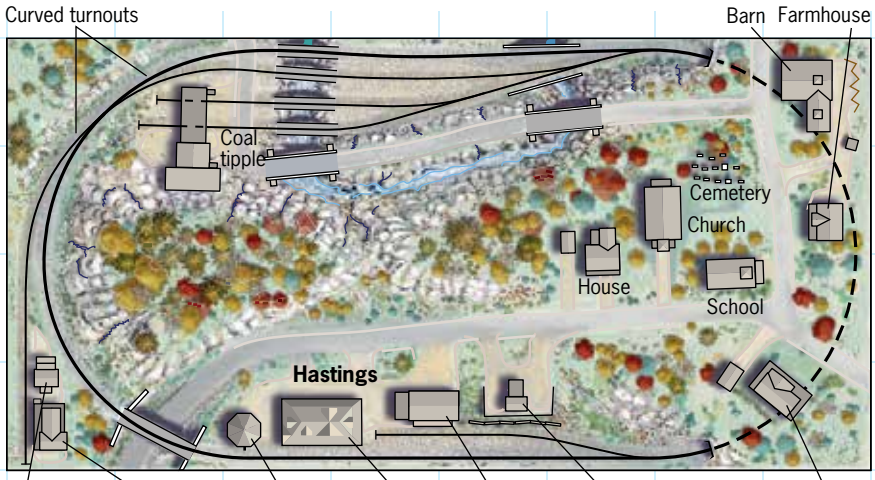
Illustration by Rick Johnson

Add a short extension, such as the one shown in plan 18, and you greatly expand the layout's operating possibilities. Most of the plans shown here have track leading off one or more edges, allowing you to add on to them later and expand your empire. RL

15 Deer Mountain

Published: June 2004
Scale: HO (1:87.1)
Plan size: 4 x 8 foot
Minimum radius: 18"
Minimum turnout: no. 4

Deer Mountain could be set anywhere from Illinois to Pennsylvania in the mid-1940s to the late 1950s. The model railroad features a large ridge that runs through the middle of the layout, providing scenic interest. The track that runs past the freight station could be used as a starting point for an extension or a staging yard.

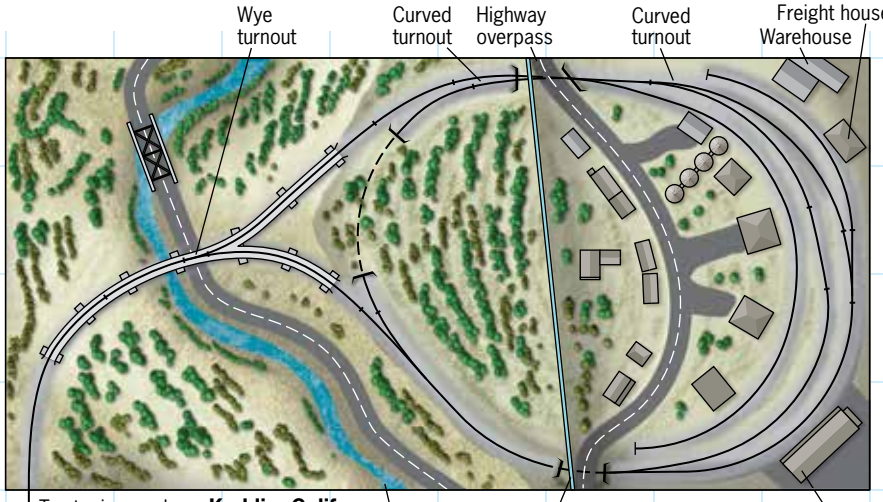


Scale of plan: 9⁄16" = 1'-0", 12" grid

Illustration by Rick Johnson

16 Keddie Wye

Published: *Model Railroad Planning 2006*
Scale: HO (1:87.1)
Plan size: 4 x 8 foot
Minimum radius: 18"
Minimum turnout: no. 4



Scale of plan: 9⁄16" = 1'-0", 12" grid

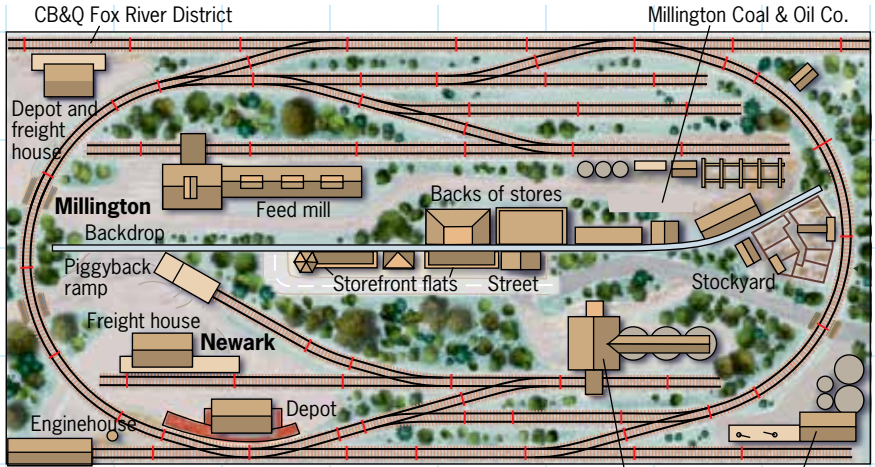
Illustration by Theo Cobb

The wye at Keddie, Calif., was a junction on the Western Pacific (today Union Pacific) in the Feather River Canyon. A major part of the junction's charm is the combination of bridges over Spanish Creek and a tunnel that make up the wye itself, which, even when modeled at this compressed size, will make an impressive scene.

17 Illinois Midland

Published: *Model Railroad Planning 2004*
Scale: S (1:64)
Plan size: 4 x 8 foot
Minimum radius: 19"
Minimum turnout: no. 5

This plan is for a quintessential granger branchline railroad, and features an off-layout interchange. The layout is designed to use sectional track from S-Helper Service's S-Trax line. These track sections include molded-plastic roadbed, making it easy to get the layout up and running.



Scale of plan: 9⁄16" = 1'-0", 12" grid

19" minimum radius
No. 5 turnouts (S-Trax)

Illustration by Robert Wegner

The 3.5 percent grade up to Mahoosic Notch on Jack Ozanich's HO scale Atlantic Great Eastern Ry. adds to the fun by requiring pusher locomotives to help heavy freights make the climb.
Craig Wilson and Jack Ozanich photo

Figuring grades and clearances

How to plan slopes your trains can climb

By Andy Sperandeo

Even as you draw in two dimensions you can start thinking of your model railroad as three-dimensional. To have a track cross above another track or over itself, you need to plan a reasonable grade. Or you can build grades for scenic and operating reasons. In the hilly or mountainous country so popular with modelers, trains have to operate up and down grades. You may even want a grade steep enough to require helper or pusher engines.

You also need to provide enough separation so that trains on the lower level can pass under the supporting structure of the upper level track. That supporting structure may be your usual subgrade and roadbed, or it may be a model bridge. The distance between the rails of the lower track and the bottom of whatever supports the upper track is called the clearance, and it must be sufficient for the kinds of trains you want to run.

Measuring steepness

Railroad grades are expressed in the number of units climbed or descended in 100 units of travel. A slope that rises one unit in 100 is a 1 percent grade. One that rises two units in 100 is a 2 percent grade, and so on.

On model railroad track plans we often show the lowest track elevation as zero and give elevations above that in inches. Starting from your zero point, measure 100 scale inches along the track and mark the elevation in inches at that point to establish the grade.

Or lay out a line climbing to a desired elevation and measure to determine the grade. Determine the track distance in scale inches between your lowest and highest points, divide the difference in elevation by that distance, and move the decimal point in the answer two places to the right.

Clearance table

	N	HO	S	O
H: NMRA S-7 clearance*	1 21/32"	3"	4⅛"	5½"
R: Recommended railhead-to-railhead separation	2 7/32"	4"	5½"	7⅜"

*For more details see www.nmra.org/standards/s-7.html

Suppose you have a rise of 4½" over a distance of 11'-3". Multiply 11 x 12 to convert to inches, add 3, and divide 4.5 by 135. That equals .0333, and after moving the decimal point you can read the result as a grade of 3.33 percent.

That's pretty steep, and to reduce the grade the railroad must gain less elevation over the given distance, increase the distance, or manage some combination of the two.

Measuring distance

So how do we measure distance on a track plan? Since our tracks are often more curved than straight we're faced

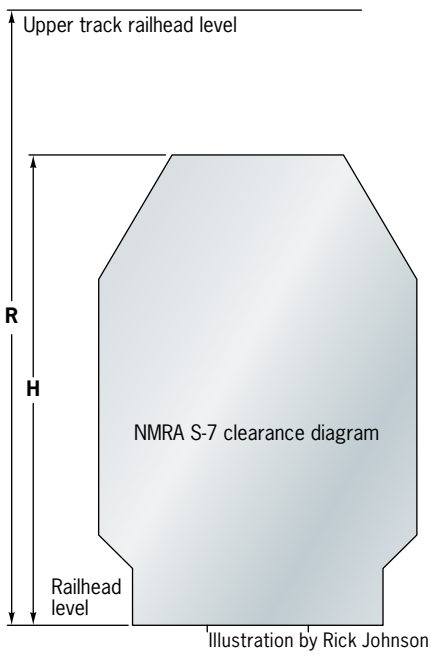


Illustration by Rick Johnson

with the problem of measuring the length of twisting, turning lines. But your compass can do this if you replace the pencil point with a second metal point, turning it into a pair of dividers.

Using your scale, set the dividers to some convenient measurement, then use them to step off the distance along the track. If you set the dividers to a scale 10", ten steps equal 100" and you can mark an elevation at that point to set the desired grade. Or set the dividers to a scale foot and step off the given elevation in feet. Multiply the number of steps by 12 to convert feet to inches and divide that distance into the elevation to find the grade.

There's a degree of error in measuring curves with dividers, but all that means is that the grade will be a small fraction of a percent steeper than indicated. Usually close is good enough, or you can deliberately plan a slightly gentler grade than you want to build.

For greater accuracy, a simple length of soft copper wire makes a useful measuring instrument. Bend it to follow the line of your track, put sharp bends at each end of the distance to be measured, then straighten the wire between the sharp bends and measure the straight-line distance with your scale.

Or you can use a measuring wheel called an opisometer that you steer along the line of your track. Usually these have scales in inches that you'll have to convert to your drawing scale. Some digital versions do this for you.

Overhead clearance

Requirements for each scale are given in the clearance table opposite. These are from National Model Railroad Association standard S-7 and represent the ideal prototype clearance of 22 feet above the rail. (In HO scale, 22 scale feet is approximately 3$^{3}/_{64}$".)

Real railroads don't always have this much clearance, and you don't need to either. But if you're going to skimp you should know the scale height of your rolling stock and maintain enough clearance for it. Be aware that some models are taller than they should be.

Remember to allow for the structure supporting overhead tracks, whether it's a scale-model bridge or simply the plywood and roadbed combination under your trackwork. Either way it needs to be included in the railhead-to-railhead measurements indicated by track plan elevations. (Where one hidden track crosses over another, you can use short lengths of a thin, stiff material like Masonite hardboard to support the upper track.)

A bridge deck structure can range from about three to more than six scale feet deep, depending on the type and length of the bridge. In HO three feet is $^{13}/_{32}$", and code 83 flextrack is $^{3}/_{16}$" thick. If you plan for 3" from railhead to railhead where a track passes under a bridge, you're really allowing at most 2$^{13}/_{32}$", or a scale 17'-6". That's too little for the biggest modern cars, although older, smaller rolling stock may be OK. The clearance table gives recommended separations for track planning. RL

Characteristics of grades

Railroads would avoid grades if they could because climbing them increases operating expenses by limiting the length of trains and requiring more and heavier locomotives. In reality this is impractical. Even flat-looking country has some slope, and of course there are hills and mountains that have to be crossed. Railroads often follow watercourses to find the easiest path through the terrain, but the streams and rivers wouldn't be flowing if they weren't moving downhill toward sea level.

On a model railroad we may need grades to achieve a desired routing, and we may also use them to help portray particular types of railroading. The descriptions below relate grades to the kinds of railroads that use them.

0 to .99 percent: Except in the flattest terrain, grades as gentle as .3 or .5 percent often require heavy earthwork, extensive bridges, and greater length of run. These expenses may be justified only if traffic is unusually heavy. The former New York Central advertised its New York-Chicago main line as "The Water Level Route" because most of its grades were less than .5 percent (with the notable exception of the Central's 1.6 percent climb out of the Hudson River Valley at West Albany Hill).

1 to 1.99 percent: A grade of 1 percent, such as on the former Western Pacific line through California's Feather River Canyon, is a moderate grade for crossing mountains. The former Pennsylvania RR climb through the famous Horseshoe Curve is on a grade of 1.86 percent.

2 to 2.99 percent: When Congress passed land grant laws to subsidize 19th-century railroad construction in the West, it specified that grades on the new lines could not be steeper than then existed on the Baltimore & Ohio. This required the builders of the original Central Pacific and Union Pacific lines to maintain grades of 2.2 percent or less.

3 to 3.99 percent: Mainline railroads on grades this steep are unusual and found only in rugged terrain. The former Santa Fe line over Raton Pass on the Colorado-New Mexico border was built on a grade of 3.5 percent, leading the railroad to later build a second route farther south to carry the bulk of its transcontinental freight traffic on grades not exceeding 1.25 percent.

4 percent and steeper: The steepest mainline grade in the United States is the former Southern Ry. line over Saluda Mountain in North Carolina, at 4.7 percent. Grades that steep are more common on cheaply constructed backwoods logging and mining railroads. Seven percent is about the practical limit for normal adhesion (smooth wheels on smooth rails) and in steam days required special gear-driven locomotives like Shays, Heislers, and Climaxes.

Sand on the rails and the smoke plume from the 2-8-8-4 show what hard work was required to lift Baltimore & Ohio coal trains up the 2.4 percent Cranberry Grade at Terra Alta, W.Va. Gordon R. Roth photo

If you've got the room, you can effectively double the size of your model railroad by adding a second level, as shown here on Cal Winter's HO scale Florida East Coast Ry. Cal's layout is plan 101. Paul Dolkos photo

Layouts for large spaces

Plans suitable for rec rooms, basements, or barns

By David Popp

Got the room to think big? Though smaller plans have a lot of advantages, some people find that they have the space to build a big model railroad. In this case, you may have part of a rec room or most of a basement you can work in, or you may have a garage or an outbuilding (such as a barn) at your disposal.

With room for a long main line, towering scenery, and large industries, big layouts have a lot of appeal. And these layouts generally have the capacity to run a lot more trains, which means you can keep a fair number of people busy during an operating session. Add a helix and one or more extra levels (sometimes called decks), and now your trains really have some ground to cover as they travel across the layout.

Though all model railroads need careful planning, designing and building big layouts requires even more attention to detail, especially considering the time and investment a large layout represents. You also want to be sure you get the most out of the space you have. This doesn't necessarily translate into filling every square inch with trains, which is often a temptation with a big model railroad. Instead, keep in mind that your layout room still needs to have space for people to run trains, view the finished scenes, and work on your empire.

For those planning really big layouts, I'd suggest reading *Track Planning for Realistic Operation*, by the late John Armstrong. The material John covers in his book builds upon the material the *Model Railroader* staff has presented here to get you started. Consider that book the advanced course in layout design. RL

87 Central River Subdivision

Published: November 2006
Scale: N (1:160)
Plan size: 12 x 14 feet
Minimum radius: 17" (main), 13" (staging)
Minimum turnout: no. 6
Maximum grade: 1.38 percent

This plan was designed to provide room to run long N scale trains. It's accessible from three sides, allowing operators to follow their trains in either direction around the layout. The fourth side is anchored on a wall, and a curved backdrop hides the inner staging yard loops. If you set the layout height at shoulder level, operators would require only minimal bending to get to the staging yard.

The plan also features a branch line that interchanges with the main. The branch could easily be extended to add more towns around the outer walls of the room.

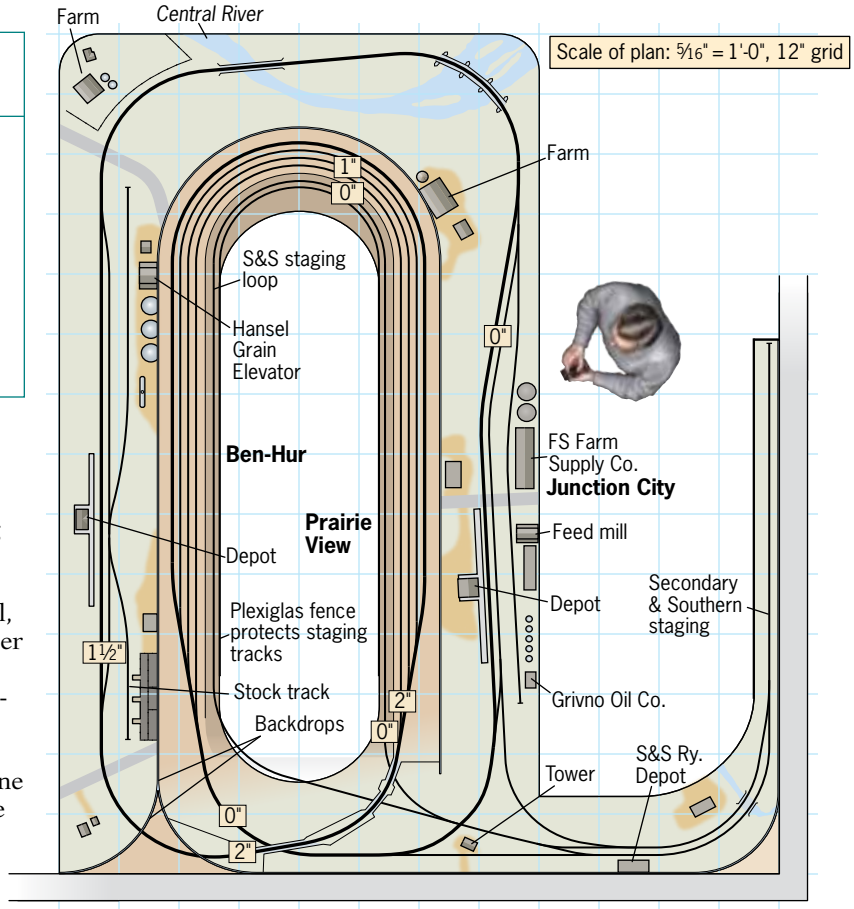


Illustration by Rick Johnson

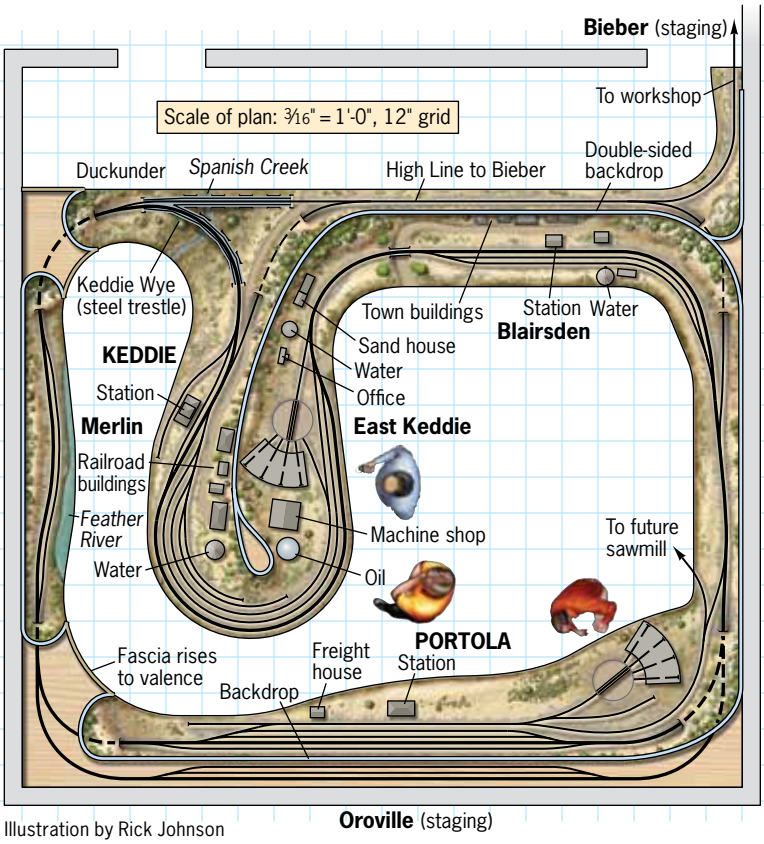


Illustration by Rick Johnson

88 Western Pacific Third Subdivision

Published: September 2001
Scale: HO (1:87.1)
Plan size: 20 x 20 feet
Minimum radius: 24"
Minimum turnout: no. 6 (main), no. 4 (yards)

The Western Pacific Third Subdivision plan was designed to fit in a rec room and features some signature scenery of the WP's Feather River Canyon route. The design uses backdrops as view blocks to create several distinct scenes. One staging yard is set in an adjoining room, while the other is neatly tucked behind a low backdrop, so that the tracks may be reached by standing on a step stool but are not visible to a viewer standing on the ground. Like plan no. 16, the Western Pacific Third Sub features Keddie Wye, but this time with the needed room to connect all three legs to the rest of the layout.