Model Railroader MAGAZINE

DESIGN YOUR OWN LAYOUT • PLAN FOR UNCOUPLING
A SUPPLEMENT TO *MODEL RAILROADER* MAGAZINE

Workshop tips

Layout planning ideas

- Plot realistic towns along the tracks
- Chose the ideal entrance for your train room
- Design railroad yards that work

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Towns along the tracks

A well-detailed and realistic downtown scene can add as much to a model railroad as any lineside industry. Figures, vehicles, and signs bring this street on *Model Railroader*'s Black River Junction layout to life.

Give your model cities the same realistic treatment you give your trains

Model railroaders can be sticklers about detail and prototype appearance. To some, the wrong horn or radio antenna on a diesel stands out like a beacon. Yet many of these modelers build their layouts with towns that would give urban planners nightmares.

As model railroaders, our first priority when planning a layout is going to be the track. But it's often easy to forget that the cities and towns on our layout should exist for reasons beyond the railroad. Making sure your miniature villages are livable, drivable, and realistic looking will have visitors to your layout swearing that they've driven through the area you're modeling, even if your layout is freelanced.

Realistic street arrangements

Try looking at the terrain around your layout as a city planner might. What is the easiest and most obvious place for the main streets through your town? Do all the buildings in town have street access and adequate parking? Do your roads have any curves, grades or intersections that would be improbable on the prototype? Do your streets have the striping, curbs, gutters, signs and other details you would find on the prototype? Do they seem to have a purpose and go somewhere, even if it's just off the edge of the layout?

When deciding where to place your streets, also keep grade crossings in mind. Although in railroading's early days it was common to lay tracks in the middle of streets, these days, grade crossings are avoided wherever possible. Look at your layout and ask whether any grade crossings could be eliminated by road over- or underpasses, by shifting a street to cross the railroad where there are fewer tracks, or by simply ending a street at a dead end.

Today's urban sprawl would seem out of place on layouts set in an earlier era. Cities grew up around a compact core. In most towns, the depot was in the heart of it all, with major streets leading to it. Look at historical maps to see how towns grew with the railroads. Google Earth (earth.google.com) is a good source for current aerial views of prototype street and rail arrangements.

Give your town a history

Your layout may represent a specific moment in time, but your town has a past. It's easy to give your town a sense of history with a few simple details. A pioneer or military figure in a scale larger than your trains could be drafted into service as a memorial statue to grace a downtown park. A sign on a bridge might mark the high-water point of a historic flood. A dead-end street, closed to eliminate a grade crossing,

would be a sign of change. A warehouse could be refitted as an office or condo complex, the ties of its abandoned siding still visible through the weeds. And a shuttered factory, its fading sign touting the enduring quality of its butter churns or buggy whips, can add a humorous touch as well as visual interest to your layout.

Remember that towns grew outward from the center. Put your older-looking brick business blocks in the middle of town, and put the concrete, glass and steel ones toward the outskirts.

And don't limit your towns to trackside industries, either. Your scale residents need places to live and shop. A row of white clapboard houses stretching up the hillside says "Appalachia" as effectively as a coal mine.

A roadside tourist trap touting local crafts could add great visual interest as well as a sense of place; decorate it with seashells or a nautical theme for an East Coast road, Amish crafts in the Midwest, and Native American blankets and moccasins in the Southwest.

Track is expensive

Our instinct as rail enthusiasts is the more sidings, the better. However, prototype railroads don't feel the same. To them, track is expensive both to lay and maintain, and turnouts even more so. For that reason, rail-served industries tend to locate along existing spurs, rather than getting industrial sidings of their own.

So rather than looking for a place to wedge in another turnout, lengthen an existing spur and add a couple more industries along its length. Not only will this add to your switching challenges, but just as on the prototype, it will save you on track maintenance.

Or, instead of having that siding serve just a few buildings, put in a loading ramp and turn it into a team track. Any kind of off-line business can ship or receive cargo on a team track, making it a potential destination for all sorts of interesting cars. For a bigger town, a freight house or truck terminal serves a similar function.

The prototype look

Giving your railroad a feeling of place should go beyond choosing the terrain your trains move through. Making sure your buildings fit the location you're modeling is as important as picking the right trees. If you wouldn't stick a cactus on your New England-based railroad, you shouldn't put up a stucco depot, either.

If you model a specific prototype, you probably already have access to a few books about your road. Even if you're freelancing, look in the library for books about roads that served your railroad's area.

If you model the modern era, your task is easy; the buildings you want to model still exist. You can find pictures of the area you're modeling online fairly easily. Search the Web for the home pages of the city or county governments, chambers of commerce, downtown business associations, and real estate agents in the area you're modeling. Also, try searching for the name of your town at images.google.com to find pictures; you can eliminate some of the less useful results by adding terms like "downtown," "historic," "buildings," or "railroad" to your search.

Another place to find contemporary photos online is www.City-Data.com. This site compiles vital statistics about cities large and small and allows users to post their own pictures. Photos of trackside industries may be rare, but this site can help you get an idea of the general architectural style of the area.

If you are modeling an older era, a little more digging may be required. Search online for historical societies for the state, county and town you're modeling. Not all will have a photo collection online, but members should be happy to help guide your research.

Museums, universities and larger city libraries also sometimes post historical photo exhibitions online. Virginia Tech, for example, has a huge file at imagebase.lib.vt.edu/browse.php, including more than 12,000 images in the railroad category alone. Try searching with the terms "historic photo collection" to find other online archives.

Paying a little attention to how you model the towns on your layout can pay off in increased realism, and may improve your operating possibilities, as well. –*Steven Otte*

Urban Planning 101

Keep these principles in mind when planning towns on your layout:

- Like railroad tracks, streets should, where practical, be straight and level.
- Minimize grade crossings, and adequately protect the ones you do have with crossbucks and gates.
- Road overpasses make great scene separators or view blocks.
- You can show off your rock-modeling skills on road cuts and fills as easily as you can along train tracks.
- Cluster similar buildings together. Put stores next to stores, houses next to houses.
- Refer to prototype photos to make sure your buildings, trees, and landmarks look like the ones in the area you're modeling.
- Not all industries need their own spurs. Adjacent businesses can share a spur, adding to switching challenges.
- A team track, freight house or truck terminal is a realistic way to let your railroad serve any kind of industry you might imagine.
- Not all businesses on your layout need to be rail-served. Your town's inhabitants need restaurants, groceries, banks, and barbershops, too.

The company houses on the Turtle Creek Mine Branch are as effective at placing this layout in Appalachia as the mine or the mountains behind them.

When he built a layout room above his studio, photographer Tommy Holt used a wide stairwell away from the walls as an entrance. Tommy Holt photo

Getting in and out of your layout room

Options to consider when you have a choice

How you get into your train room often isn't a design feature that you get to choose, and most of us have to try to be happy with whatever situation we find. However, if you do have a choice, what would you prefer? Here are several options in order from most to least desirable, with suggestions on how to make the best of any kind of entryway.

Up from below

Most experienced layout designers and builders would agree that in the best of all possible worlds you'd come up into your layout room from below, as in the photo above. You might be coming into an attic or upper-story room, or perhaps into a room added above a garage. This kind of entry offers the least possible obstruction to whatever layout design you choose.

If the stairwell is away from the wall you'll have to make sure that there's a layout aisleway where it comes up. Even with a stairway along a wall, it's not too much of a restriction to design a narrow section of benchwork to span the opening and allow people to climb up beside the layout.

This may be the best option, but nothing is perfect. Unless there are also windows or other kinds of access to the upstairs layout room, everything used in and on the layout has to be brought up the stairs. Restrictions in the stairway may limit the dimensions of materials that can be carried up.

Down from above

Next best in descending order – I have to admit that was intentional – is a stairway down into the layout room from above. This is the most common way to enter a basement, for example. It shares many of the advantages and disadvantages of the up-from-below entrance, with the additional disadvantage that the stairwell occupies area that might otherwise be available for the layout. If the stairwell is away from the walls, the layout may be wrapped completely around the basement and even along at least one side of the stairwell. If the stairs are along the wall, one of the oldest model railroad design tricks is to tunnel through a stair riser to allow an around-the-walls main line to pass through the stairway, as in the lower photo opposite.

Basements typically have small windows near the ground line, and on sloping lots may have above-ground side entrances. Either can allow lumber and other materials to be brought in without using the stairs.

Side entrance

And finally we come to the most problematic of all, a doorway through

A simple lift-out layout section carrying your main line across a doorway may be all it takes to allow you and your guests to walk in and out of your railroad room without stooping. Jeff Wilson photo

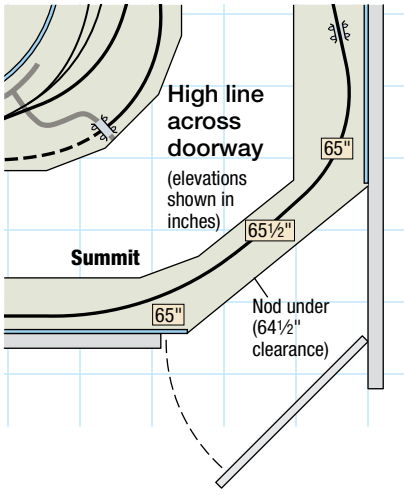


Illustration by Rick Johnson

a wall of the layout room. The question in this case is whether or not the layout will cross the entryway.

In many cases, a walk-in layout shape can be chosen or devised that will let the doorway open directly onto an aisle leading to all parts of the layout. Usually this will involve having turnback loops – "blobs" as master layout designer John Armstrong would say – on either side of the entrance.

Or perhaps the layout schematic will allow a stub-ended terminal yard on one or both sides of the entry. Either way, the walk-in layout will allow entrance and exit without stooping or bending, which most model railroaders consider the ideal.

In some situations, having the layout cross a side entrance may be the only way to achieve the track plan schematic you want. Even so, there may still be ways to get into the train room without groveling on your hands and knees through the dreaded "duckunder" passage. Consider these options:

A stairway along the wall of Keith Jordan's basement was a layout-design obstacle that proved easy to overcome. The track through the stair riser leads to a staging yard behind the stairs. Keith Jordan photo

• **Movable layout section.** A gate, drawbridge, or "elevator" (a layout segment engineered to move straight up, leaving normal headroom for people walking beneath) can allow no-stoop access just like a walk-in plan. See the photo at the top of this page for a simple example.

• **High-altitude crossing**. Where the main line can cross the doorway with sufficient elevation, you can walk through normally or perhaps with only a "nod-under," as in the track plan segment above, bowing your head as you pass under the layout. This can be useful for mountain-climbing or multi-deck railroads, especially if the lower decks don't cross the entrance.

• **Castered chair or wheeled garden seat.** It's easier to sit and bend from the waist to roll under a layout that crosses a doorway than it is to crawl on all fours.

• **Low handrails under the layout.** When all else fails, railings at least lend solid support to people duck-walking through an unwelcome but unavoidable duckunder. A railing is also handy when using a rolling chair.

• **Narrow the layout.** If you must duck under, try to make the unpleasant trip underneath is as short as possible. Whichever entry option you choose will then be easier to implement and less onerous for both you and your guests. – *Andy Sperandeo*

Yards that work

Think about the purpose of the yard before planning track

Railroad yards come in a wide variety of types: classification, terminal, interchange, storage, and more. Model railroads also have one type of yard not found on the prototype, the staging yard. Regardless of type, for a yard to work on a layout, it must have several basic features, including provisions for switching, service, and storage. It must also be sufficient for the traffic density it is to handle.

Yard tracks may have a variety of configurations. Some have simple ladders, in which the turnouts all diverge from one lead track. The alternative is a compound ladder, where the turnouts branch off one track and then divide again. Then there is the choice between parallel and sequential track accomodations, the latter most often seen on the prototype in commuter operations, where one train is terminated behind another on the same track. What you plan to do with a yard is an important factor to keep in mind when deciding on track arrangements.

Smaller stub yards

Let's start with a very basic arrangement, like the end of a single-track branch line. The locomotive needs a way to get from one end of the train to the other after the end of its run. The simplest way is to add an additional track and a couple of turnouts, forming an escape track. See **fig. 1**.

Another way to free an engine from its train is to use a switch engine to pull the train back from its locomotive and into a siding or yard track. This switcher can be justified as the size of the branch terminal city grows in importance and more tracks are added. Arriving trains can pull into a stub track and have the train pulled back by the switcher, allow-

Fig. 1 Escape track

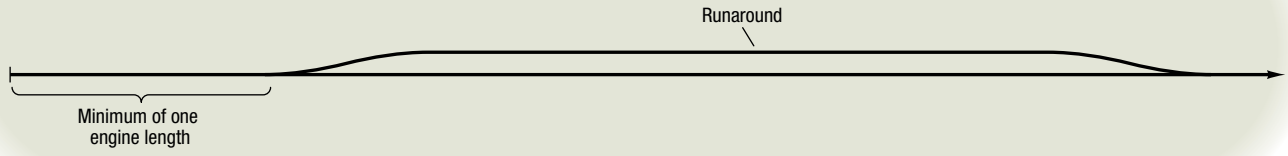
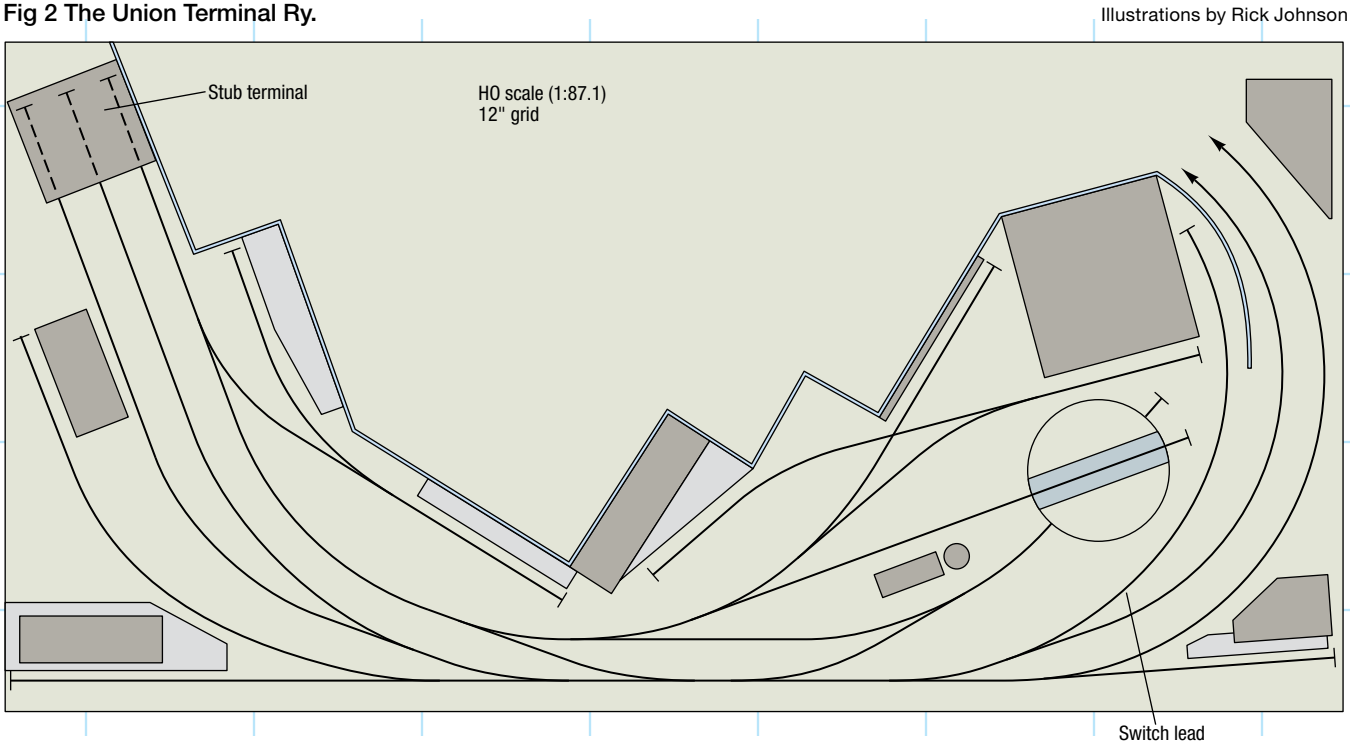


Fig 2 The Union Terminal Ry.

Illustrations by Rick Johnson



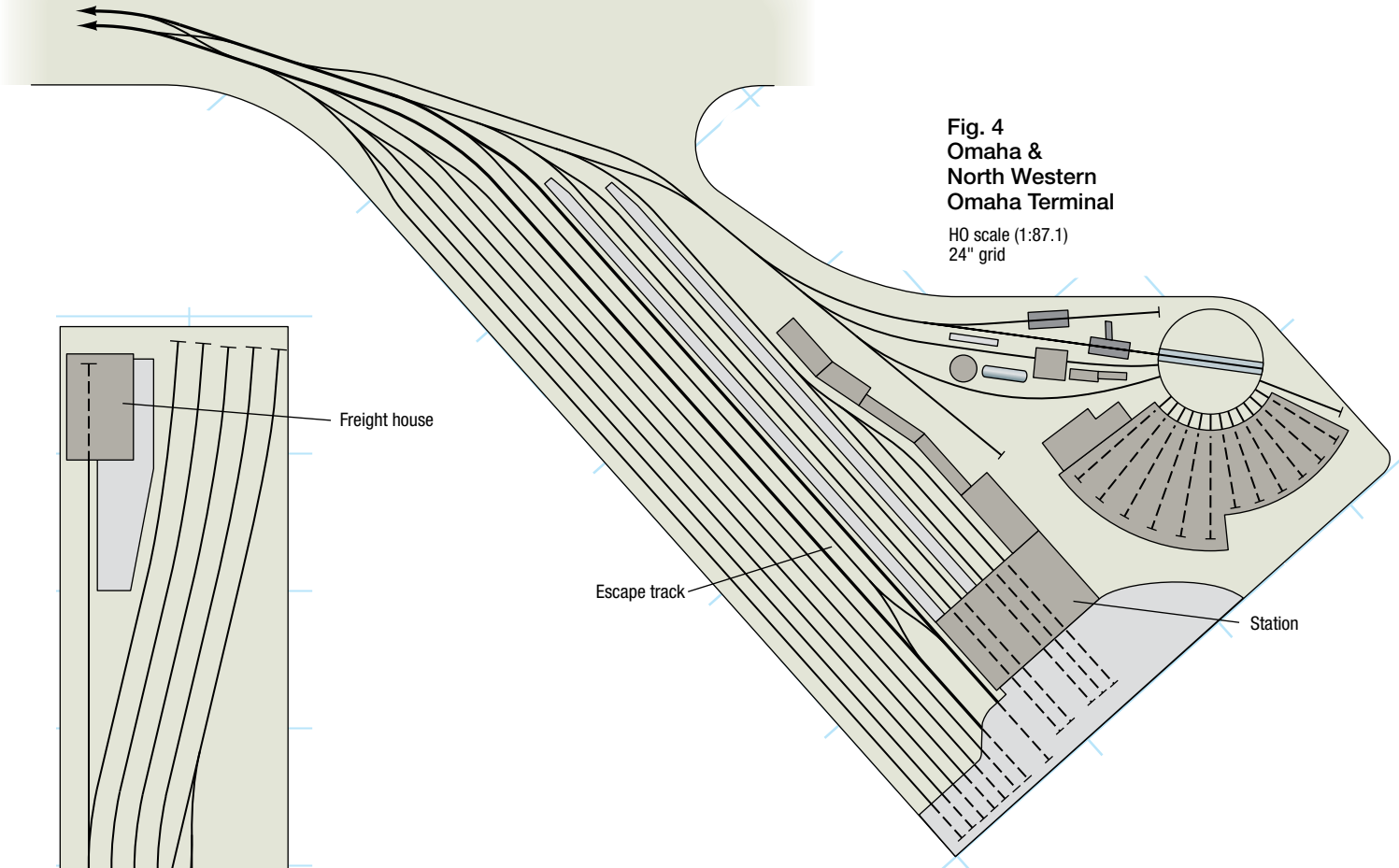


Fig. 4
Omaha & North Western Omaha Terminal
HO scale (1:87.1)
24" grid

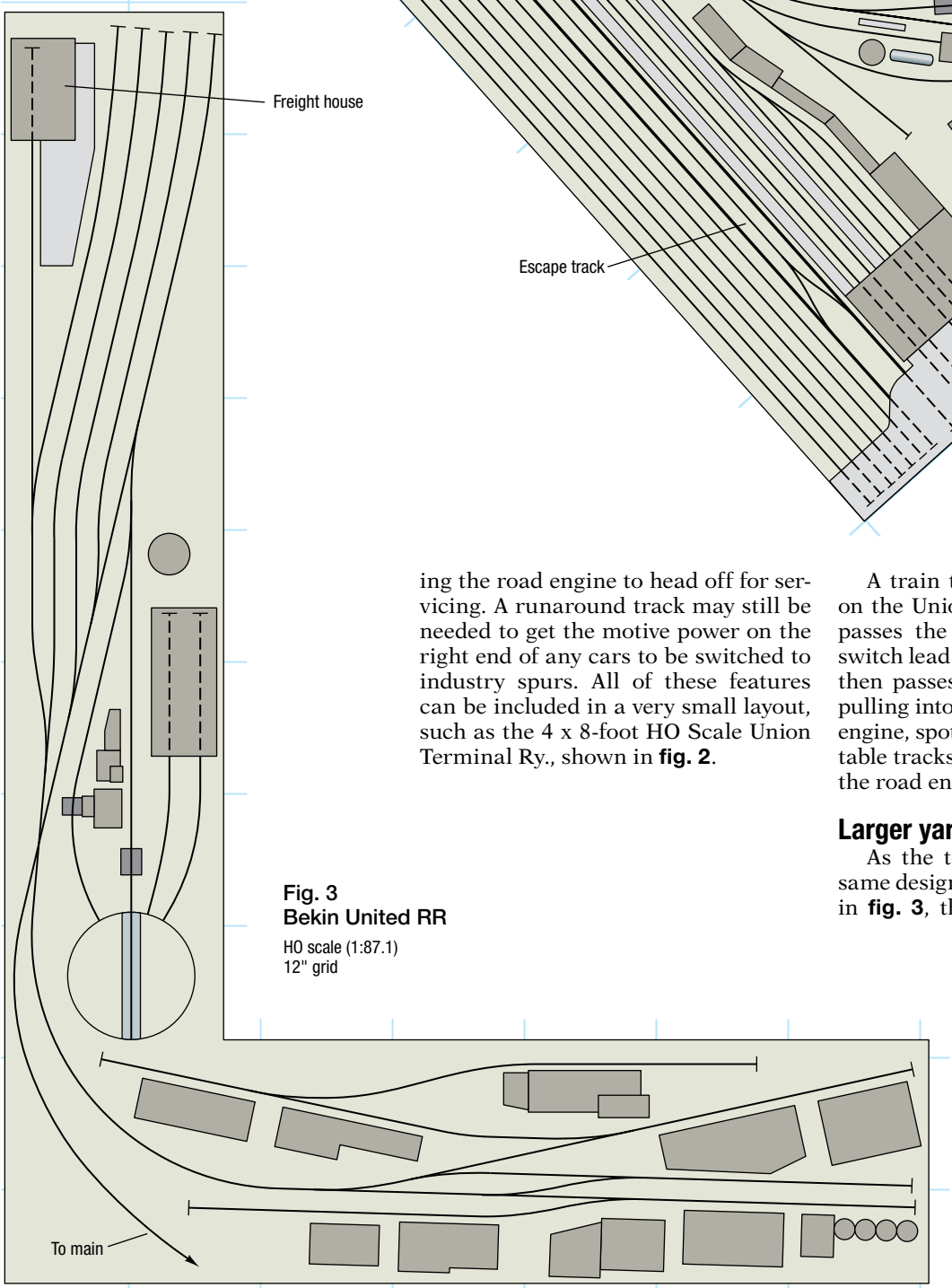


Fig. 3
Bekin United RR
HO scale (1:87.1)
12" grid

ing the road engine to head off for servicing. A runaround track may still be needed to get the motive power on the right end of any cars to be switched to industry spurs. All of these features can be included in a very small layout, such as the 4 x 8-foot HO Scale Union Terminal Ry., shown in **fig. 2**.

A train traveling counter-clockwise on the Union Terminal main line first passes the turnout that leads to the switch lead and the rest of the layout. It then passes a short runaround before pulling into the stub terminal. A switch engine, spotted on the lead or the turntable tracks, can then pull the train off the road engine and sort the cars.

Larger yards

As the terminal grows in size, the same design principles apply. As shown in **fig. 3**, the Bekin United RR has a

stub yard off the main with the track to the waterfront industries serving double duty as the yard lead.

This arrangement also demonstrates a third way that the road engine can be freed from the train. A train running counter-clockwise on the main would back into the stub-ended yard. The road engine can then simply pull forward to free itself from the train.

A large city terminal can also be a stub yard. The Omaha yard of the fictional Omaha & North Western, shown in **fig. 4**, combines both freight and passenger stub tracks. Arrival tracks between the station and freight yard share an escape track that allows engines to cut off from their trains, back out and go to the engine terminal. The freight yard tracks diverge from a compound ladder to maximize the length of each track.

The terminal is approached by two tracks to allow increased traffic density. A scissors crossover allows access to any track in the yard, station, or engine terminal. This allows two simultaneous train movements, be they trains on the main line, switchers, or engines proceeding to and from the servicing points on the roundhouse leads. These two approach tracks should be as long as the longest yard track for the greatest operating flexibility.

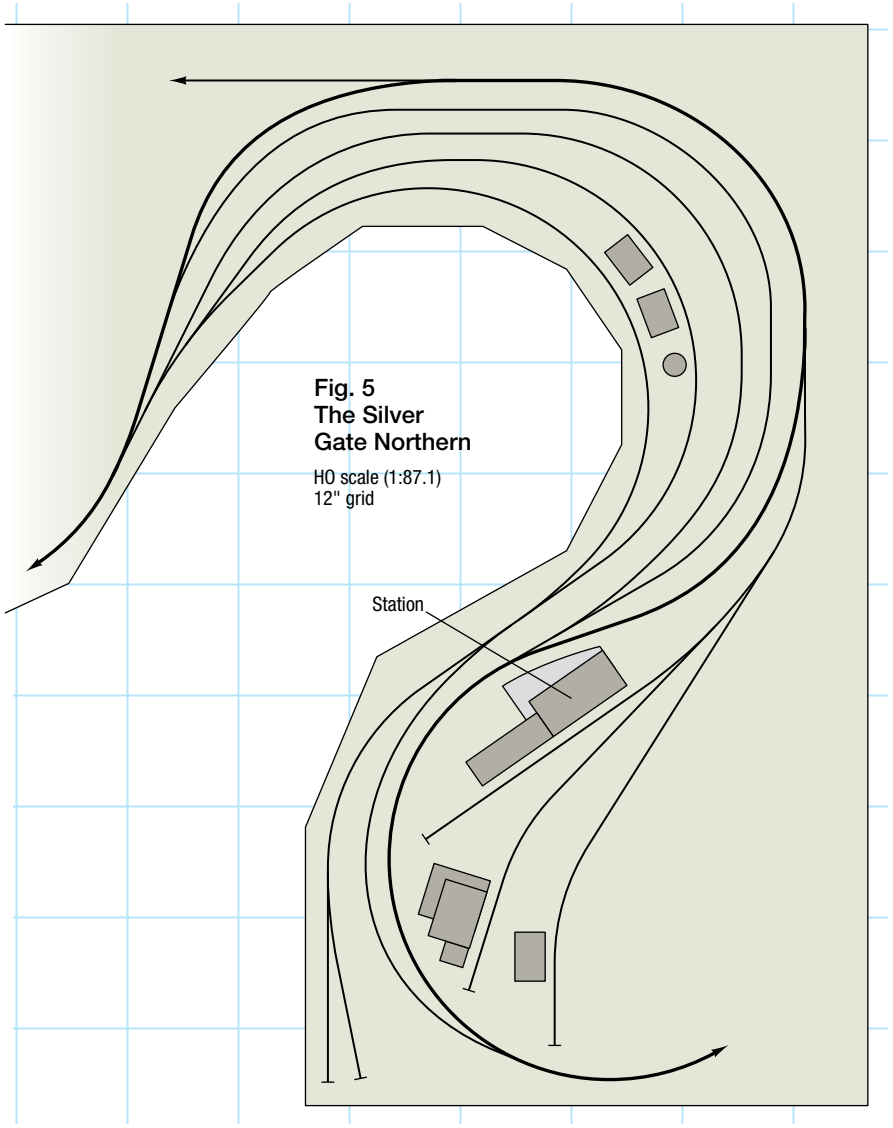


Fig. 5
The Silver Gate Northern
HO scale (1:87.1)
12" grid

Double-ended yards

Double-ended yards are more flexible. They allow for greater traffic density simply because both ends of the yard can be worked at once. Also, cutting the engine off an arriving train is not as much of an issue.

A lack of space often prevents using double-ended yards on smaller layouts. However, it's possible to include such a yard on an HO scale layout less than 10 feet on a side.

The part of the Silver Gate Northern shown in **fig. 5** has a yard with the same features as stub yards. The ladders are compound to maximize yard track length, and the tracks are curved to fit in the limited space while still maintaining side-to-side clearance between tracks.

Adapting from the prototype

Prototype track modeling can be very satisfying, but it's not always the best choice for layouts. The prototype exists to make a profit or serve a public interest, while layouts exist for the entertainment of the builder and fellow modelers. The difference is subtle, but it should be taken into account.

The Slaton, Texas, yard of the Atchison, Topeka & Santa Fe Ry. is one example. The yard, just east of Lubbock, Texas, served as a division point, a junction with a branch line to Lamesa, Texas, and the western end of a mainline section that included a stiff grade up the Caprock Escarpment.

In the model world, the yard may be best represented by flipping it front-to-back, as shown in **fig. 6**. This puts the yard ladders next to the aisle for easier reach and viewing, as well as making it easier to see cars at the ends of the tracks, where most switching, coupling, and uncoupling would happen.

Since flipping the yard puts the main line next to the backdrop, it could continue in a straight line across a doorway drop leaf at the west end of the yard.

The west end has a straight ladder with no. 6 turnouts arranged on a no. 5 lead angle. A slight curve after the frog permits longer body tracks while keeping the gentler no. 6 turnouts.

The east end of the Slaton yard, shown in **fig. 7**, is the business end, containing the engine servicing area, the yard lead, and the junction with the Lamesa Branch. The engine terminal amounts to little more than diesel service tracks, since the roundhouse and steam servicing buildings were removed by the mid-1970s.

The entrance to the Lamesa Branch is on a wye, just as on the prototype. This allows turning engines or cars without a turntable.

The mirror imaging of this yard puts the yard switch lead on the same side of the main line as the Lamesa Branch. The crossover arrangement has been slightly modified to allow any of the yard tracks to be reached from the lead, main, and branch tracks. This permits the use of two switchers, if necessary, to keep the yard fluid under busy conditions. The caboose tracks also have been modified to provide access from both ends.

The yard tracks are about 25 feet long, so the yard lead isn't long enough to pull an entire track in one move. If

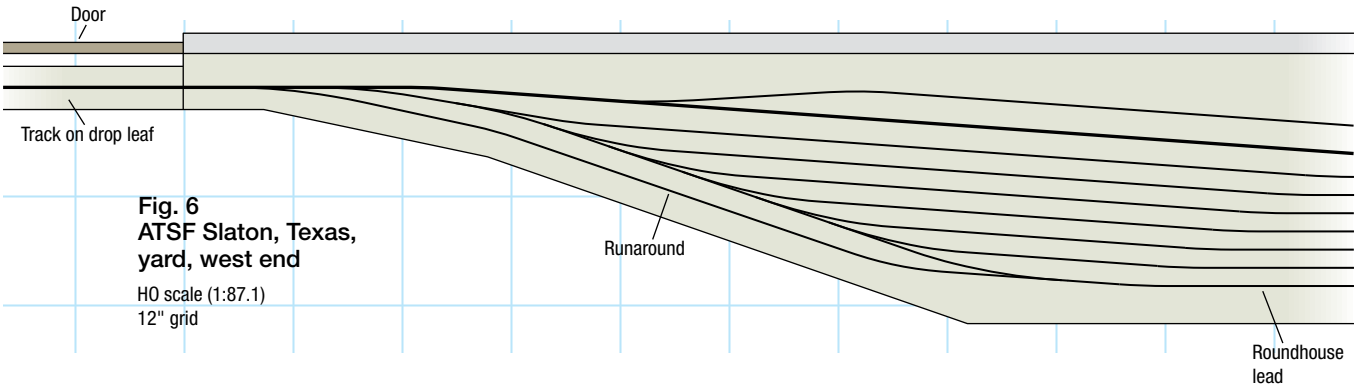


Fig. 6
ATSF Slaton, Texas, yard, west end
HO scale (1:87.1)
12" grid

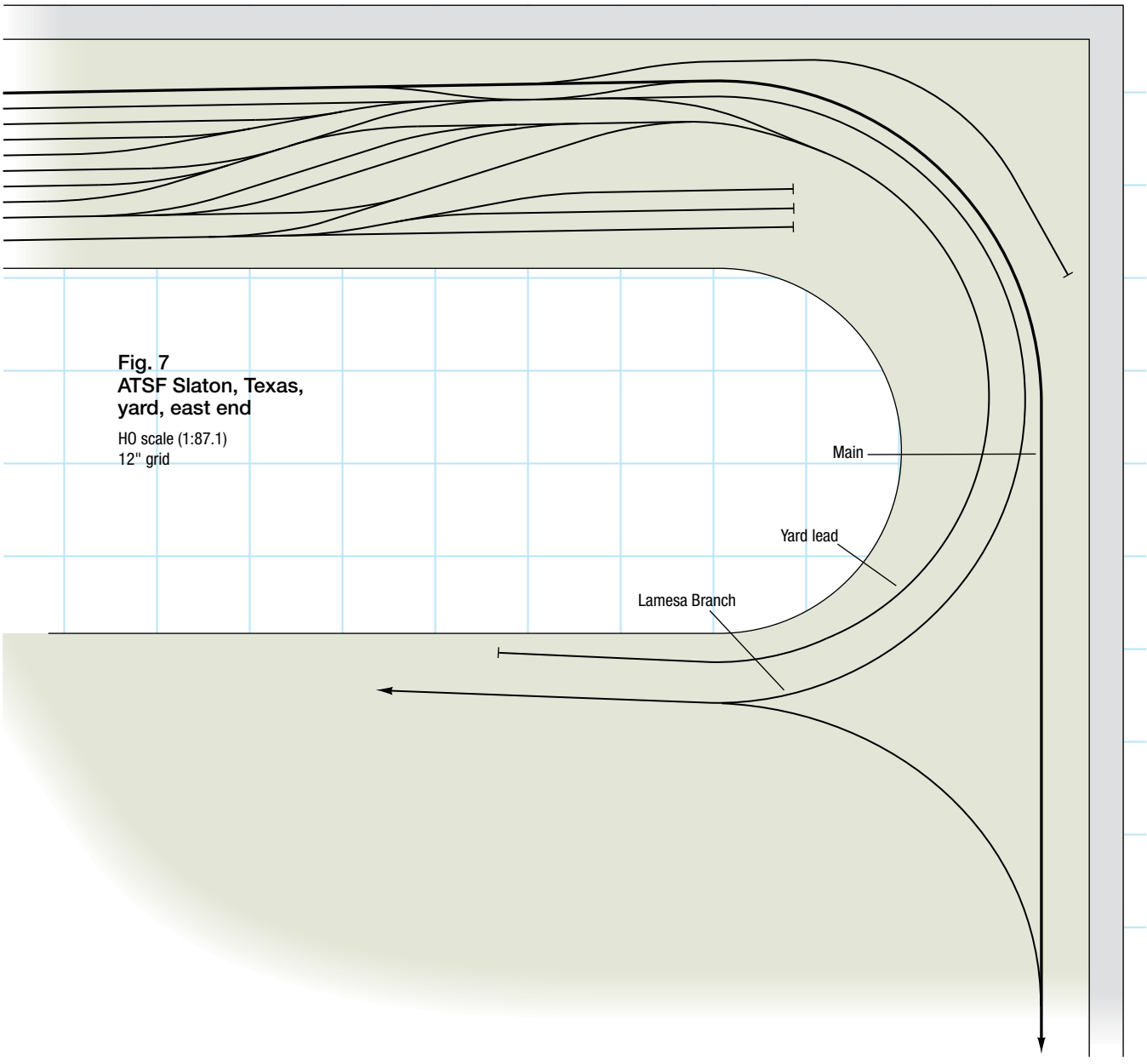


Fig. 7
ATSF Slaton, Texas, yard, east end
HO scale (1:87.1)
12" grid

conditions merit, the Lamesa Branch could be used as a lead for pulling an entire track.

Overall, most of the operation is up front nearest the aisle, where there is better access and viewing, just as at the west end.

Yards on model railroads tend to be congestion points because our roads have a higher mainline traffic density. This makes good yard design all the more important.

Yards that work on model railroads result from straightforward application of basic design principles. Determine the purpose, fit the tracks to the available area and desired purpose, use straight ladders or compound them for the longest possible body tracks, and ensure adequate access from the operating aisle. *–Don Mitchell*

Plan for uncoupling

For hands-free uncoupling with hidden magnets, you'll need to think ahead

Many of us plunge into designing and building layouts with little or no thought as to how we'll uncouple cars. It's true that you can always add uncoupling magnets after your track is built, but that can lead to a choice between undesirable alternatives. Either you install exposed magnets that don't resemble anything you'd see on a full-size railroad, or you have to remove some track and roadbed to install hidden permanent magnets or electromagnets.

A better approach would be to plan for uncoupling locations when you're deciding on the final details of your track design. That way you'll be in a position to run through operating patterns in your mind or on paper and decide where you'll need to uncouple cars most often. Then you can mark your track plan as a reminder to install the appropriate magnets as you lay your track. For more on planning for uncoupling, you can read "How do I uncouple that car way over there?," by Paul Dolkos, in *Model Railroad Planning 2008*.

No plan is perfect, and you'll likely have unforeseen maneuvers that require manual uncoupling. Still, advance planning and installing uncoupler magnets as you build will let you enjoy the automatic uncoupling capability built into today's magnetic knuckle couplers.

Many model railroaders have gotten used to manual uncoupling. They use wooden skewers or blade-ended picks to twist knuckles open, or use other kinds of tools to pull the trip pins ("glad hands") to one side. But reaching into the model scene spoils the illusion of realism, and magnetic uncoupling can avoid that. Also, passenger cars with diaphragms (passageway connections) that actually touch can make manual uncoupling difficult if not impossible.

The uncouplers shown here are for HO, but similar magnets are available for most model railroad scales. These examples will help you plan where to put uncoupling magnets and to be ready to install them. – *Andy Sperandeo*

Locating magnets on a track plan

Where to put magnets

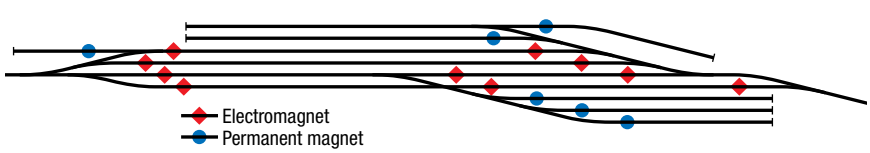


Illustration by Model Railroader staff

Use electromagnet uncouplers on double-ended yard tracks and sidings, as well as on mainline tracks, so engines and cars will be able to uncouple at those points only when you wish. Electromagnets (which you activate by pushing a button to energize the magnet) are also a good idea in locations where a train or yard cut can be working over two or more magnets at once. On single-ended yard and spur tracks you can use permanent magnets.

Exposed permanent magnets

The two magnets shown here, the Kadee no. 312, top, and 321, above, can be installed any time after tracklaying, but they don't resemble anything on a prototype railroad. The wider no. 321 allows delayed-action uncoupling, so a car can be pushed to and left at a spot beyond the magnet.

The advantage of magnets like the Kadee no. 312 (top) and no. 321 (above) is that they can be installed at any time after the track is laid. Their disadvantage is that they don't look realistic, although they can sometimes be disguised as part of a grade crossing or a motor-car setout.

The no. 321 magnet can be installed on top of the ties of HO track with code 100 rail (rail height = .100"). The thicker no. 312 magnet needs to be recessed into the ties on track with any size rail, as does the no. 321 with rail smaller than code 100. The tops of these magnets should extend above the railhead by 1/64", which can easily be measured with the feeler dowel in Kadee's no. 205 coupler height gauge.

The easiest way to install these magnets is to cut out the center of the ties for the length of the magnet. Then glue a wood, card, or styrene shim to the roadbed between the cut tie ends to raise the magnet to the correct height, and finally glue the magnet to the shim.

Hidden permanent magnet

Kadee's no. 308 permanent magnet is powerful enough to uncouple reliably when installed below the ties and hidden under ballast. (It can also be used in larger scales including S and O.) The magnet with its steel intensifier plate is ⅜" thick, so it generally has to be recessed into the subgrade when used with the usual HO roadbeds. Don't be tempted to omit the steel plate from your installation, however. That weakens the magnet considerably.

For plywood subgrade, as shown in the photos, use a utility knife to cut through the top layers of the plywood around the outline of the magnet. Then use a wood chisel to remove enough layers to let the magnet rest below the top of the roadbed. Finally, use shims to raise the magnet exactly level with the roadbed and glue it in place.

Track can be glued to the magnet with the same adhesive used to glue the track to the roadbed – in this example, that's latex adhesive caulk.

If the top corners of the magnet stick out past the roadbed shoulders, use a knife to carve away enough of the rubbery magnet material to fit the roadbed cross section. This won't reduce the magnet's effectiveness.

The ballasted magnet will be invisible, so remember to mark the location with paint on the ends of the ties or on the sides of the rails so you'll be able to spot couplers above it for uncoupling.

The ⅜" thick no. 308 permanent magnet requires a recess in the subgrade so it can be level with the roadbed.

The track can be glued right across the no. 308, and the shoulders can be filled with cork or a little extra ballast.

Hidden electromagnet

Earlier versions of Kadee's no. 309 electromagnet used pole pieces that had to extend above the ties, along with a plastic mounting that was as unrealistic as any exposed magnet. Now this uncoupler has been modified so it's effective from below the ties, like the no. 308 permanent magnet. Since electromagnets work only when energized, they're ideal for main tracks, passing tracks, and double-ended yard and station tracks, since they won't cause unwanted uncouplings in passing trains.

Installation of the electromagnet requires a slot through the subgrade measuring 1" x 2⅛". The upper photo shows how I used strips of .100" styrene to support the magnet's plastic spacer strip so the steel pole pieces are level with the top of the cork roadbed.

The electromagnet could be secured by screws through the spacer, but I cemented the spacer to the .100" styrene, which I'd first glued to the plywood. Another way would be to add metal brackets on either side of the pole pieces and coil to secure the magnet from below, so it could be removed if necessary.

Once the magnet is in place, you can cut narrow strips of roadbed and install them on each side to conceal it. Kadee recommends covering the opening in the roadbed with aluminum foil before laying and ballasting the track, so you don't have to fill the gaps around the magnet with ballast. I've used thin tracing paper for the same purpose, but I left this one open so you can see how it fits.

The no. 309 needs 12VDC, but now includes a rectifier and capacitor so you can power it from an AC supply. Use a push-button or other momentary control (not included), as the coil can overheat if energized for longer than 2 minutes. As with the hidden permanent magnet, you'll need to mark its location after the track is ballasted.

This no. 321 electromagnet is supported on white styrene blocks so the steel pole pieces are level with the top of the roadbed. The coil hangs 1⅛" below the ½" plywood.

Here you can see the electromagnet's pole pieces directly under the ties. In practice you can cover the magnet opening with a piece of foil or thin paper so there won't be gaps under the ties to fill with ballast.

Go large with big business

Some industries are big enough to take up a whole layout

A paper mill, like the Crown Vantage mill near Berlin, N.H., is an industry large enough to be a layout all on its own. As part of a larger model railroad, a big industry can give a railroad an obvious reason for being. Marty McGuirk photo

Selective compression – modeling something as smaller than it really is by shrinking dimensions or omitting parts – is one of the most useful tricks in the railroad modeler's toolbox. However, there are reasons you may want to model a really big business.

Some prototype industries, such as steel mills, only come in one size: XXL. Compressed versions of these trackside behemoths just never look quite right, so we settle for backdrop flats or imply a larger complex by modeling only a corner of it.

But what if you could give that industry the space it deserves?

Modeling a truly big industry can pay off in a big way. The most obvious benefit is realism. The bigger a business is, the more it looks like it needs rail service. You can ship more cars to and from a big industry. A large, diverse industrial complex, like an auto plant, would also demand a wider variety of cars than, say, a stamping plant alone.

And instead of receiving those cars on one or two spurs, a big factory complex would have numerous sidings, docks, unloading points, and holding tracks to handle the constant flow of cars. These operations might require a dedicated switcher, which would need its own enginehouse and servicing tracks. Often these complexes will have their own power plants, creating a demand for gas, oil, or coal.

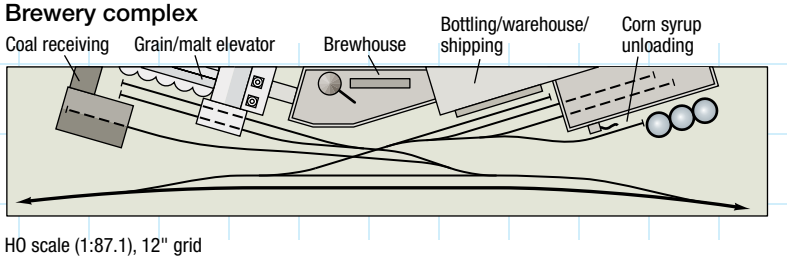
For some examples, check out "Modeling a steel mill in 4 x 8" in *Model Railroad Planning 2008* and "Big industry in the valley" in the special issue *How To Build Realistic Layouts: Industries You Can Model*. – *Steven Otte*

Brewery

Breweries are a common industry in the Northeast and Midwest, though large ones can be found anywhere from Florida to Alaska. Many offer interesting modeling opportunities, as buildings in different architectural styles were added over the years.

The heart of a brewery is the brewhouse, often a tall brick building with large, distinctive windows. A large complex will also need a bottling plant, warehouse, water tower, grain elevators, and covered loading/unloading areas for sensitive ingredients. Breweries receive rail shipments of barley malt, corn, and hops in boxcars or, later, covered hoppers; tank cars of corn syrup; and packaging materials in boxcars, including empty cans, bottles, kegs, and cardboard boxes. The finished product ships out in reefers or insulated boxcars.

Brewery complex



HO scale (1:87.1), 12" grid

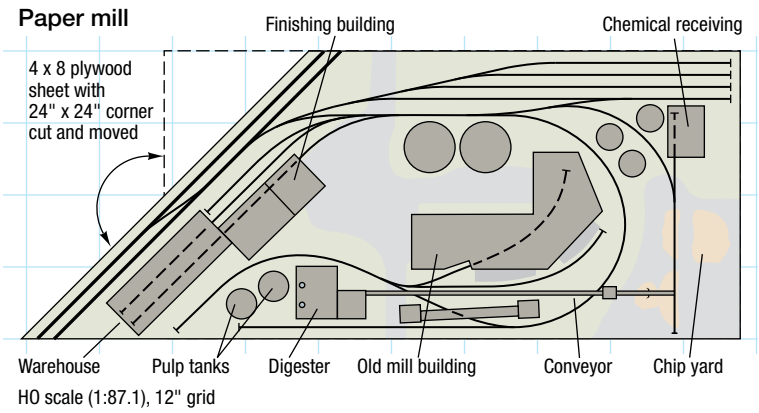
Illustrations by Model Railroader staff

Paper mill

Paper mills take in a wide variety of raw materials. Though wood chips and pulpwood (in gondolas) are the most obvious, chemicals including liquid chlorine, sulfuric and hydrochloric acid, hydrogen peroxide, titanium dioxide, kaolin clay, and talc are also needed. Most of these arrive in dedicated tank cars.

The finished product goes out in boxcars, often with plug doors to protect the paper from moisture. Such boxcars are often specially labeled and dedicated to paper service.

Most paper mills are marked by large piles of wood chips. Conveyors carry them into the digester building, which converts them into wood pulp. However, you could model a paper-only mill, which instead receives bales of pulp in boxcars. The pulp is bleached, liquefied, and piped to the long, low mill building, where it becomes paper. Rolls are then moved to a warehouse, which will have covered loading areas. A mill complex will also have tank car unloading facilities and tanks to store the chemicals. Papermaking takes a lot of water, so mills are often located along rivers.

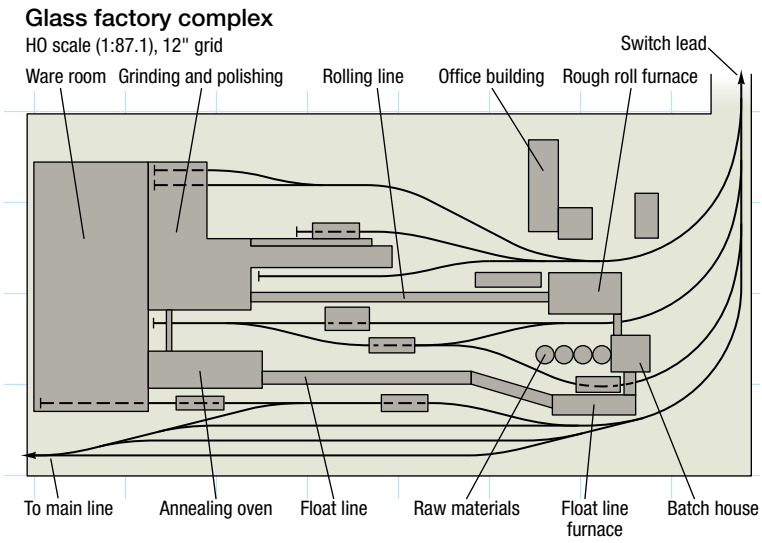


Glass factory

Plate glass factories are not as commonly represented on model railroads as, say, coal mines or grain elevators, but they're just as interesting, with plenty of detail to model. A glass plant is not only a destination for hoppers of sand, limestone, and sodium carbonate (soda ash), but also supplies boxcars of glass to ship to your sash-and-door factory or auto plant.

In addition to the raw ingredients of glass, a factory would also require fuel – a lot of it, since glass is melted at temperatures over 2,800 F. Materials needed later in the process, including salt, iron oxide, felt (for polishing), and packaging materials, would be received in boxcars.

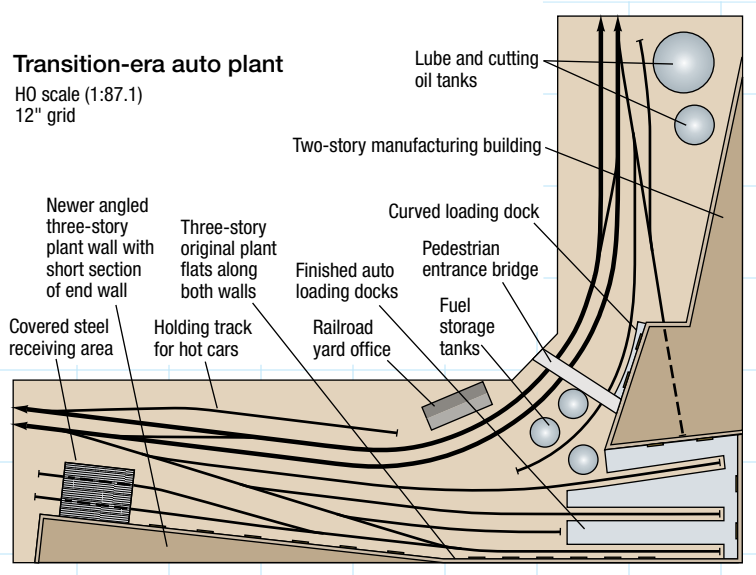
Since a glass furnace can never be allowed to cool down, factories operate 24 hours a day, keeping that industrial switcher busy.



Auto plant

How much of the auto industry you model will depend on the era of your railroad. In the early days, most fabrication was done on-site. A steam-era auto plant needed shops to work with iron, steel, glass, wood, and textiles. After World War II, factories specialized in engines, wheels, electrical systems, and more, and these parts were then shipped to assembly plants. Most parts would be shipped in boxcars, though rolls of steel, gondola loads of auto frames, hoppers full of plastic pellets, and tank cars of fuel, oil, solvents, and welding gases would add variety.

You'll also need to ship out those new automobiles. An early plant would have long docks to load finished autos into double-door boxcars, while a modern one would have movable ramps at the end of stub tracks to load today's multi-level auto racks.



Planning realistic scenery

The terrain should look like it was there before the railroad

Here's a great example of realistic scenery in a photo (opposite) of Eric Brooman's HO scale Utah Belt layout. Looking past the scene's most obvious features, I'd like to suggest that several subtleties make it look realistic.

First of all, Eric's New Mexico countryside looks like it was there before the railroad. We know that rock formations like the one on the left and streambeds as on the right evolve over geologic time. The S-curves we see the train winding through look as if they were necessary to fit the railroad into this terrain, even though a glance at the track plan (in the 2006 edition of *Great Model Railroads*) would tell us that they get the main line around a protruding corner in the Brooman basement.

Next, the railroad is following the watercourse, which Eric calls the San Pedro River. Study the maps of a few prototype railroads and you'll notice that they follow rivers and streams wherever they can. Railroad surveyors and locating engineers know that watercourses have already found the easiest gradient through changing elevations. Whenever it's practical, railroad builders take advantage of that, and try to find routes that link one valley to the next over the lowest possible divides.

Cut and fill

As railroads build through changing terrain, they use a series of cuts and fills to maintain a relatively steady grade through the ups and downs of the landscape. We can see the Utah Belt has had to cut into some higher land along the river back where the coal gondolas are entering the S-curve. In the foreground, the railroad is on a fill, an embankment raising the roadbed above the surrounding terrain to cross the tributary stream and skirt the towering rock formation.

Speaking of that tributary, railroads always make sure there are outlets for waterways and rainfall runoff that might otherwise be dammed on the uphill sides of their roadbeds. If drainage isn't allowed for, even in the driest areas, the roadbed is sure to be washed away. The short bridges and culverts railroads use for drainage give us many opportunities to add detail to our model scenes, as Eric did with the girder bridge carrying the second and third diesel units of the train in the photo.

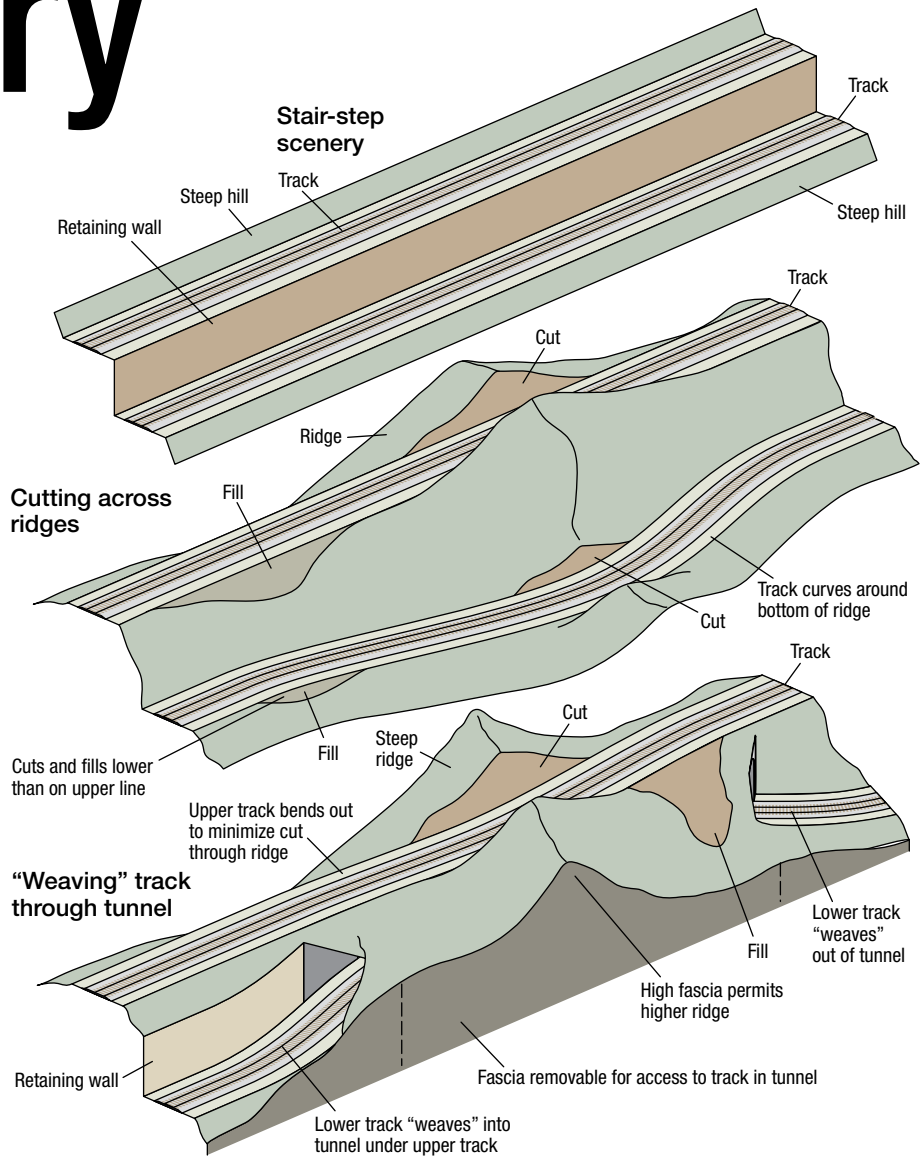


Illustration by Rick Johnson

Avoid "stair-stepping"

For other examples of how cuts and fills can add realism to your scenery, consider the illustrations on this page. The "stair-step scenery" at the top isn't what we see along most railroads. Having the rail lines cut across ridges and fill in the valleys, as in the second illustration, is much more realistic. The lower illustration shows how running one track through a short tunnel allows for a less-cluttered scene along the upper track. My thanks to Don Mitchell for the examples above, which first appeared in *Model Railroad Planning 2002*. – *Andy Sperandeo*

The scenery on Eric Brooman's HO Utah Belt RR not only looks great but has lessons to teach. Eric Brooman photo