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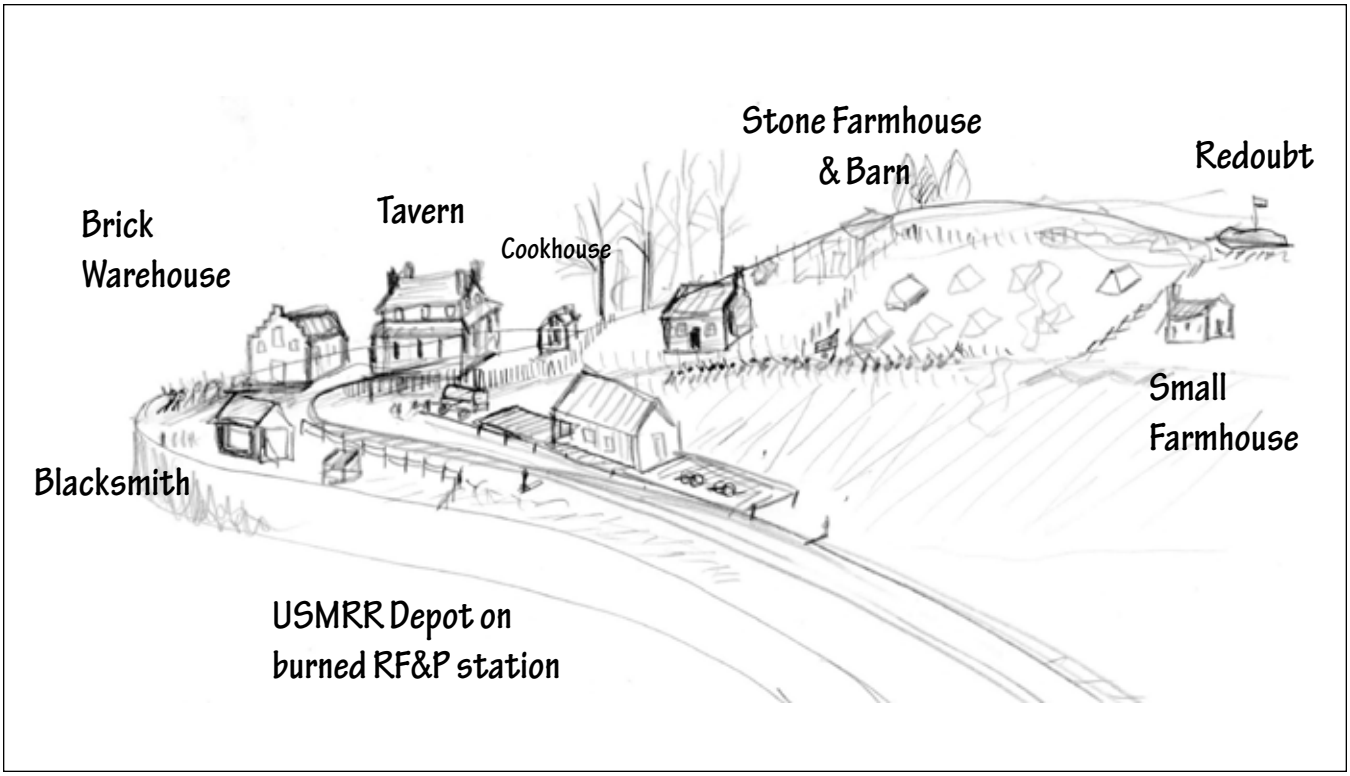
Introduction



Occasionally, I will make a perspective drawing of a planned scene on a layout to investigate how the elements might look to the viewer. For example, this is a scene planned for my home layout.

I enjoy layout planning. It is my favorite part of this great hobby. This book is a compendium of layout designs that I have developed for my own use or for other people and organizations.

I keep notebooks handy and scribble plans as the ideas come to me. My home office is cluttered with more than a dozen notebooks and sketch pads filled with design ideas. When I haven't had a notebook handy, I have used napkins, scrap paper, pizza boxes, and even a foggy door in the shower to work out ideas for a layout problem that has been vexing me.

Of the thousands of plans I have sketched out, this book features 45 that have reached the final stage of presentation.

Design principles

When designing layouts, I adhere to the following general principles.

Be prototype based. I usually base my layouts on actual prototypes. While I do some freelancing in my designs, they are mostly based on prototype practice.

Keep hidden track to a minimum. In my experience, the hassle of operating hidden track far outweighs any added benefits.

Create a sincere design. *Sincere* is a term coined by model railroaders to describe a layout where the trains run through the scene only once in a session. My layouts try to give a strong sense of going someplace, and a sincere design helps create that feeling.

Maintain a high scenery to track ratio. I try not to cram track into every available square inch of a layout design. I like to give the trains breathing space. This includes simple areas I call "country running" between busy scenes.

Use a walkaround design with aisles that are as wide as possible. The aisles are the easiest part of the layout to build. Make them big.

The layouts

In selecting the layouts for this book, I aimed for a wide variety of subjects, scales, and sizes. They are organized into small, medium, and large designs, and range from shelf layouts to those that can fill a basement or a garage.

There is a slight bias to East Coast railroads because I know them the best, but I have included several from other regions of the United States. Five of the railroads are not in the United States, including one that is set on Mars about 75–100 years from now. Most of these layouts have a theme that tells a story.

I tried to pick subjects that could be built without having to scratchbuild a majority of the rolling stock and/or structures. I also tried to include tips on obtaining specific rolling stock and constructing buildings and scenery.

Some of the smaller layout designs in the book feature a single industry or activity. Most of these plans can be

easily expanded into bigger layouts. For example, the Canton Railroad design (pages 6–7) could easily be tacked on to a larger layout as an industry to switch.

Other layout designs are intended for public display at train shows, museums, and other exhibitions. I have been heavily involved in modular model railroads over the past 20 years and have built many modules and portable layouts, as well as some museum displays. I find the interaction with the public while displaying a modular or portable layout to be interesting and satisfying.

Designing a layout for a gymnasium might be a fun theoretical exercise, but almost no one has that much space, except maybe modular clubs at exhibitions, and even they can be limited on space. In all the layouts designed for homes in this book, I used actual layout spaces from places I have either visited or seen in publications. I enjoy designing alternate layouts for these spaces.

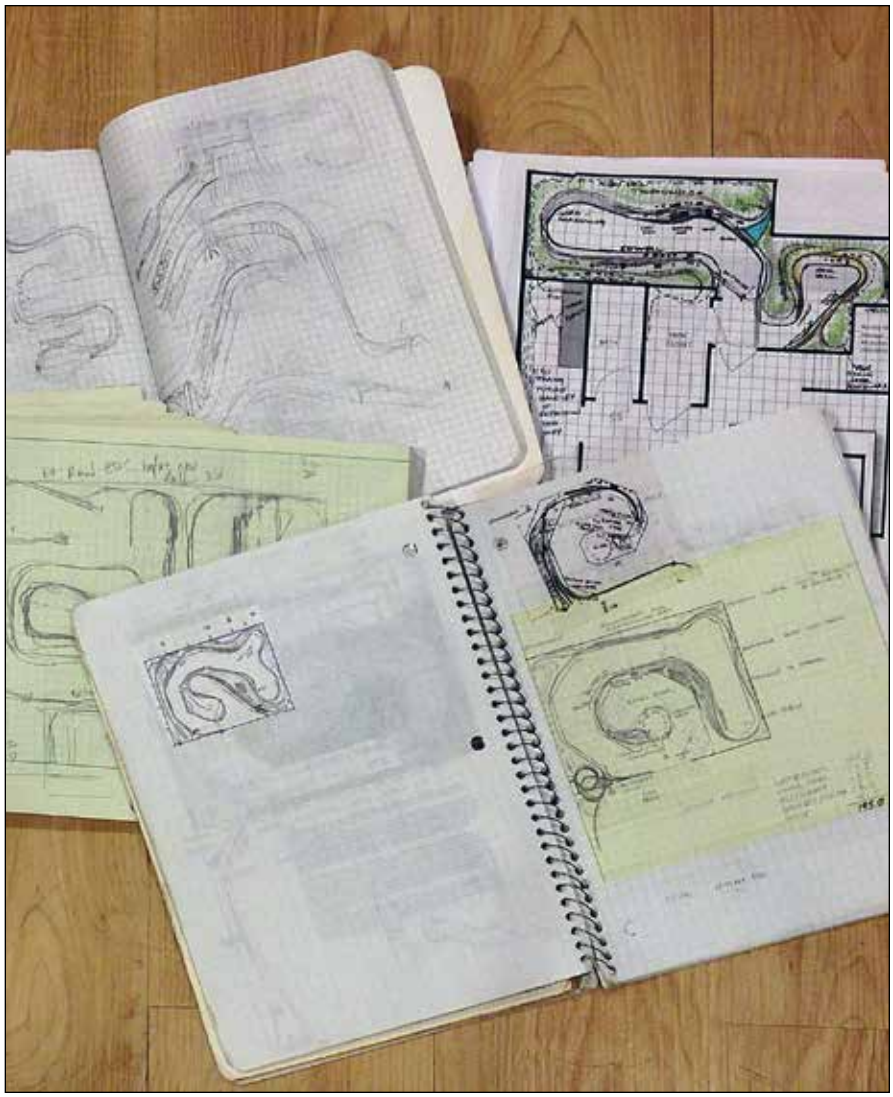
Several of the layouts I designed for clients in accordance with their requirements. I find it rewarding to see someone build one of my layout designs. Even if my layout does not get built, it usually aids in the design process of the one that eventually does get built.

Design software

I frequently get asked about the kind of software I use to draw my final plans. I have tried several drawing packages but I prefer using Adobe Illustrator and Adobe Photoshop.

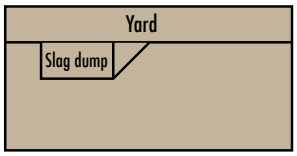
For most of the design work, I use Illustrator, which is a drawing program with some computer-aided design tools. Photoshop is an industry standard for photo manipulation, but I also use it for advanced graphic work. I use it to add textures and scenery to my drawings. I find a flatbed scanner and a Wacom drawing tablet also useful in doing track plan designs.

I hope you enjoy viewing these plans as much as I did in creating them. Perhaps you will find some ideas useful to your own situation. And if you decide to build one, please drop me a line to let me know how it goes.



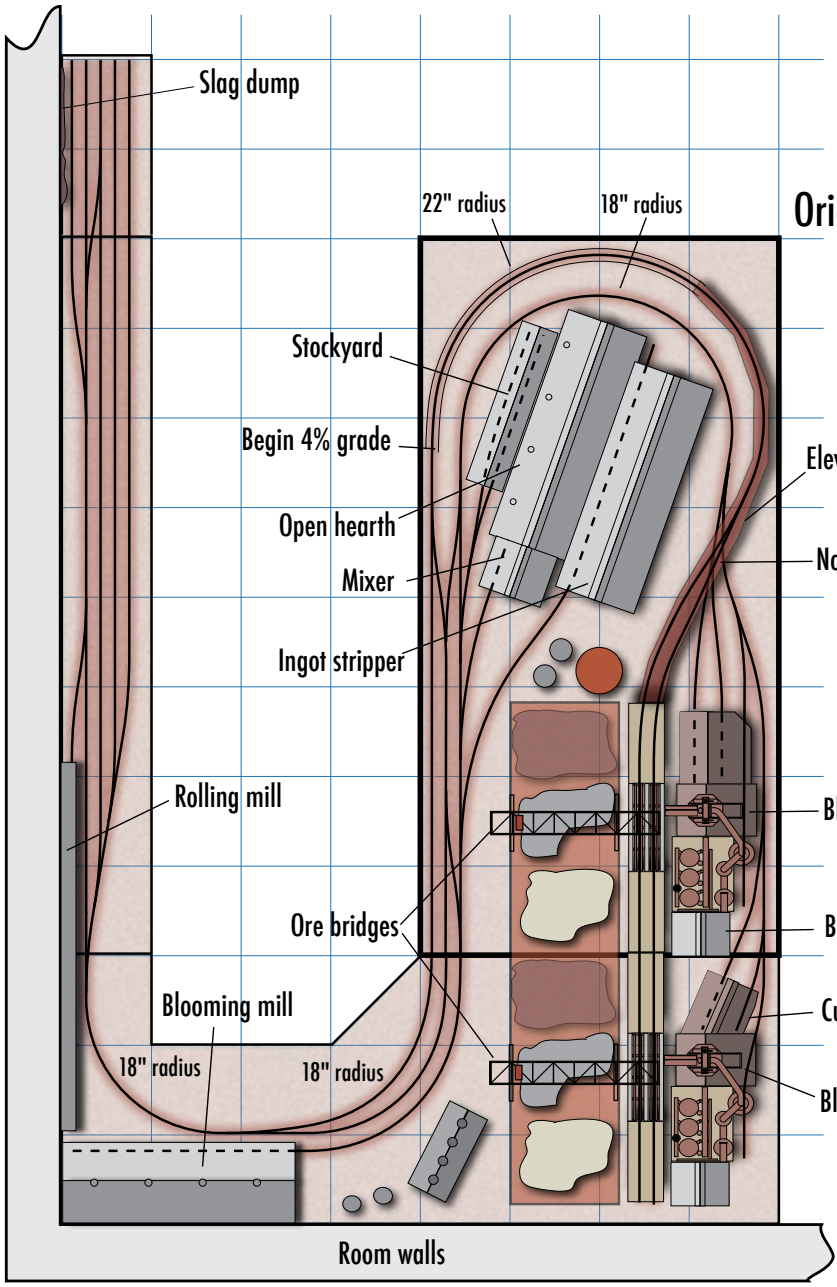
These are some of the notebooks in which I have been scribbling layout designs over the years. I like to do the early conceptual work for a layout in pencil on graph paper.

I use Adobe Illustrator for the precise drawing, including the layout of track components, easements, and curve radii. Once the engineering design is finished, I use Photoshop to add textures and scenic elements.



Plywood cutting diagram for extension
(smaller scale than main drawing)

Coke hoppers wait in a yard in front of the blast furnaces at Detroit Steel.



FIRST STEEL — HO scale

Size: 4 x 8, expanded to 10 x 13 feet
Prototype: Freelanced

Locale: Northeast United States
Era: 1950–1990
Style: Walk-in
Mainline run: 38 feet
Minimum radius: 18"

Turnouts: No. 6 (and one No. 4)
Maximum grade: 4 percent
Train length: 6–12 cars

Scale of plan: ½" = 1 foot, 12" grid

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Victoria Crater Railway

This concept sketch shows a string of loaded ore cars at the mine load-out on the Victoria Crater Railway on Mars.

Recent rover expeditions have shown that Mars has many of the ingredients necessary for mankind's expansion beyond Earth. With manned missions being planned by several organizations, humans may land on Mars in the not-too-distant future. Colonization could happen soon thereafter.

In the scenario presented here, Mars has developed several settlements that are largely self-sufficient, producing air, water, food, fuel, and housing from native materials. However, they need to import finished high-technology products from Earth.

In return, they export Deuterium, a material needed in fission and fusion reactors. It is 10,000 times more valuable than gold, and is much more plentiful on Mars than on Earth. (This scenario is based largely on the ideas presented by Robert Zubrin in his book *The Case for Mars*.)

Early iron manufacturing on Mars used surface scrapers to mine the low-grade, iron-bearing soil. While it did produce enough iron to bootstrap the steel and other industries, the discovery of a rich vein of hematite "blueberries" in Victoria Crater led Martian business interests to begin mining there. Since the soil leading to the crater was not suitable for extensive heavy-wheeled vehicle traffic, the mining company built a narrow gauge railroad from the closest settlement, Musk, about 70 miles away, to haul the ore.

In exploring the right-of-way, the surveyors discovered a frozen lake under the loose soil about halfway between the crater and Musk. The mining company erected an electrolysis plant to convert the ice to hydrogen and oxygen. This creates hydrogen for fuel, oxygen for air to breathe, and Deuterium for export.

The model railroad layout is designed for a small room, but it could also be used as a portable layout to exhibit at train shows and science fairs It has three main areas, each built on a 6-foot-long section.

On the right side of the layout is the settlement of Musk with its industrial, agricultural, and cultural areas. Most of the structures can be depicted on the backdrop, but a passenger station and some industrial structures can be modeled, including a steel mill, chemical plant, and various manufacturing facilities. The steel mill uses a direct-reduction technique suitable for Martian conditions. The passenger station includes an airlock that allows passengers to board or exit the cars.

The tracks continue to the center section, which houses the electrolysis plant. The plant uses both photovoltaic cells and a fusion reactor to generate electricity. Here, a passing siding can be used to load tank cars with water, hydrogen fuel, and oxygen.

At the far left, the tracks reach the iron mine, a passenger station, and some smaller temporary housing units for workers. The station has an overlook for viewing mine activities and admiring the huge crater.

The mine is located in the crater. The bucket wheel excavators and a central benefactor device, depicted on the backdrop, extract ore from the exposed soil in the crater. The ore is

sent to a tipple at the rim of the crater via conveyors. The tipple loads the ore into jimmies on two parallel loading tracks. There is no runaround, so the engines utilize a push-pull method of operation.

Since high-technology goods need to be imported from Earth, they are quite expensive. Thus, the railroad utilizes simple, rugged technology built as quickly and inexpensively as possible. This is the perfect situation for a narrow gauge railroad. In fact, from a distance, this railroad looks a lot like one on Earth 100 years earlier.

This makes the job of the modeler easier, as existing HO engines and cars can be used with only cosmetic alterations to account for operation in an atmosphere without oxygen. HO scale model diesels could be modified to have airtight operator compartments and hydrogen fuel tanks.

HO freight cars could be used with modifications such as removing the air brakes and perhaps lightening the frames. The reduced gravity on Mars means that cars will cube out before being overloaded by weight. A modeler in the United States could use European or Australian rolling stock, which is not often seen here, to create an exotic Martian look.

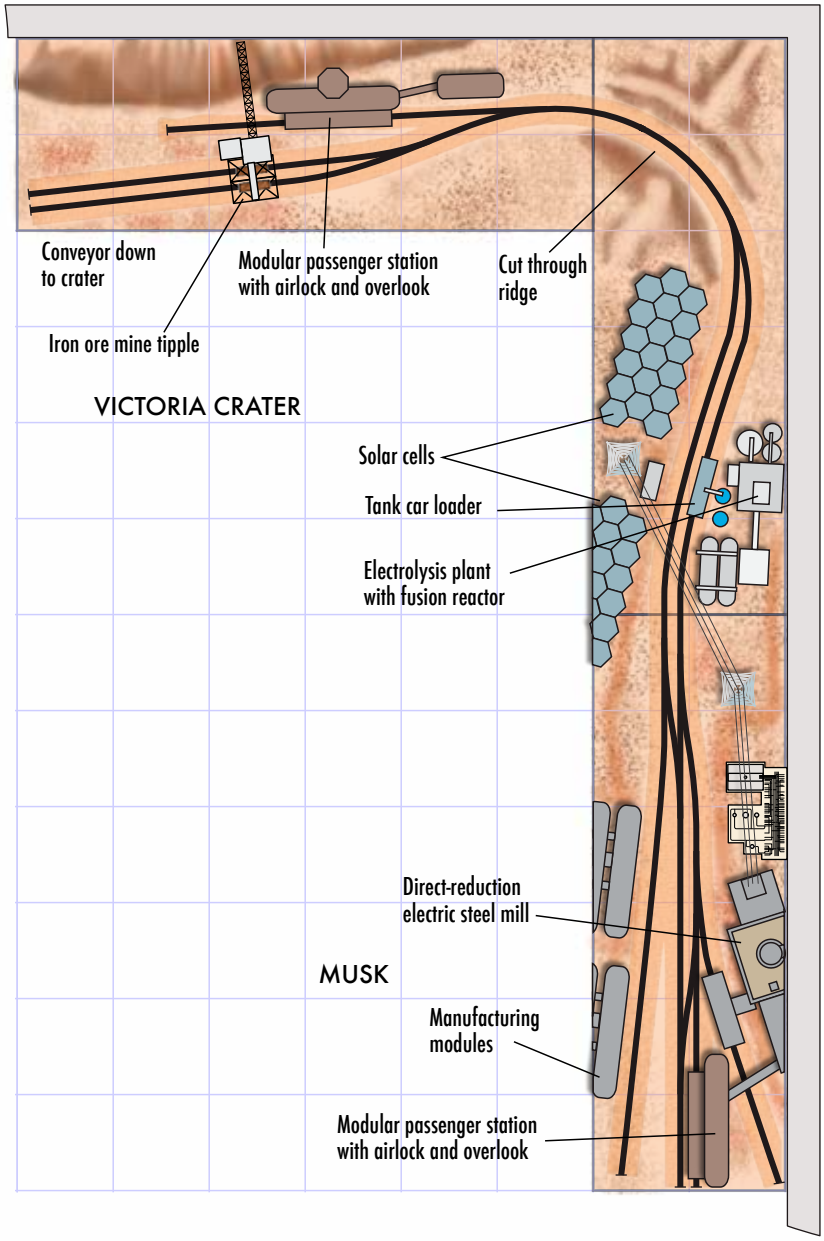
The track would use lightweight rail on concrete ties, as there is no wood on Mars.

By modeling in S scale, you could use 28mm scale science-fiction figures from various manufacturers. These companies also make futuristic vehicles that can help detail the scenes. On Mars, the figures must wear spacesuits. However, recent research at MIT and other places is leading to the creation of spacesuits that resemble wet suits, which would be more comfortable to wear. So converting these S scale figures to having these new spacesuits may be easily done with a little modeling putty.

All structures need to be scratchbuilt, and you can use HO scale industrial parts like tanks and electric towers. Mars colonization literature suggests that structures would be comprised of domes and modular elements, or made from locally fabricated bricks. Many housing units and structures would be built at least partially underground for protection from radiation. However, agricultural units would need exposure to sunlight, possibly through transparent domes.

Operating the layout is rather simple. Trains with ore cars and tank cars shuttle back and forth to the various industries. Other trains take passengers and workers to and fro.

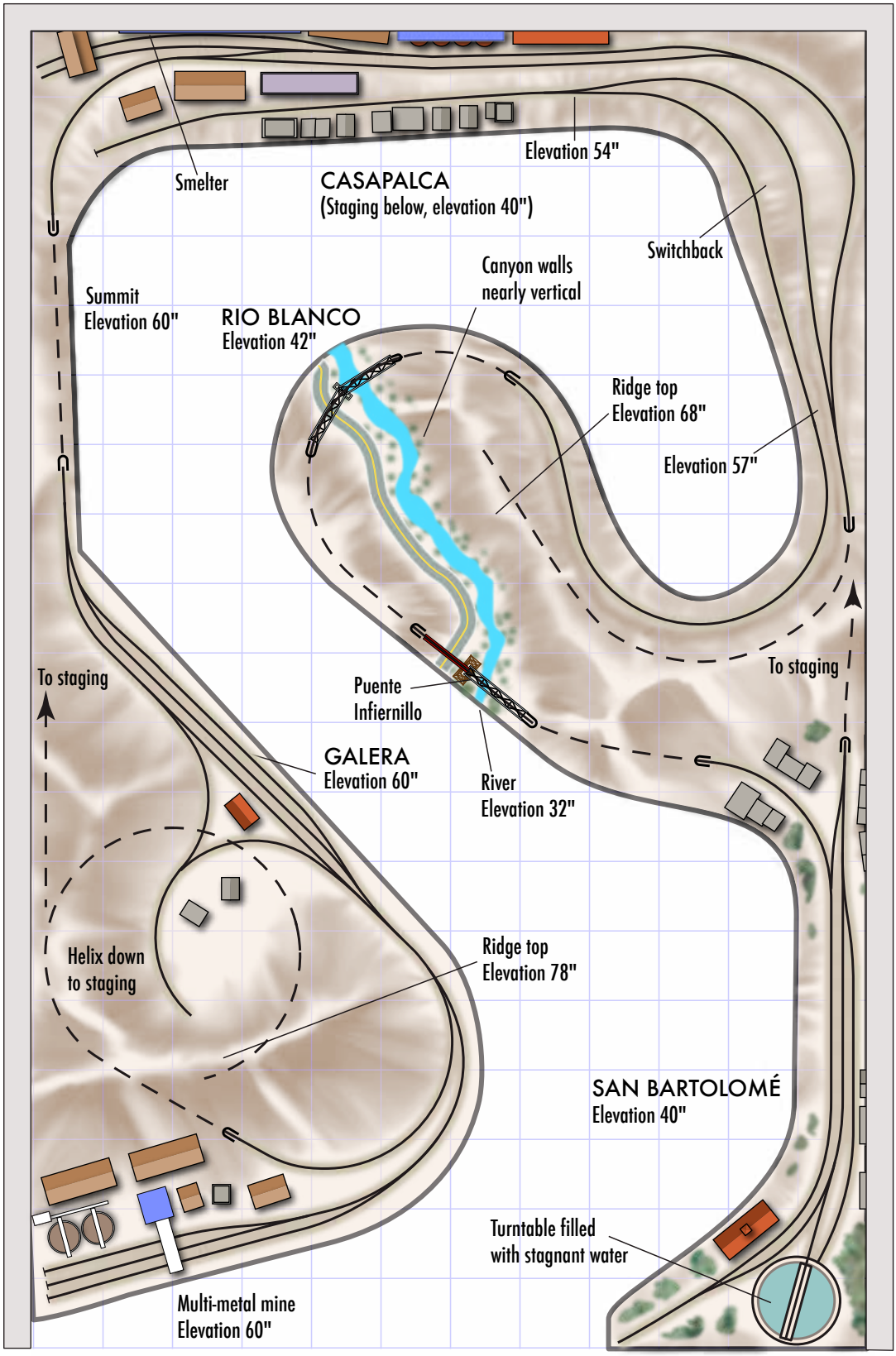
The ore shuttle can be animated for simplified operation when displaying at shows. The operator would be free to interact with the spectators to discuss the potential benefits and costs of settling Mars.



VICTORIA CRATER RAILWAY — Sn30 scale

Size: 8 x 12 feet
Era: 2080–2100
Locale: Mars
Prototype: Freelanced
Style: Shelf or exhibition
Mainline run: 18 feet
Minimum radius: 24"
Turnouts: No. 6
Maximum grade: 0 percent
Train length: 4–6 cars

Scale of plan: ½" = 1 foot, 12" grid



TRANS-ANDES RAILWAY — HO scale

Size: 12 x 19 feet
Prototype: FCCA
Locale: Casapalca, Peru
Era: 2015

Style: Walk-in
Mainline run: 110 feet
Minimum radius: 30" on main line, 18" on Galera wye
Turnouts: No. 6

Maximum grade: 4 percent on main line, 2.5 percent in helix
Train length: 7–8 cars

Scale of plan: ⅜" = 1 foot, 12" grid

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DaniCa Forest Products

The paper mill at West Point, Virginia, serves as a prototype for this layout. Bulkhead flatcars carry cut pulp logs that are unloaded in the flume. The crane unloads whole logs from trucks.

Even today, a paper mill makes a good subject for a model railroad. Railroads use a variety of car types to service a paper mill including bulkhead flatcars, tank cars, open wood-chip gondolas, covered hoppers, coal hoppers, and boxcars.

DaniCa Forest Products is a free-lanced chemical process paper mill typically found in the Southeast. (The *Ca* represents its Canadian owners.) In addition to making paper pulp, the chemical process creates various chemical by-products including that funky paper mill smell. Most by-products are recycled or shipped out as commodities.

As depicted on the layout, the mill can accept pulp logs on bulkhead flatcars, or wood chips on tractor trailers. A specialized unloader that looks like a backhoe mounted on a rail gantry knocks the pulp logs into a water flume. The flume then transports the logs to a drum debarker and chipper.

Fresh chips join others brought in by truck on a wood-chip pile. An array of conveyors moves the chips from the piles to the kraft mill, where they get converted to pulp. The pulp is shipped out as an intermediate product, but much of it moves to the Fourdrinier machine house, where it is made into paper.

Most buildings come from Walthers kits, although some need to be kitbashed to make them longer and narrower. Scratchbuilding is necessary for the conveyors and log and chip unloaders.

The detailed structures provide a modeling challenge. With tall buildings on each side of the tracks and conveyors crossing overhead, the layout offers an industrial canyon for visual spectacle.

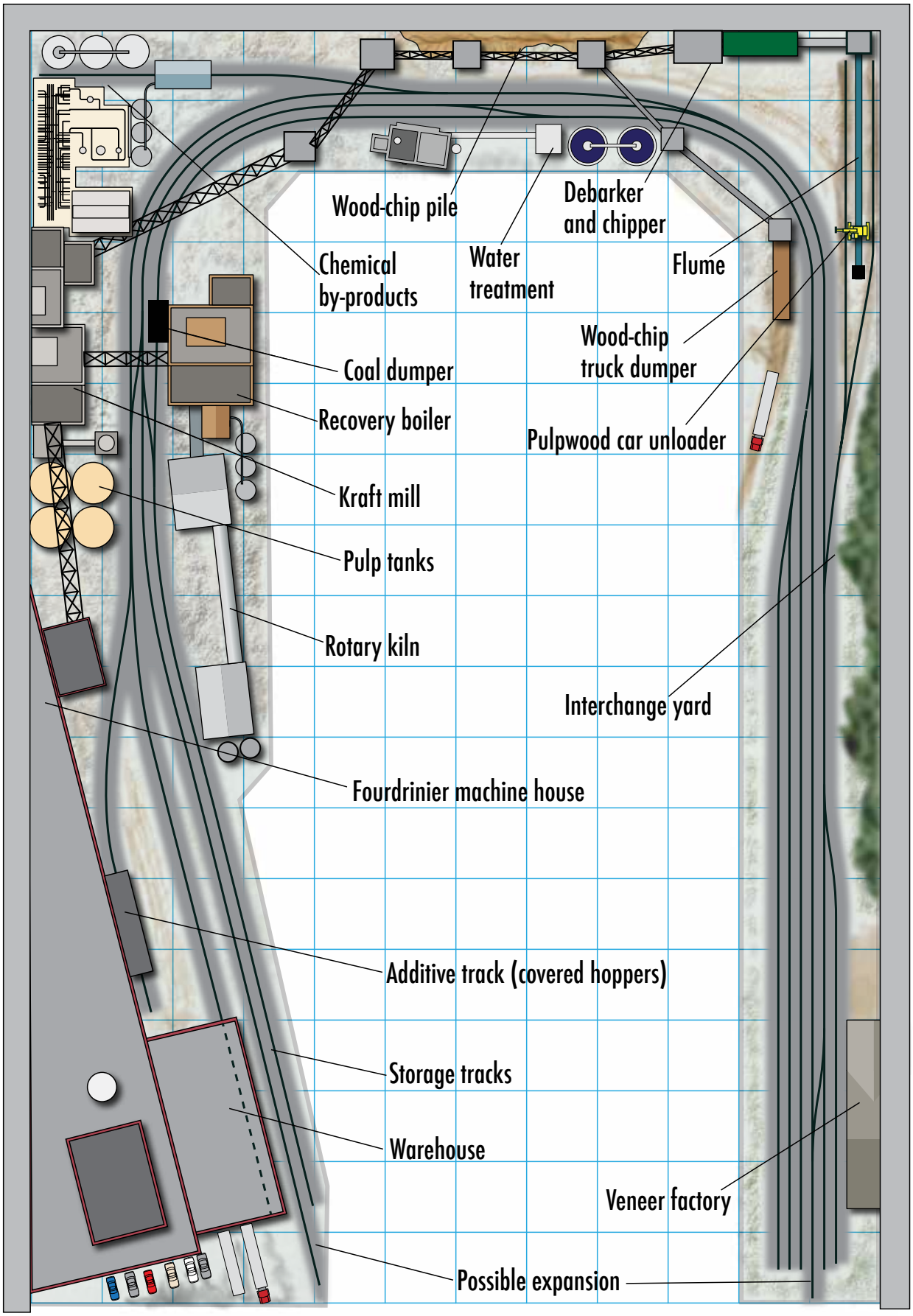
DANICA FOREST PRODUCTS — HO scale

Size: 12 x 18 feet
Prototype: Norfolk Southern
Locale: Southeast United States
Era: 2001
Style: Walk-in
Mainline run: 46 feet
Minimum radius: 30"
Turnouts: No. 6
Maximum grade: 0 percent
Train length: 10–12 cars

Scale of plan: ⅜" = 1 foot, 12" grid

The interchange yard has room for other industries. The plan has a veneer factory but any industry would do.

If space allows, this layout could be expanded as shown on the plan.


Wood-chip pile
Debarker
and chipper
Chemical
by-products
Water
treatment
Flume
Wood-chip
truck dumper
Coal dumper
Recovery boiler
Pulpwood car unloader
Kraft mill
Pulp tanks
Rotary kiln
Interchange yard
Fourdrinier machine house
Additive track (covered hoppers)
Storage tracks
Warehouse
Veneer factory
Possible expansion

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Maryland Midland

Maryland Midland GP38-2s work hard up the grade at Sabillasville curve in August 2005.

When I proposed the oNetrak concept to Northern Virginia Ntrak at an annual Christmas party, the idea was hotly received, literally, as the poster board I used to illustrate the idea was accidentally set afire by one of the holiday candles. Luckily, the host of the party was a professional firefighter, and he quickly doused the flames, but the oNetrak idea was launched. Later, the club developed a set of oNetrak modules depicting the Chesapeake & Ohio Mountain Subdivision.

The oNetrak concept works best when it is set up with a unified theme such as the C&O Mountain Subdivision or the Florida East Coast Modelers oNetrak layout. The layouts depicted here use a unified theme based on the Maryland Midland Railway.

The Maryland Midland is a short line that grew out of the abandoned Western Maryland Tide Subdivision. The main yard at Union Bridge hosts the largest customer on the line, Lehigh Cement. The cement plant was reached via tracks running down Farquhar Street. (Those were recently removed, but they were in operation in 2005 when this layout is set.)

The horseshoe curve at Sabillasville at the top of the Owens Creek canyon is a railfan favorite. The Maryland Midland interchanges with CSX at Highfield and Emory Grove.

The smaller layout depicts two towns, Union Bridge and Thurmont. These modules are fairly conventional rectangles except that they are built in 5-foot increments because 5 feet makes more efficient use of 8-foot lumber when cutting the frame members, and they are not much harder to transport than 4-foot-long modules. Two end-turn modules create a loop.

In the larger layout, a set of specialized modules focuses on Sabillasville, the twin bridges in Owens Creek canyon, and Emory Grove, which

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Tennessee Pass

A 2-8-8-2 Mallet, D&RGW no. 3602, pulls a westbound freight with 70 cars under the telltales of Tennessee Pass Tunnel in September 1931. *Otto Perry, Denver Public Library collection*

The Denver & Rio Grande Western Tennessee Pass Line, at 10,212 feet, is the highest main line in the United States, and it is also one of the steepest. During WWII, traffic boomed, and this is the time period depicted in the track plan.

Minturn is a crew change point and site of the helper engine terminal. Little switching or classification occurs in Minturn Yard. However, the Malta Turn is made up in the yard from blocks dropped by manifest trains for switching in town and the few industries on the line. Malta is modeled in staging.

Helpers with a separate crew tack on the end of the train. Both crews throttle up the grade. Wireless DCC is a key requirement for this operation.

Upon leaving the yard, the tracks pass Rex, where a 2 percent grade kicks in.

The track enters the steep Eagle River Canyon and approaches Belden. The plan depicts both sides of the canyon since the railroad built the siding across the creek from the main. The Gilman Mine tipple is in the canyon.

After passing the mining town of Red Cliff, the tracks reach Pando. Here, Camp Hale, home of the U.S. Army 10th Mountain Division, was located. The camp is depicted on the backdrop.

Continuing uphill, the tracks punch through Deen Tunnel and then traverse the famous S curves at Mitchell.

The summit tunnel at 62.4" elevation caps the climb. Tennessee Pass siding on the east end is a key location and marks the end of the visible run. Here, helpers cut and turn on the wye.

A deep rocky cut hides the entrance into the helix and staging. The helix has three tracks and four turns at 2 percent grade for nearly 650 feet of track. Trains can be staged in a serial or head-to-toe manner. There is plenty of room inside the helix for a staging operator to manage the trains and get them ready for their next run.

This is an all-steam railroad. Although D&RGW had some diesels during this time period, they did not run on Tennessee Pass. Amassing the O scale steam engines needed for this layout could be a challenge and potentially expensive. In the interest of economy, you could move the time period on the layout up to the transition era, without too much anachronistic drama, except that the second bore of the Tennessee Pass Tunnel would be missing. Traffic would also be less, and Camp Hale would be shut down.