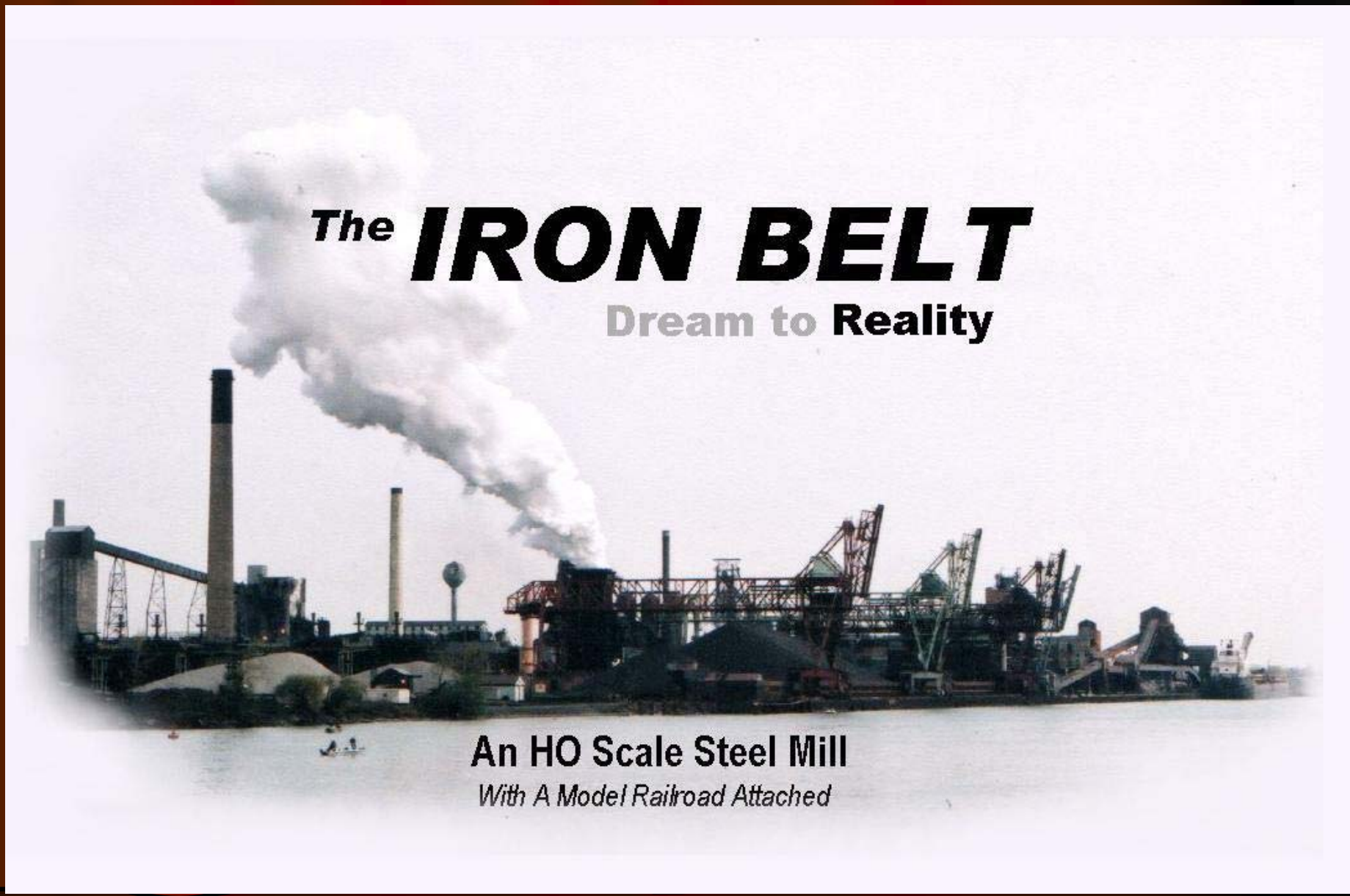

The IRON BELT
Dream to Reality
An HO Scale Steel Mill
With A Model Railroad Attached

Introduction

Hello, fellow modelers, and welcome to my imaginary empire!

Before we dive into this virtual tour, let me ask: Do you recognize the following from my original web site, *http://trainweb.org/ironbelt*?

That was *then*...

...this is *NOW!*

Introduction (continued)

Spending the first 13 years of my life in Southeast Michigan, I saw a fair number of steel mills and Lake boats. Repeated tours of Ford Motor Company's River Rouge facility in Dearborn showed me what a real-life spaghetti bowl track network looked like; I was mesmerized by the huge fires and the machinery that contained and controlled them. What *really* hooked me, however, was seeing a super-sized clamshell bucket - suspended from a trolley on a traveling bridge - dive into the bowels of a Lake freighter to unload iron ore at National Steel's Zug Island works. That vision was permanently lodged in my mind, defining what my future Dream Layout would resemble.

In this presentation, I'll be telling you what I *wanted*, what I *did*, and what I *got* as a result of my modeling efforts. I'm trying to stay away from the low level construction details of particular structures – much of that info has all been covered on the Iron Belt website as well as various clinics I've presented on each one of them over the past few years.

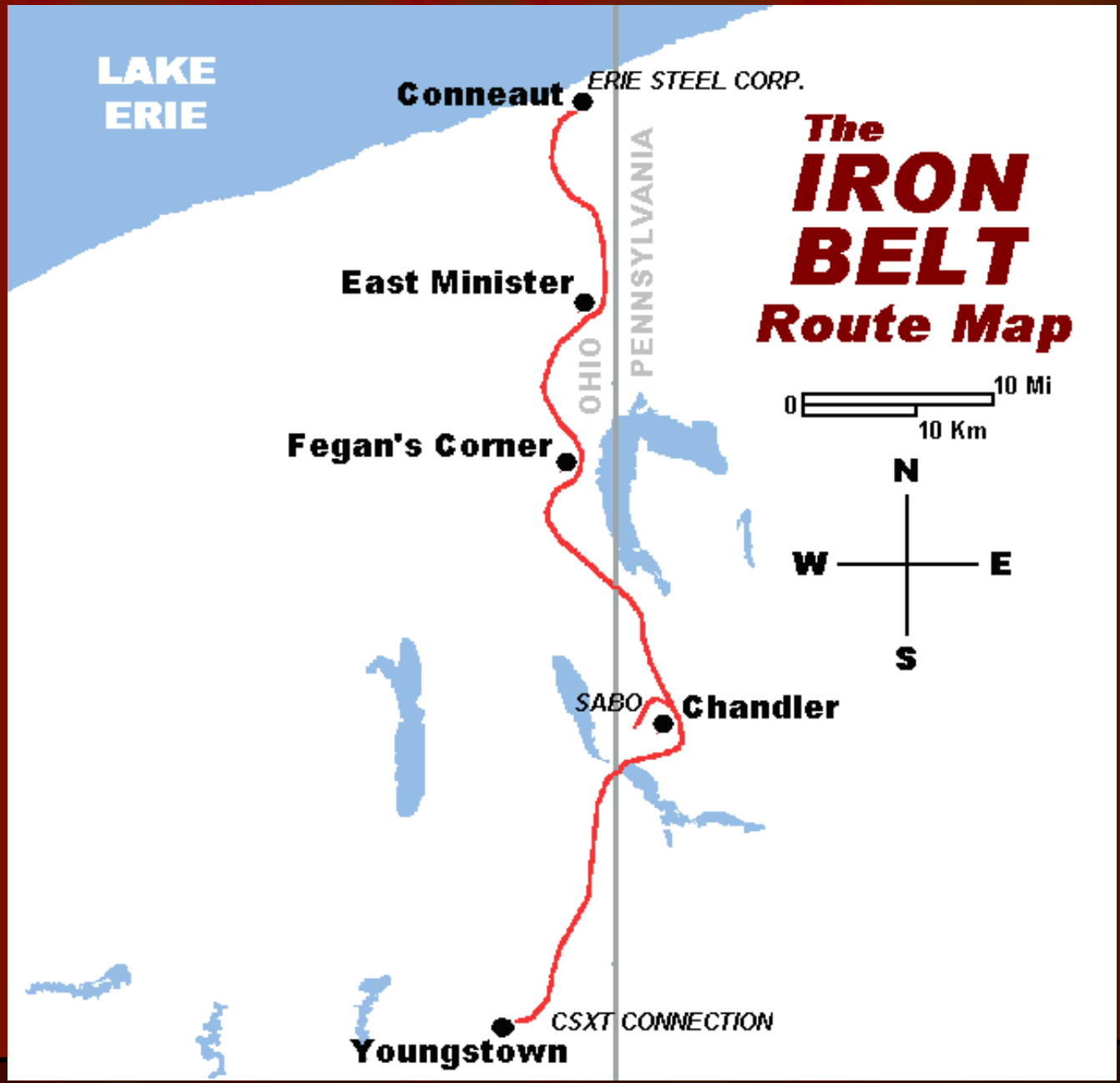
My primary intent is to give a photo tour of the *Iron Belt* as it exists in late May of 2006 – still far from completed, but ready to support limited train operation. After sharing a few lessons learned in the construction process, we'll have a look at the major mill structures, followed with some views of the separate 'railfanning' main line, then conclude with some sample operation scenarios both inside and outside the mill boundaries.

Introduction (continued)

Q: *What is* the Iron Belt?

A: It is an HO scale representation of a mythical integrated steel mill that could have existed somewhere along the Southern shore of Lake Erie, in the early 1990's. The namesake railroad is the tiny remnant of a former Class I line, officially listed as the *Chicago & Lake Erie*, whose fortunes rose- and in later years, *fell* - along with the once-mighty iron and steel industry of the Eastern United States; hence its nickname. As of 1990, its remaining right-of-way has been acquired by CSX (which wanted access to the Eastern Lake Erie port cities), while a handful of locomotives are still sporting *Iron Belt* paint and road numbers.

See the following page for a route map:


LAKE
ERIE
Conneaut
ERIE STEEL CORP.
The
IRON
BELT
Route Map
East Minister
OHIO
PENNSYLVANIA
0
10 Mi
10 Km
Fegan's Corner
N
W
E
S
SABO
Chandler
CSXT CONNECTION
Youngstown

How did I come to decide on this configuration? First, let's review the **3 questions** that form the basis of John Glaab's introductory course on steel mill modeling:

Q: What *Era* [and region] is being modeled?

A: 1990-to-Present, Lake Erie and Northeastern Ohio

Q: How much *space* is available?

A: 17ft by 15ft, not including outer walking areas

Q: How much *complexity* is acceptable?

A: Summary representation of 'hot end' steelmaking processes, with a "3-foot-rule" level of detail

This discussion would be incomplete without including a list of required and desirable attributes, termed "givens and druthers" by the late John Armstrong. So here they are [on the next page]:

Givens

- Steel Mill – Integrated, Operating, Hot-End
- Rural Main Line – visually separated, passes thru scene *only once*
- Free-lanced, but *plausible* for era and region modeled
- Point-to-point 'dedicated' mill trains
- Freight car 'spotting' locations (for switching operations)
- *30" minimum radius* main line curves (to accommodate 89-foot auto racks and TOFC flats)
- Point-to-Point Coal Traffic (Mine-to-Coke-Ovens)
- *Eventual* DCC functionality
- At least 1 grade crossing with flashing Crossbucks
- Visitor-friendly – no "mandatory" duck-unders
- Minimize risk of trains falling to floor
- Continuous looping, if desired
- Single-level (no space for helixes)
- 80% of layout covered by *some* scenery
- Up to15ft-length freight trains on mainline
- Lake boat, ore bridge & stockpiles

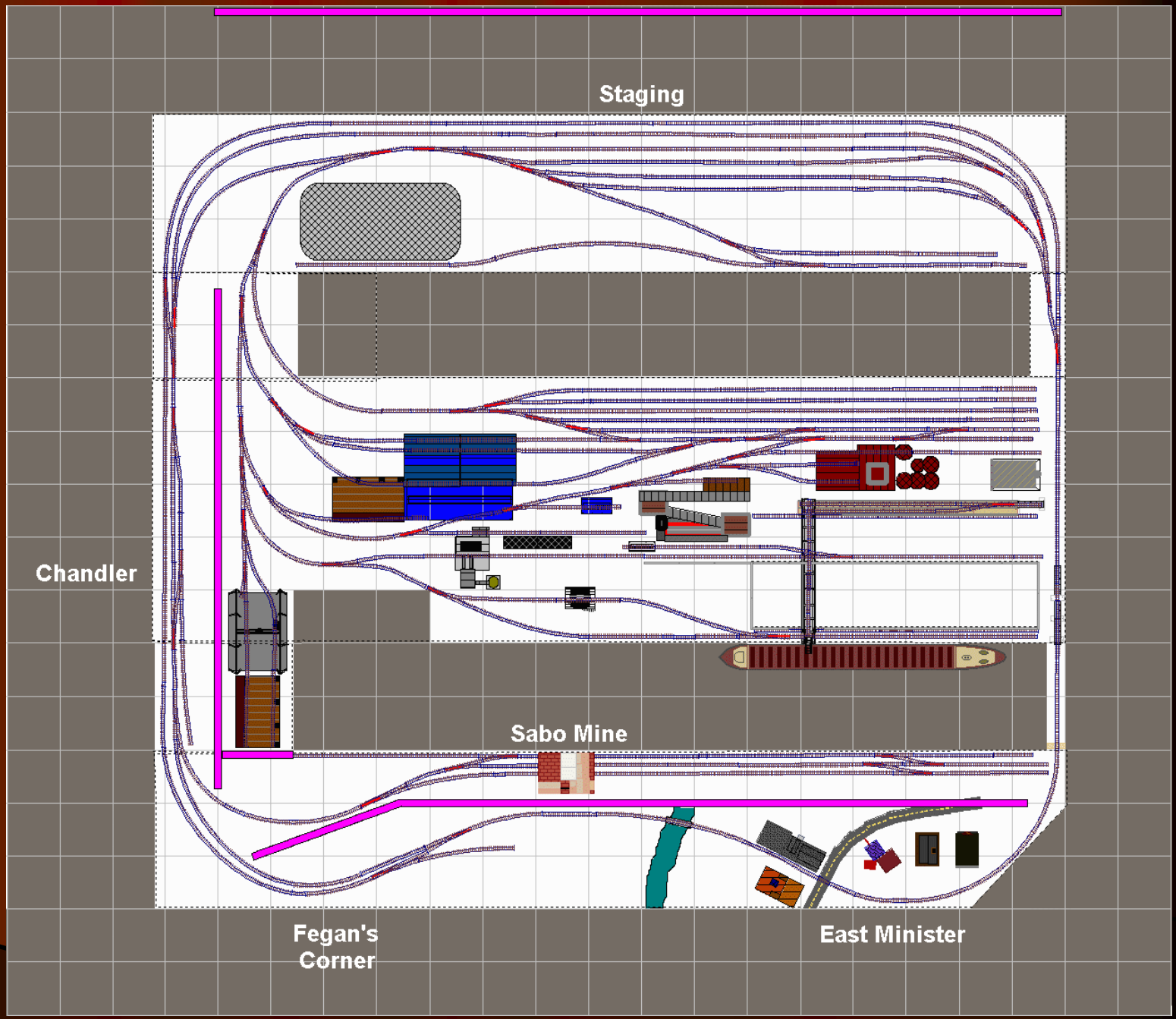
Druthers

- Figures & Vehicles
- Operating Clamshell Bucket on Ore Bridge
- Operating Highline
- Creek with fake 'water'
- Helper engine operations
- Lineside Spurs (for main line switching)
- Live Coal Loads
- Scale Lights/illumination
- Loco servicing facility
- 'Swappable' structures and/or terrain
- Separate staging yard(s)
- Metal wheelsets on all rolling stock
- All locos DCC decoder-equipped
- All rolling stock "era-correct"

The end product of my efforts, based on the two lists above, is an ‘E’-shaped island layout in the center of my garage, with major scenes visually separated (note the thick magenta lines on the track plan). Why didn’t I do an around-the-walls layout? Because of the *shelves* – mine is a family of packrats, and we’re continually running low on storage space. Besides, those shelf racks aren’t *always* a *bad* thing – they come in quite handy for clipping-on photo floodlight fixtures.

On the following page is a diagram of the layout, with the walking areas indicated in dark gray:

Track Plan



Construction Notes

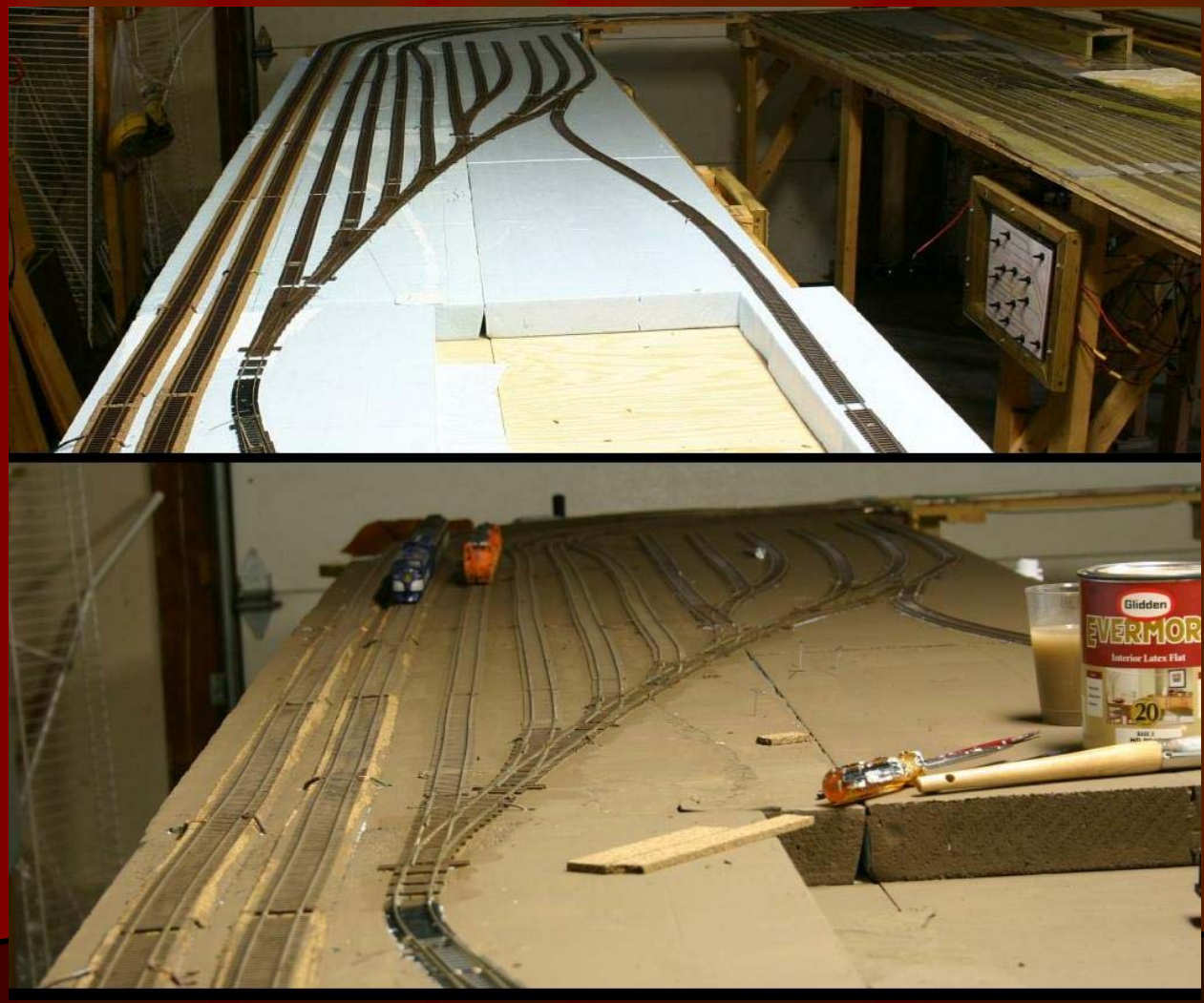
As I hinted earlier, there will be no in-depth description of the under-the-hood attributes of the Iron Belt, but I'll list a few main items:

The benchwork is just garden-variety two-by-four framing that can support the weight of a 250-lb adult, topped with ¾-inch thick plywood. There's also plenty of diagonal bracing to make it "jiggle-proof" without being bolted to any walls. Since my steel mill track [salvaged from my previous layout] was already on homasote, I obviously had to keep that; but all the new trackwork sits upon a Dow Board foam sub-roadbed. The raw materials pit and dock area sits atop some leftover pieces of Siever's mail-order prefabricated supports, but the majority of the pike rests upon simple two-by-fours.

I knew from the outset that if I put trains on the bare Dow Board and started running them, I'd be forever procrastinating on the scenic work. Applying contest-quality scenery to the entire layout will take me years' worth of evenings and weekends, but I at least want something better than bare plywood [or Dow Board] showing in my layout photos. Many people throw on a base coat of green paint, but since the Iron Belt is primarily *industrial*, I chose dirty brown instead. As an example, the following page shows a before-and-after view of the staging yard:

What a *difference* a coat of Latex can make!

Staging Yard – Before and After Application of Earth-Colored Paint



Scene Separation

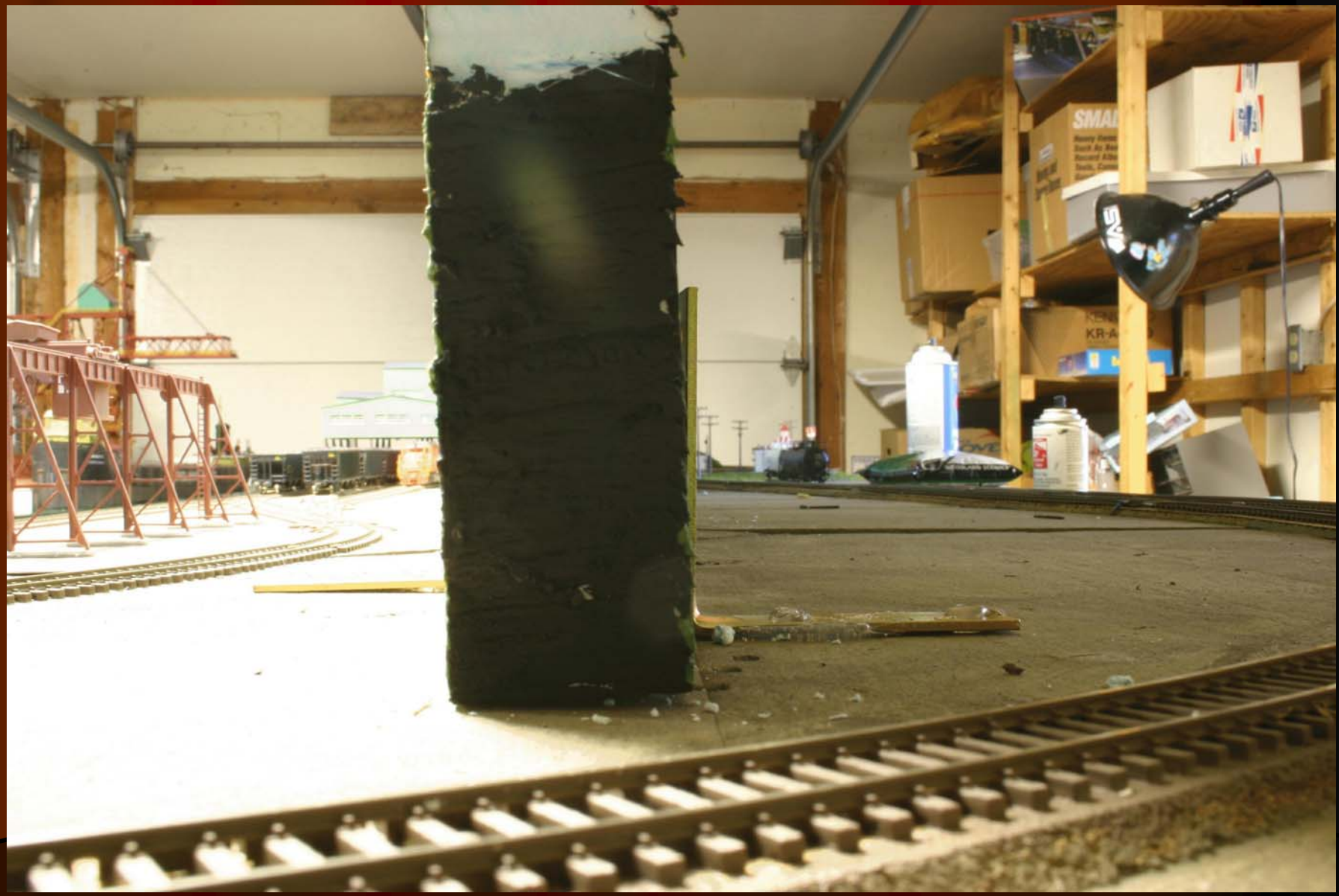
As I was storing the Dow Board I originally used as sub-roadbed for the new areas, I noticed how easily the two-inch-thick sheets stayed vertical. Furthermore, the light blue coloring resembled the sky. That's when I decided to try using Dow Board as a means of isolating the different scenes on my layout.

For starters, I bought two 4x8 sheets of half-inch Dow Board to hang over the shelves opposite the North end. I was delighted with the instantly- improved appearance, so I acquired some additional two-inch sheets, sliced these lengthwise, and positioned them in key locations. All I needed to keep them upright was four 'L' brackets (two on each side) for each individual 2x8 panel. Hot glue was used to secure each bracket on the horizontal plane; I left the vertical surfaces clean so I could freely slide the Dow Board in and out as needed.

The photos on the next few pages show the shelving North of the staging yard – *before* and *after* I hung the Dow Board - and the 2-inch-thick sheet I placed between the rural main line section and the coal mine yard.

A Quick, Inexpensive, and Flexible Backdrop Solution: Blue “Dow Board” Insulation Sheets

Dow Board as a View Blocker



Another view of the Dow Board view blocker, showing “L” brace hot-glued to horizontal surface

As a temporary backdrop solution, I borrowed a technique from the late Bob Ross – painting his so-called “Happy Little Trees” on the bare Dow Board with latex paint. I applied splotches of varying shades of green onto a flat black base, using a sea sponge as an applicator:

Fitting All the Pieces Together

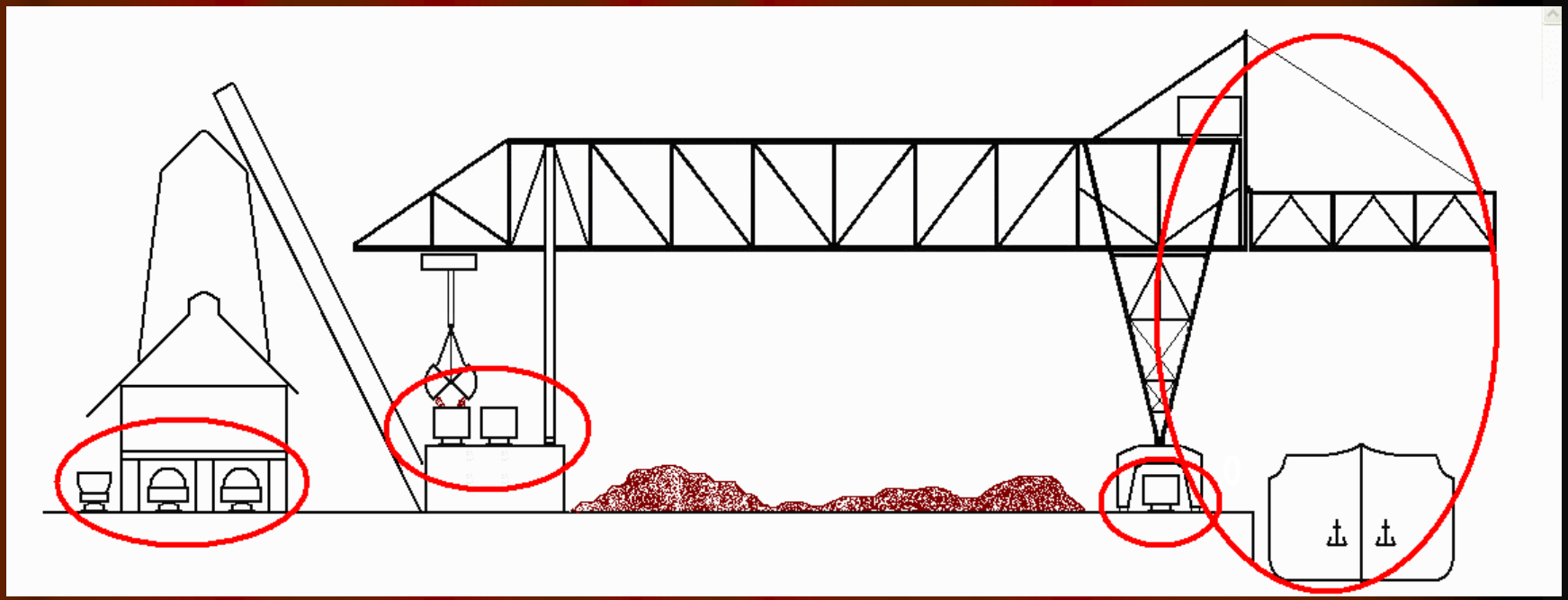
A Steel mill layout, with its many interconnected on-line structures (with track laid *in*, *on* or *through* them), presents a larger-than-average number of opportunities for track laying and/or terrain building errors. That's why it is especially important to *avoid permanently fastening track until ALL clearances are verified.* I've always been in the habit of pre-assembling my layout structures before deciding on a final location, and I have yet to discover an actual fit that doesn't require a little more layout area than the footprint drawing led me to believe.

Nevertheless, the issue still managed to bite me when I erected the extension benchwork for the ore dock and stockpiling area, that was supposed to be straddled by the ore bridge. Back in the Fall of 2003 when I began construction on the bridge, the main span measured 30 inches in length. So I cut a piece of leftover wooden floor moulding to use as a 3-D template to guide the construction of the ore dock area, and placed it in the garage with my under-construction layout.

In the meantime, as I was 65% of the way to completing my ore bridge model at my indoor work bench, I decided to nix the first attempt and build a new structure. The revised model was indeed better and [unfortunately] *bigger* – i.e., 3 inches longer. I forgot about this as I used the original 30-inch template to measure the positions of my highline, ore pit, and dockside track.

A year later, when I was ready to install the blast furnace and related structures, I noticed that the ore bridge seemed a tad longer than I remembered it – and sure enough, it was long enough to clip the upper pulleys and maintenance platform on the skip hoist. There was absolutely no way for me to easily reposition the blast furnace, the highline *or* the dock, since the track was already fastened, wired and embedded under a cork 'street' surface.

Verify Clearances *BEFORE* Cementing Track or Terrain



ALWAYS **verify clearances *before* cementing your track or terrain…**

...avoid *unintended consequences* !

Fitting All the Pieces Together (con't.)

Tearing up the track and widening my dock benchwork would have been a daunting task, undoing several weeks of focused effort. Luckily, in the end it was not necessary for me to take such Draconian measures. I noticed that I could surgically trim off 20 scale feet from the inland end of the ore bridge without hurting its appearance [it was not an exact prototype replication to begin with].

So that is what I did (see 'after' image on following page).

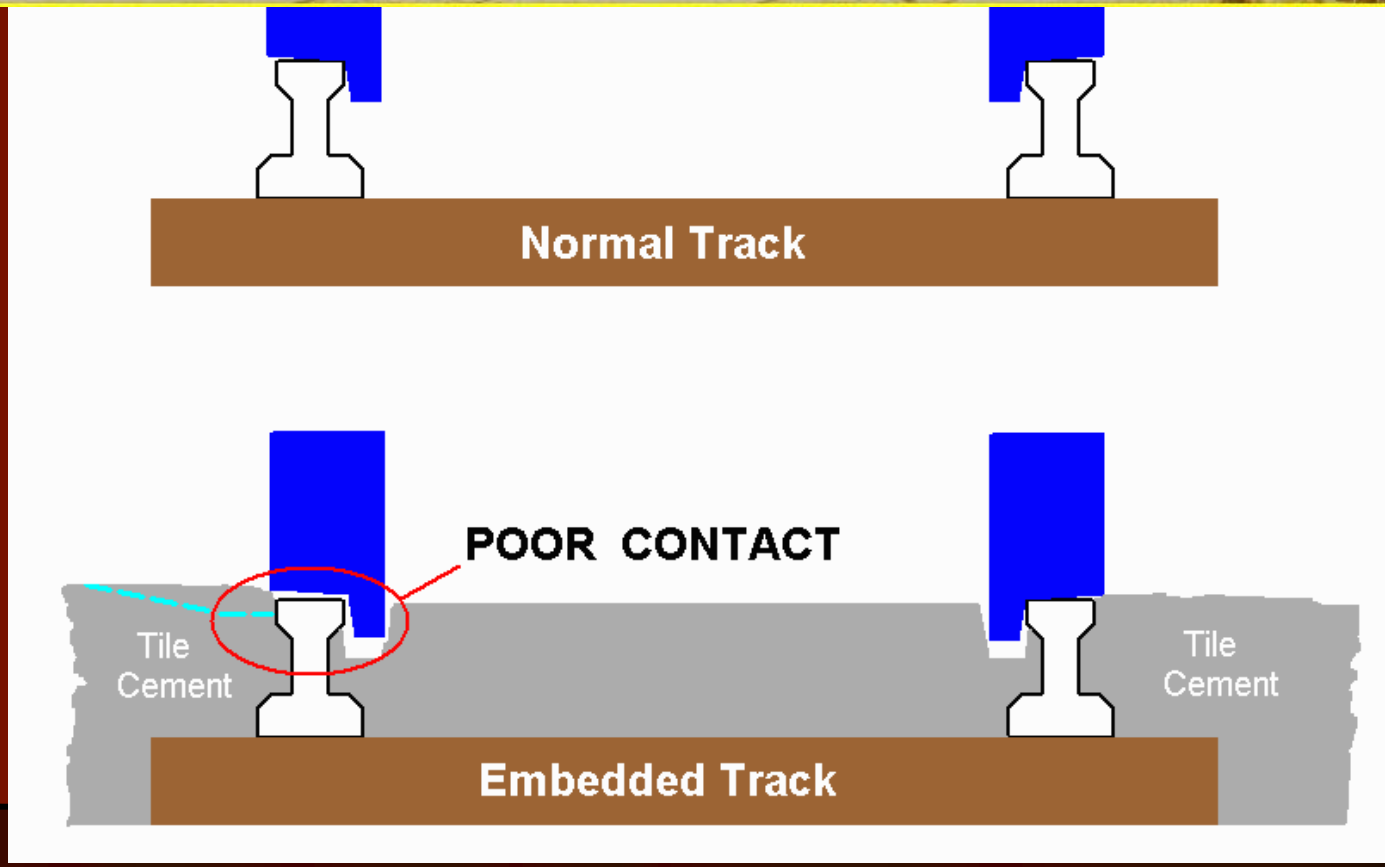
It bears repeating:

ALWAYS verify your clearances with the actual assembled structures BEFORE permanently cementing any associated track or terrain!

Corrective surgery, with help from Dremel

Embedded Track – *Lesson Learned* :

Always leave the outside edge of the railhead *slightly above* any paved surface that surrounds it!



A Rotary Dumper for Point-to-Point Coal Trains

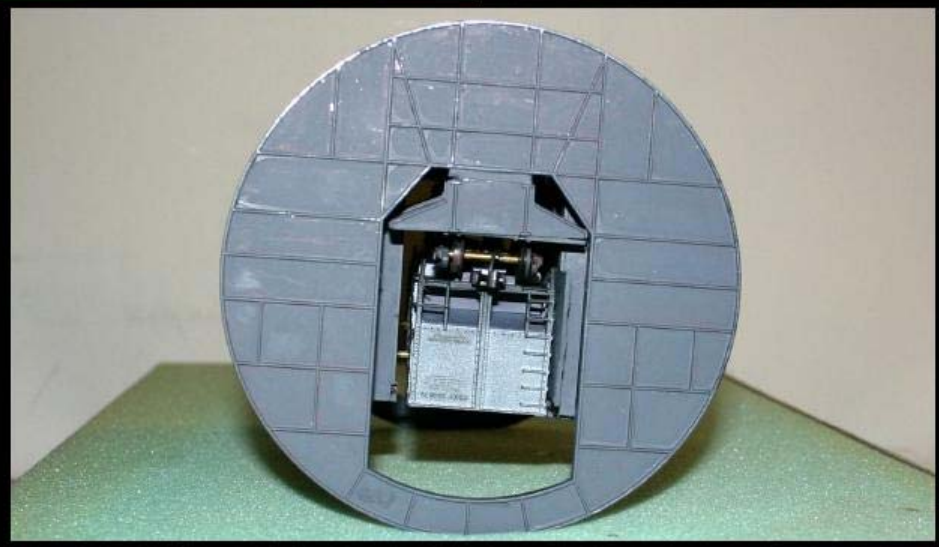
One significant feature of the new Iron Belt layout is a Walthers rotary dumper for unloading the coal for the coke ovens. A bucket sits below the surface to catch the emptied coal, which then gets recycled for a later operating session. [No, it's *not* motorized, it moves solely by the "Hand of Providence"! Of course this may change in the future...]

Originally I had wanted to use live coal loads – I even kitbashed little funnel holes in the roof of my Walthers New River mine to load the hoppers. After some experimentation, however, I realized this was not a practical approach because of all the coal dust generated. [Not only is it messy, it's also a fire hazard!]

Plan B was to make my own solid coal loads using Dow Board and Abrasives Depot-brand Black Beauty® granulated coal. They had to fit in the coal cars loosely enough so they would slide out when the car was flipped over. I also had to modify the rotary dumper to grip the hoppers with *set screws* - the original restraining tabs would need to be removed since they would block the solid loads from falling.

Rotary Dumper details:
A bucket to catch falling coal loads, a 6-lb jar of coal slag,
and some homemade solid coal loads

Rotary dumper, modified to accommodate solid coal loads.
Top: Set screws to grip coal car
Bottom: A Bethgon™ held in position



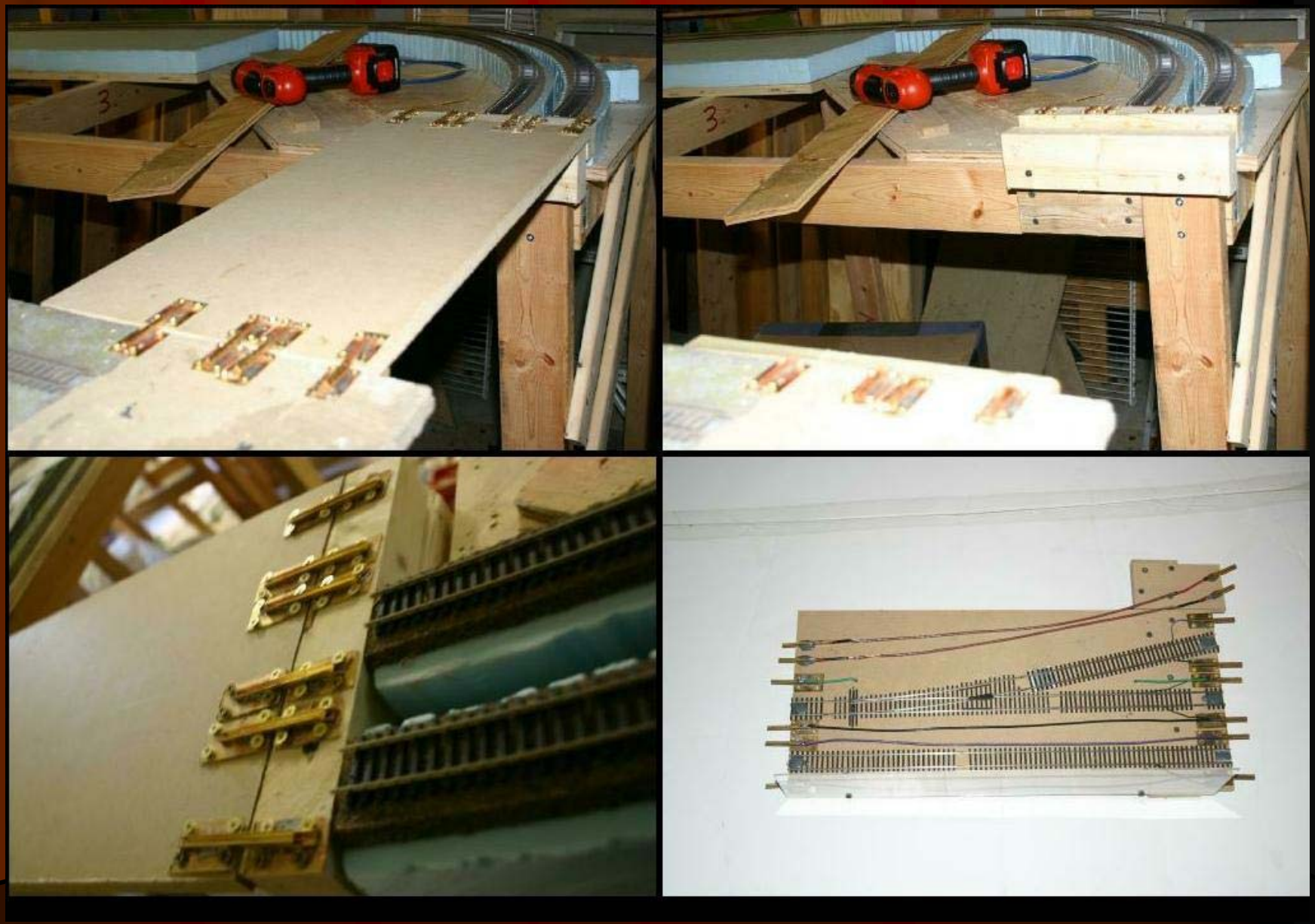
A Duck-Free, Fall-Free Zone

Recalling a major shortcoming of my previous layout in my Laurel, Maryland home, I wanted to make a few track sections easily-removable if necessary, in case any “agility-challenged” visitors [incapable of ducking beneath the benchwork] wanted to see the interior details of my steel mill. While chatting on the telephone about this with one of my online forum pals, he recounted a story of how one of his SP “Daylight” Proto2000 E-8 locos plummeted to the floor after he forgot to replace a missing lift-out section on his own layout.

This, and other similar experiences I read about on the various forums, convinced me to go the extra mile installing emergency power-cutoff wiring so none of *my* locos would meet the same fate. I also installed Plexiglas shields at the places where the track ran close to the layout edge.

The following page shows images of one of my removable sections at an early stage of construction. The brass slots serve a dual purpose of providing electrical connectivity and securing/aligning the roadbed.

Views of lift-out platform, before and after installation of track and wiring



Photos and Ops: A Tale of Two Modes

When it comes to photographing some of my extra-large steel mill structures, keeping background eyesores out of the picture is a major challenge. Even though they are rarely opened, I need to leave the main garage doors unblocked. And the storage shelves covering 3 of the 4 walls rise all the way to the ceiling – I can't permanently cover every one of them the way I did [with Dow Board] on the northern wall.

Eventually it dawned on me: Any operators or other guests visiting the layout will already know it is a model, so having the shelves and garage doors visible is no big deal. But for publishable photos, even if I cannot make the background look like the real sky, I at least want to hide the unattractive attributes of the trainroom. I don't want the blast furnace relief valve platform to be camouflaged by the garage door opening motor!

So I decided my layout can have two modes of existence: *Operating* 99% of the time, and *photographic* for the other 1% when I need to stage some decent-looking pictures. As before, it was *Dow Board* to the rescue!

The following slide shows the steps I took to set up the blast furnace harbor scene after I initially installed my ore boat. (Sorry, there are no 'full water' scenes in my virtual tour – I decided that wasn't quite worth the effort.)

Operating Mode –vs- *Photographic* Mode:
Simulating a blue sky background, and water in a harbor

...and that's about all I can think of saying about layout construction and other under-the-hood or behind-the-scenes topics, so now let's begin our...

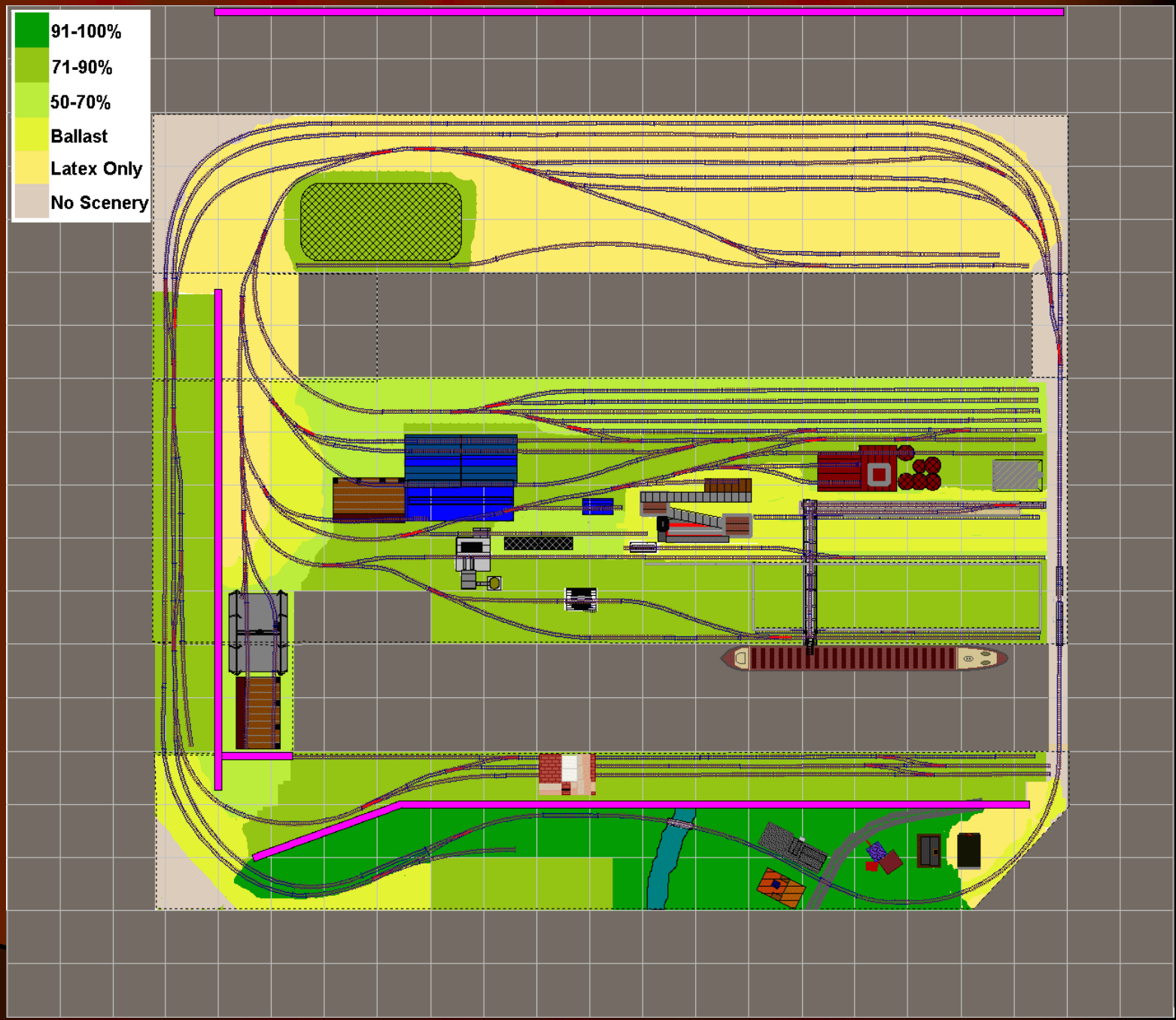
Virtual Tour

I mentioned in one of my “Given” list items that I did not want to have a large amount of bare plywood or Dow Board appearing in my photos. Hopefully I can claim success in achieving that goal, although there are certain areas (such as the staging yard) that obviously need much more work.

The graphic on the next page attempts to show how far I’ve gotten in applying scenery to various parts of the layout, using a ‘green-scale’ spectrum – starting with **gray** (for bare plywood) and ending with **deep green** (for complete or *nearly*-complete coverage).

Unfortunately, I was not able to disguise all the seams between the temporary blue-sky background panels in some panoramic views.

Scenery progress



A *Process-Based* Viewing Sequence

Another goal I have for this layout is to explain, via models, the entire 'hot' end of iron and steel manufacturing – from the receiving of raw materials through the stripping of solidified ingots*. (*Most modern steel mills employ continuous-casting technology.)

With this in mind, I will begin with panoramic views, then zoom-in on the ore dock. Next I'll discuss the coke oven facility, followed by the coke's next destination: the blast furnace. The structures tour will conclude with some views of the Basic Oxygen Process (BOP) furnace facility, and a cursory glace at the ingot stripper crane.

The Iron Belt is not 100% steel mill, however – I also want to share photos of the visually separate main line areas and the coal mining spur. I have fond memories of chasing trains around places like these.

Last but not least, I'll trace some regular point-to-point train movements (augmented by photographs of course!) for in-plant trains, plus a unit coal train between the mill and the mine. The presentation concludes with photos of external lineside businesses served by the CSX local, with a few 'railfanning' shots thrown in.

Sit back, enjoy the ride!

Panoramic view of steel mill – harbor side

Panoramic view of steel mill - yard side

Raw materials processing: S.S. *Marquette*, ore bridge and stock piles, with blast furnace in background

Coke Processing

Coke oven battery, with highline ‘flood’ loader

Conveyor junction house at top of coal crusher building

An early under-construction view of repositioned incoming coal conveyor

Under-construction view of coke wharf, export conveyor, and highline coke flood loader

Under-construction view of coking coal stock pile, with conveyor

Blast Furnace

A view of the blast furnace across classification yard, looking East

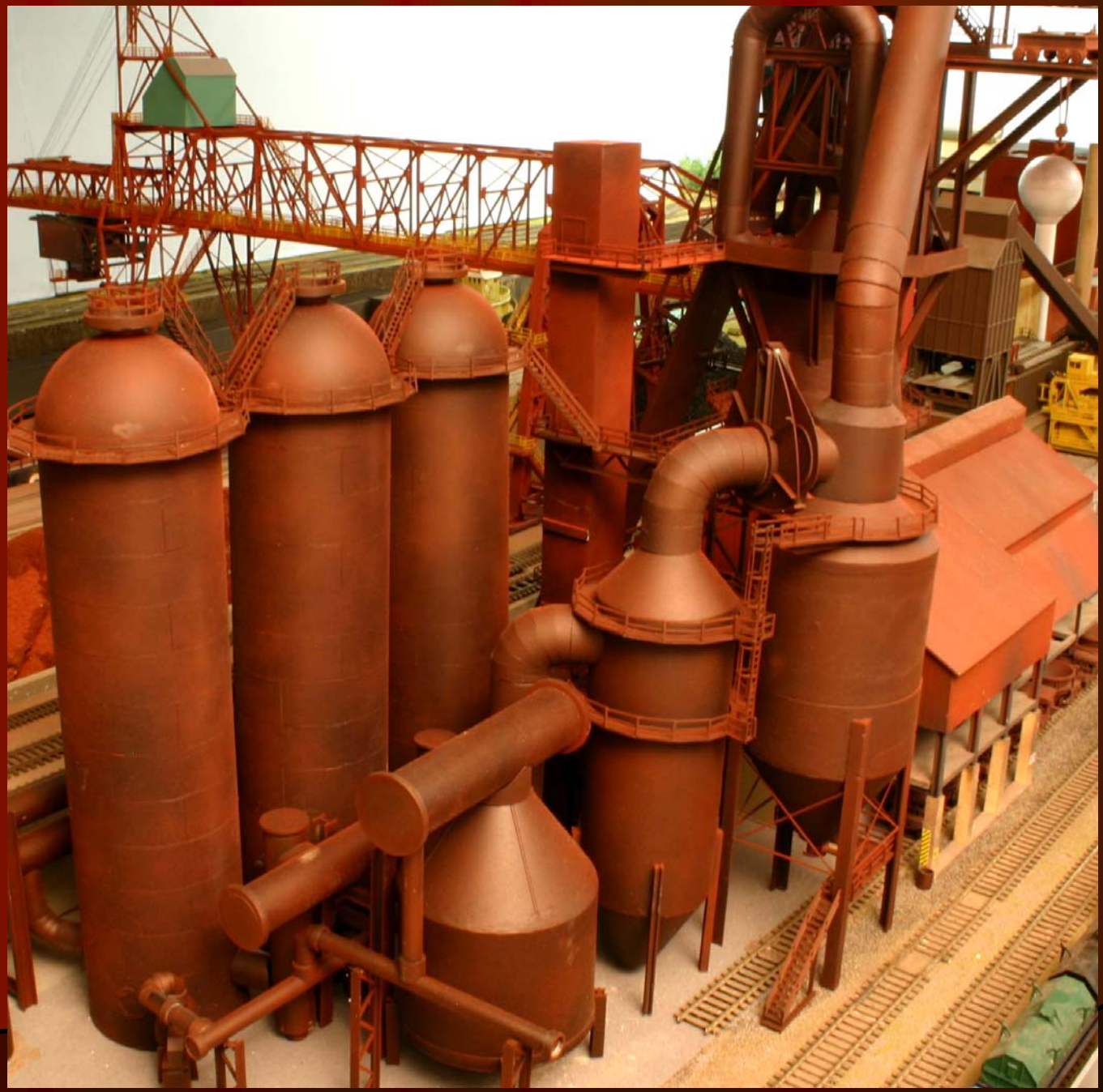
Riverfront view of ore bridge and blast furnace, with stern of S.S. *Marquette* in foreground

A view from the inland end of the ore bridge,
blast furnace bell platform in left foreground

Overall view of blast furnace dust/gas cleansing apparatus

Behold! The *Walthers Error*

Another view of dust catcher and gas cleaners



Close-up of stoves and hot blast main (note goggle valve atop dust catcher in upper right)

End view of hot blast main, with return gas piping and burner

Close-up of heating exhaust (top pipe, into stack) and cold blast main (bottom pipe), with highline in foreground

River-front view of stoves and skip hoist

Close-up of skip hoist and safety-caged stairway

Basic Oxygen Furnace (BOP)

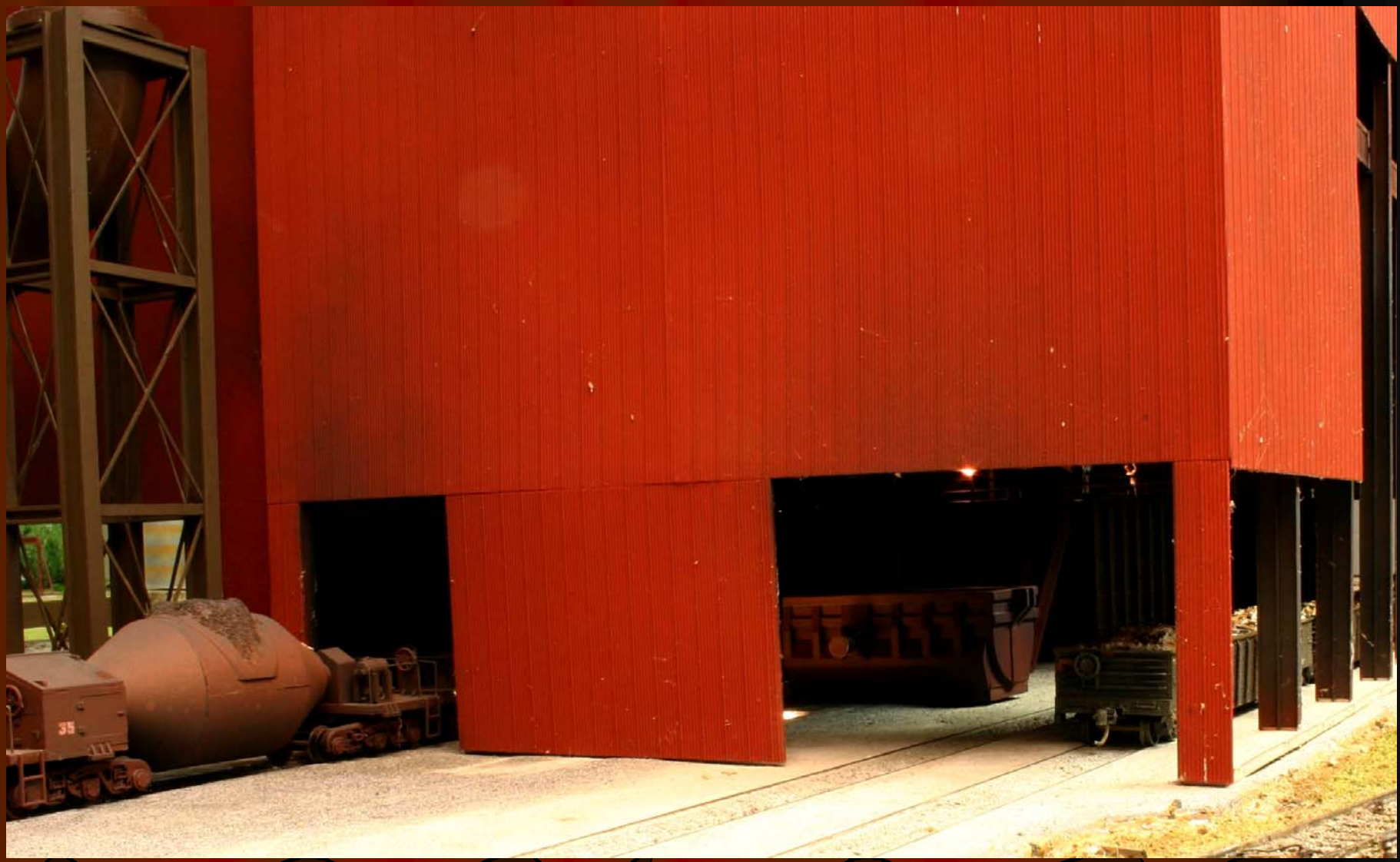
Basic Oxygen Furnace (BOP) buildings – aerial view

BOP buildings – seen from ground level

Teeming area behind BOP

Rear view of BOP complex, showing baghouse (converted Tri-State Power Co.)

BOP charging area

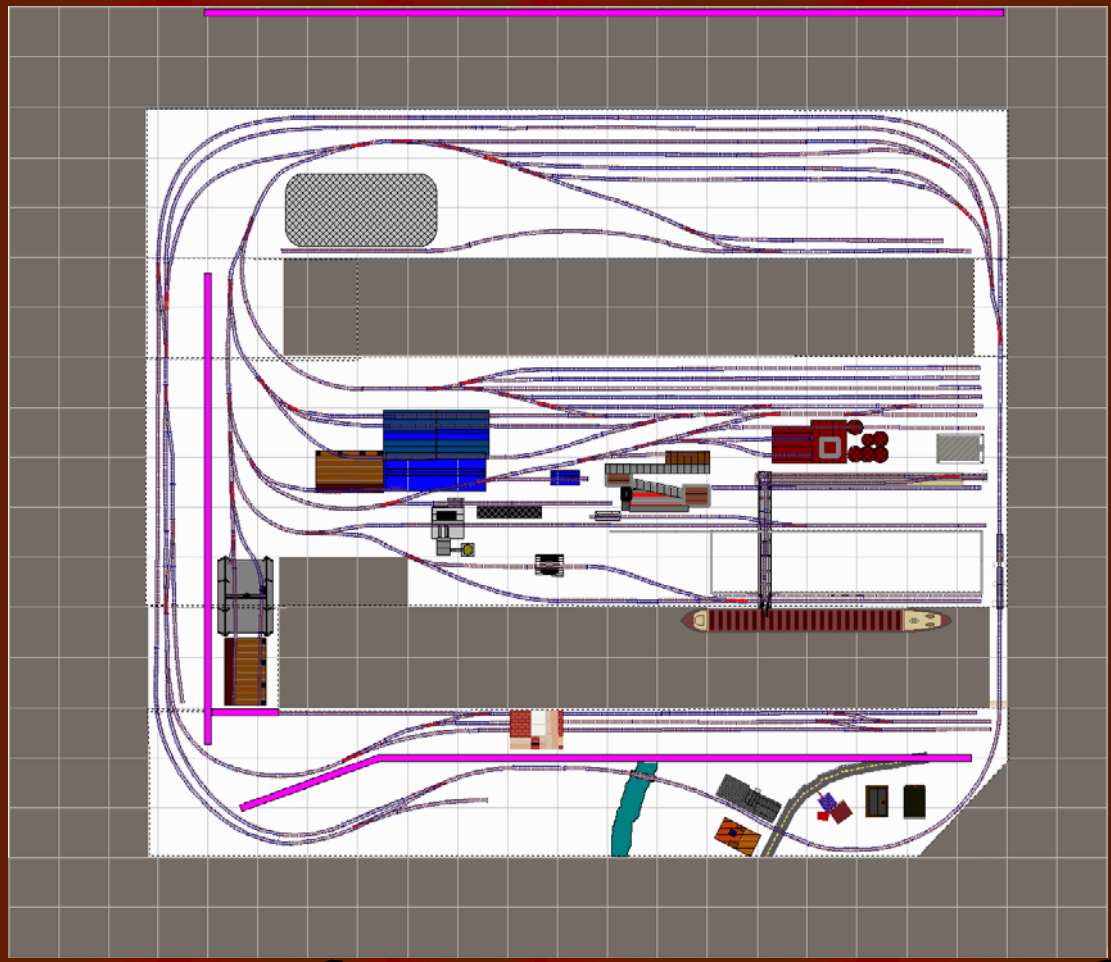


Hot metal being loaded into BOP furnace vessel

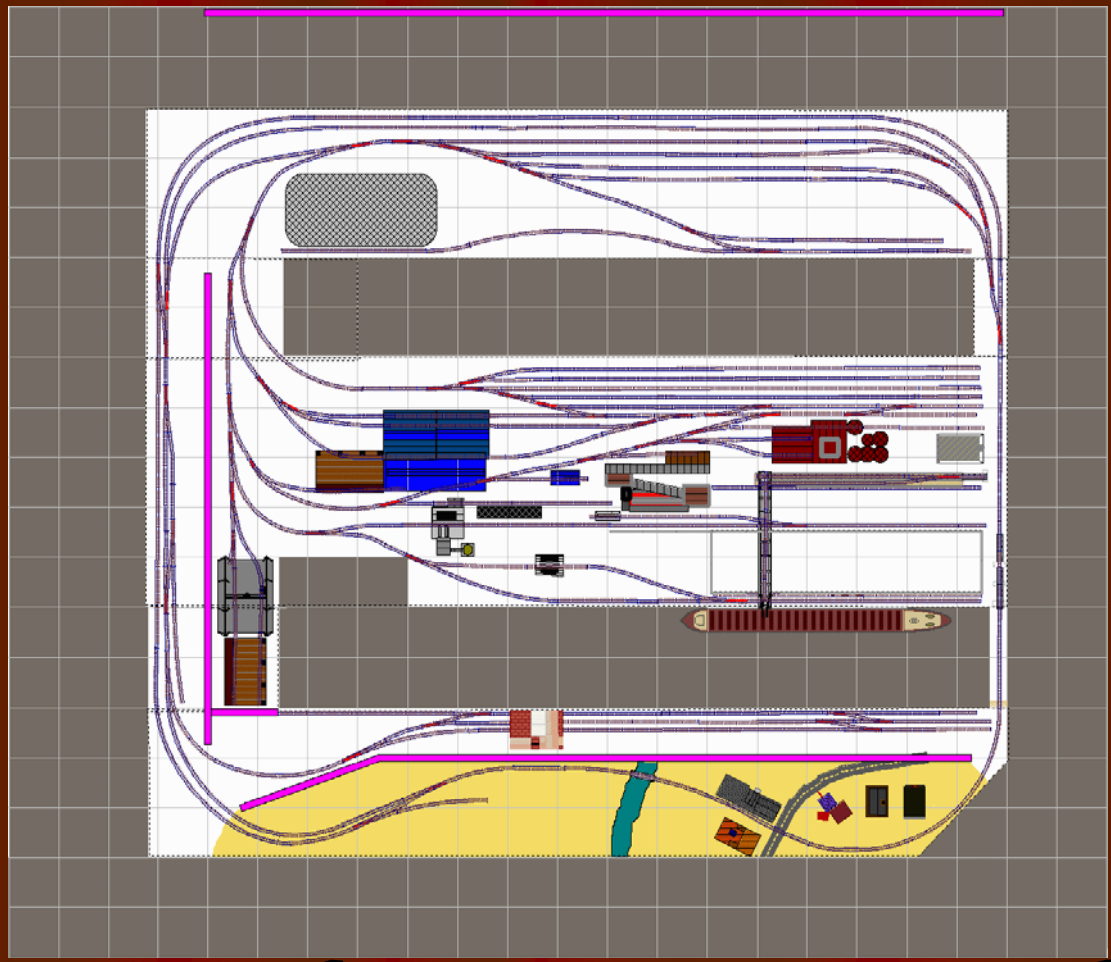
Ingot stripper and soaking pit building

Non-Steel Mill Layout Areas

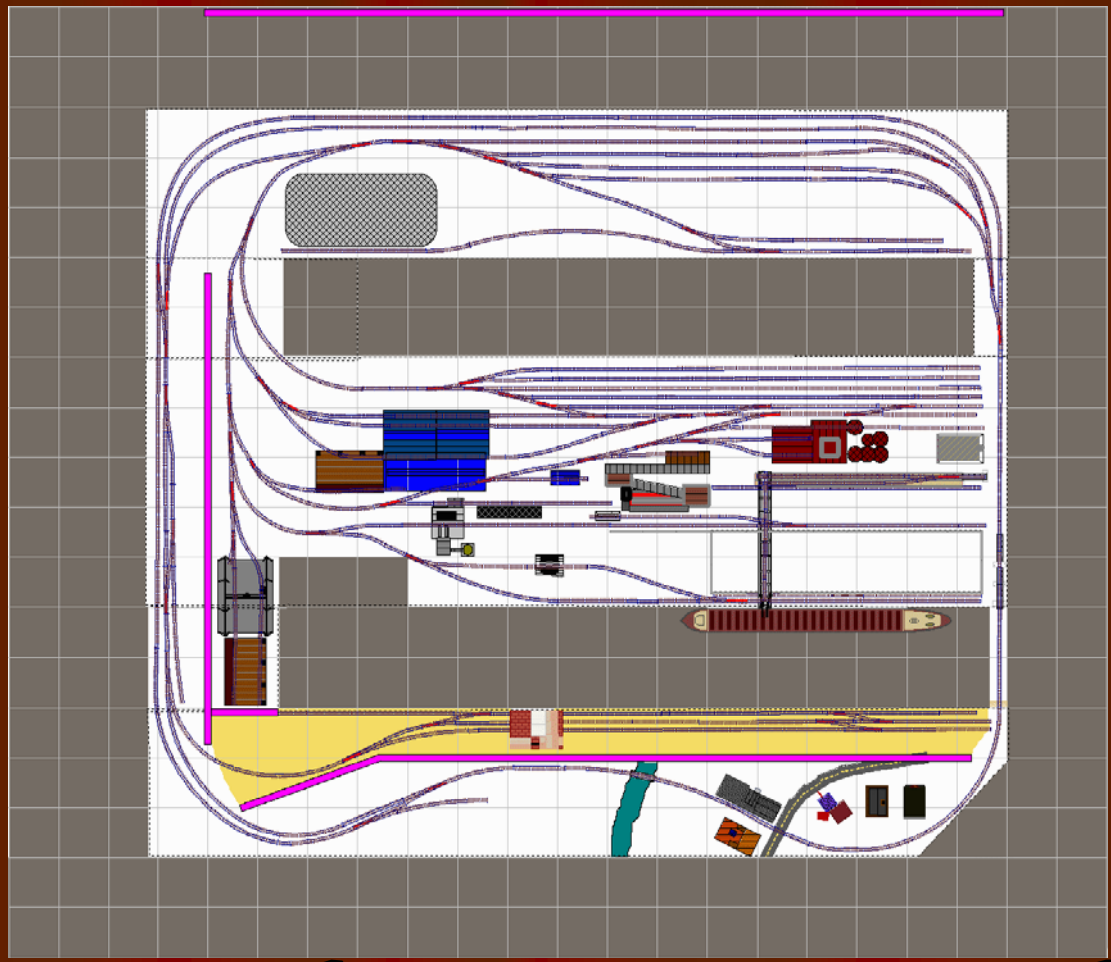
Overall Track plan



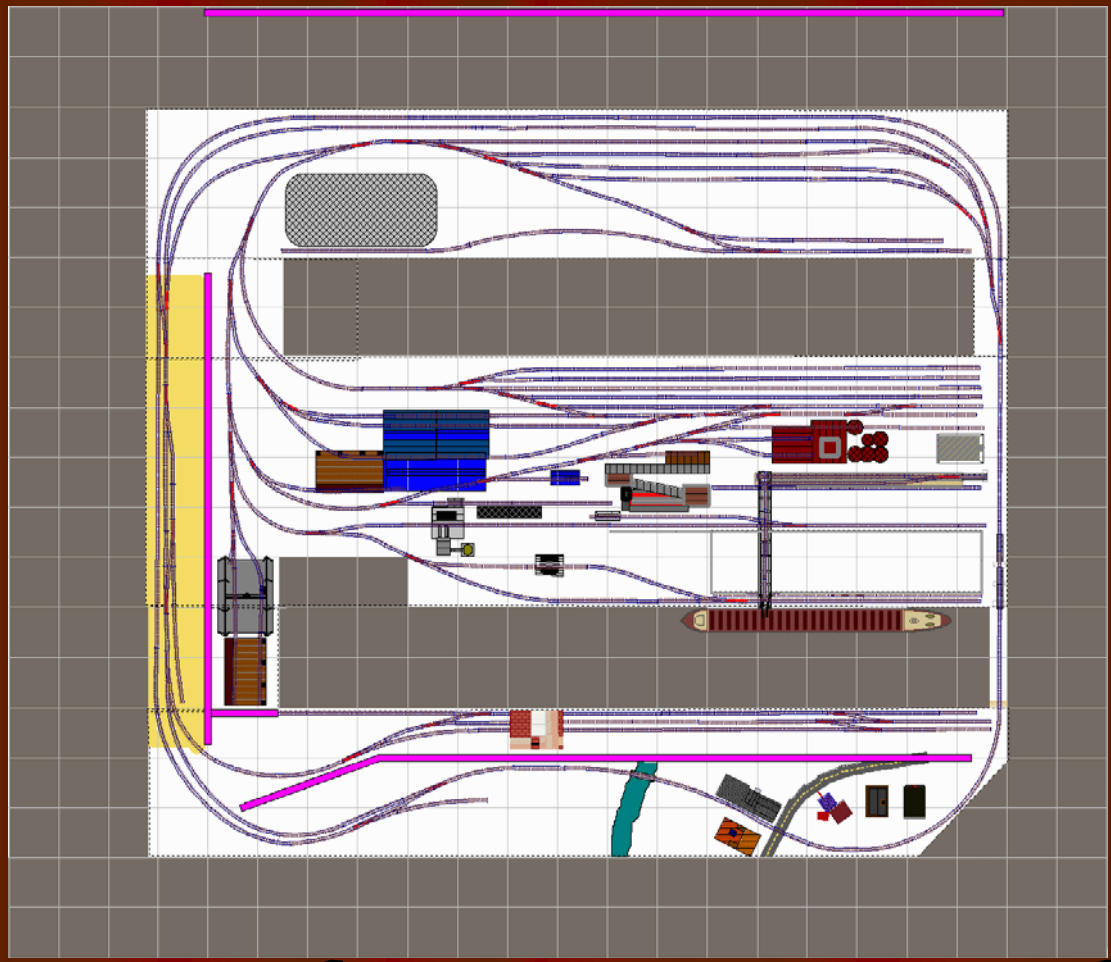
Track plan, with rural main line area highlighted



Track plan, with coal mine trackage highlighted



Track plan, with Chandler ‘suburban’ area highlighted



East Minister – depot and KFC restaurant, looking East

East Minister – looking North along Highway 7

East Minister – close-up of grade crossing

East Minister depot – looking West, along track

Bethel Creek

Fegan's Corner, with convenience store in left foreground

Rural main line area – overall view (warts and all…)

In-Plant Train Operations

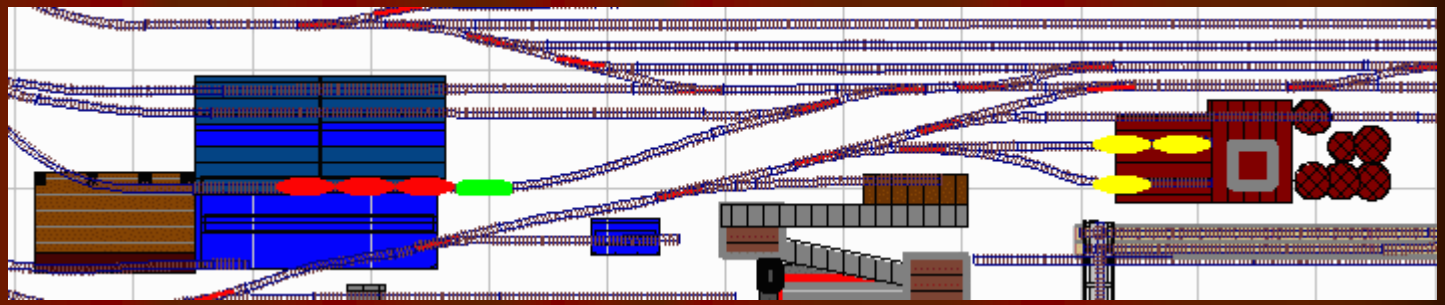
Bottle Cars Point-to-Point: Blast Furnace to BOP

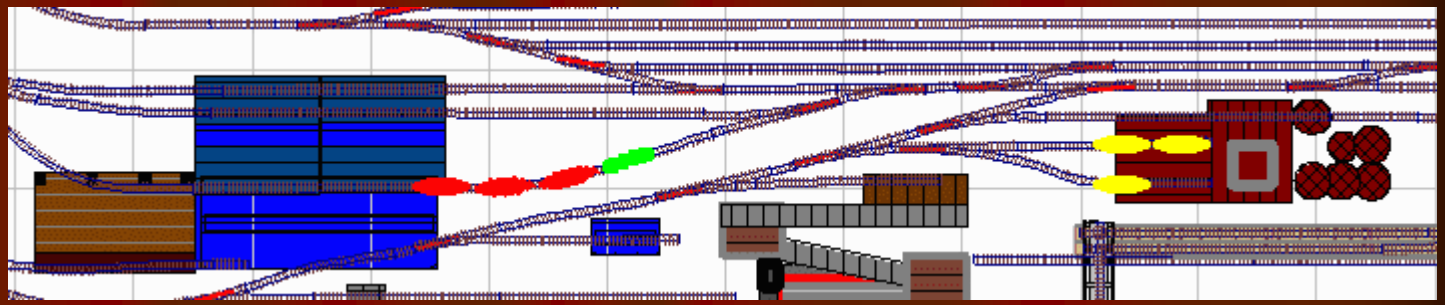
Key:

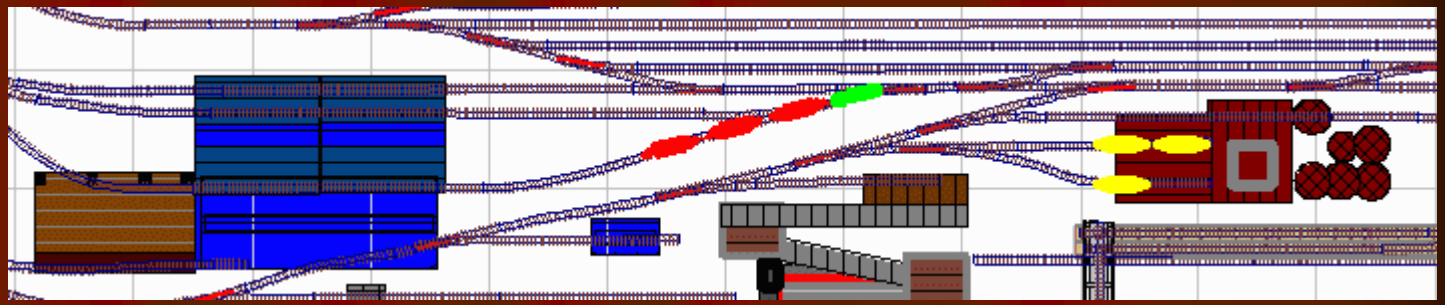
--- Locomotive
--- Bottle Car - Empty
--- Bottle Car - Loaded

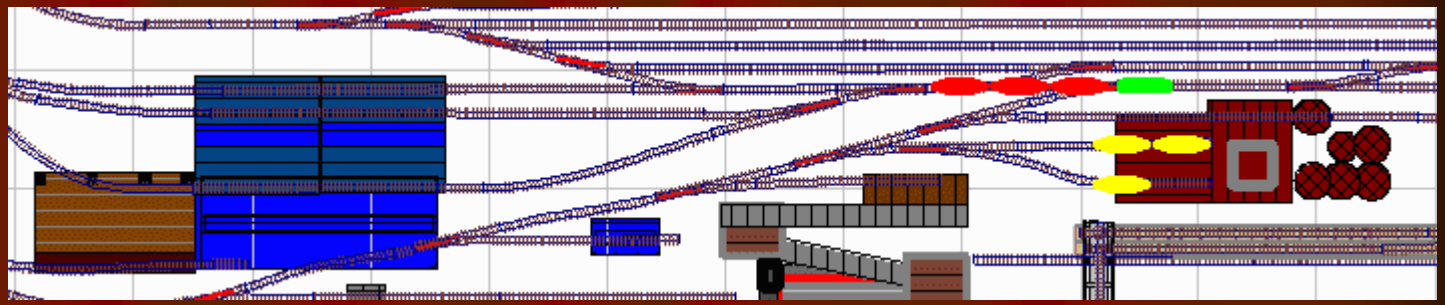
NOTE: For train movement diagrams to function smoothly, please shrink your display until the *entire slide* fits within 1 screen without the need for scroll bars.

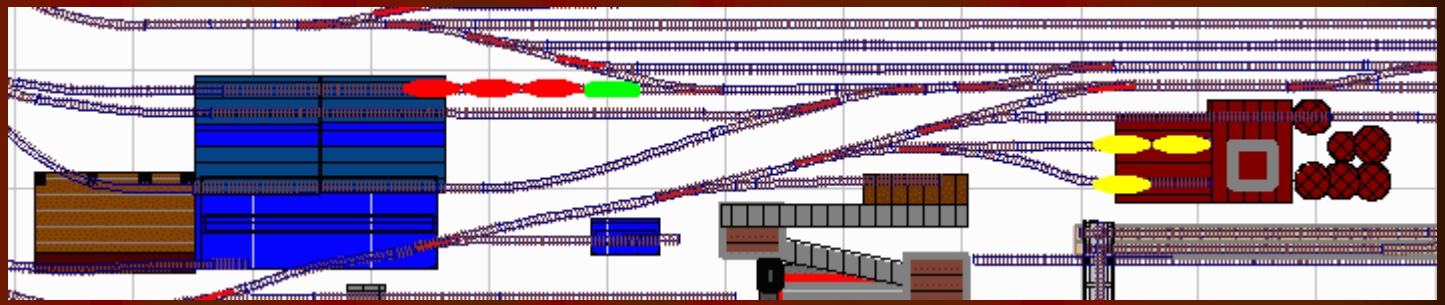
Use *Page-Dn* and *Page-Up* keys to navigate between slides.

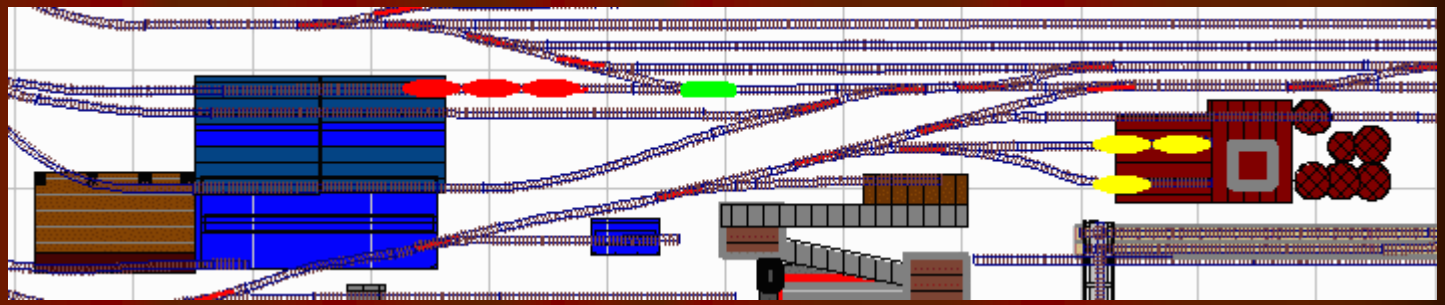


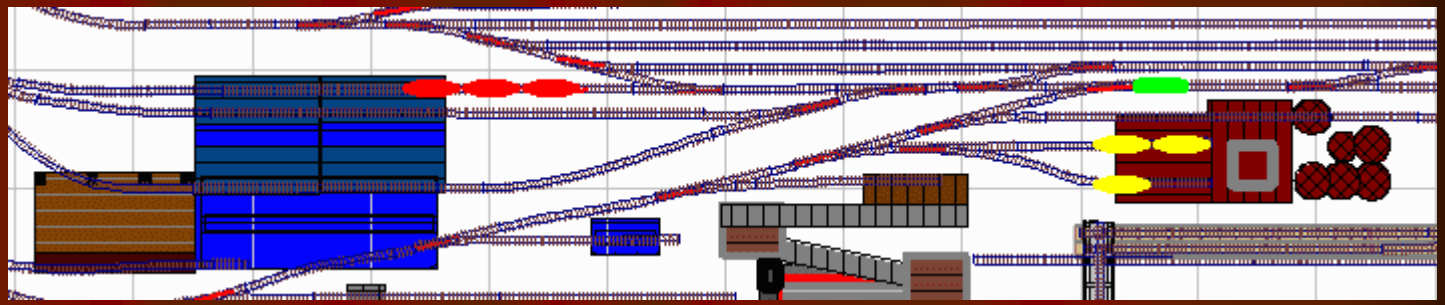


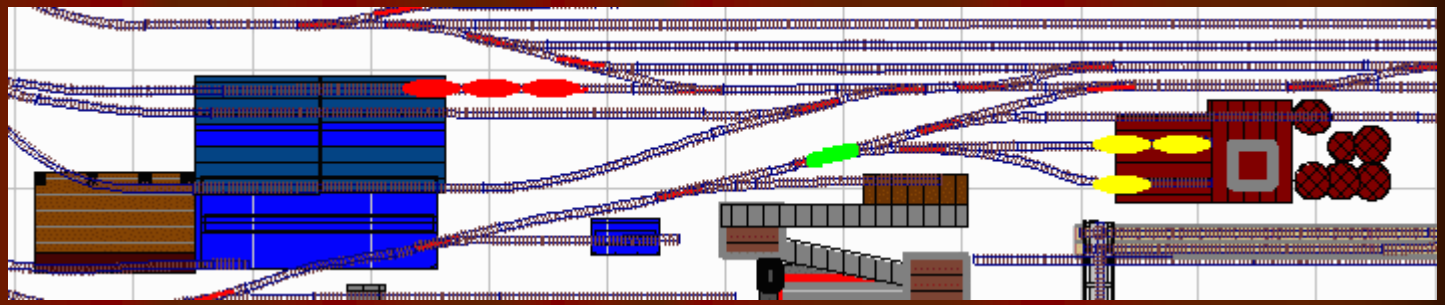


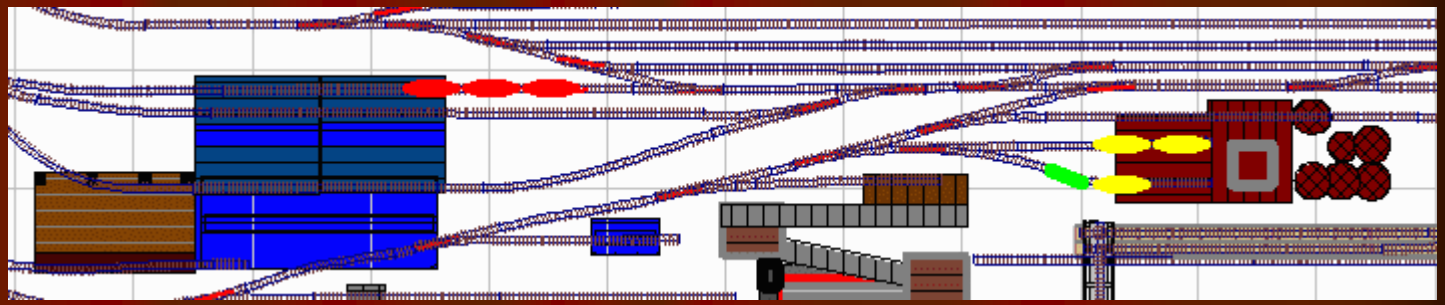


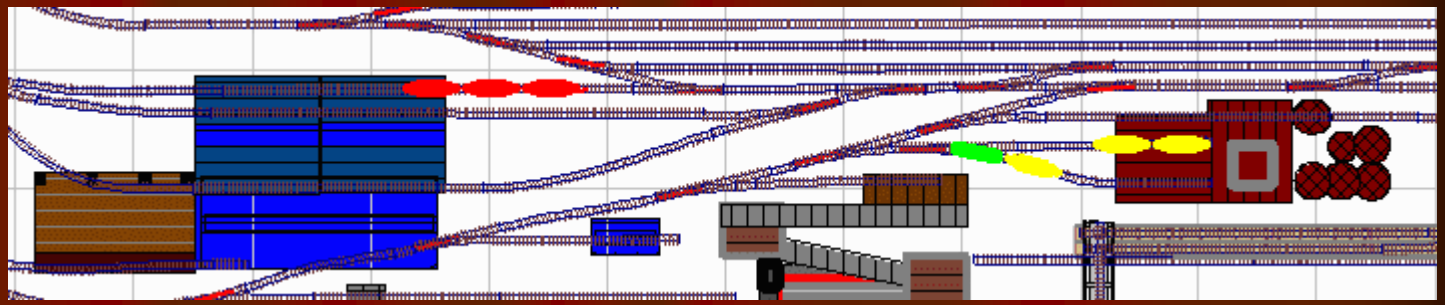


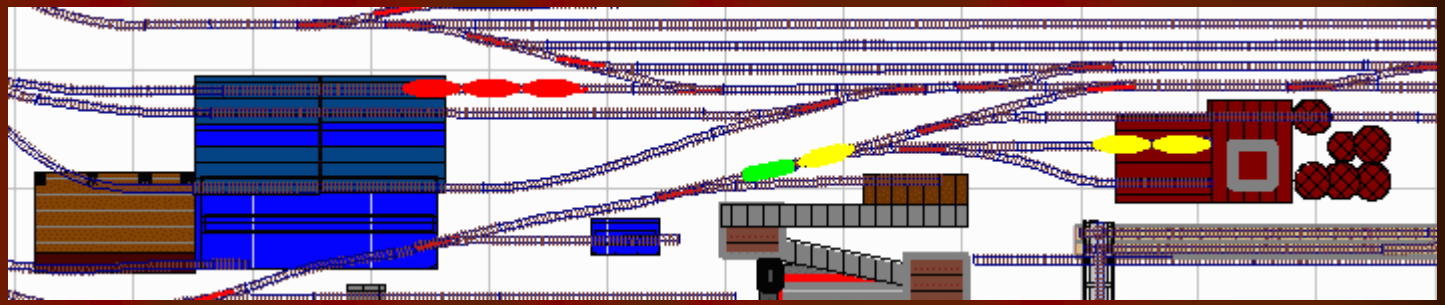


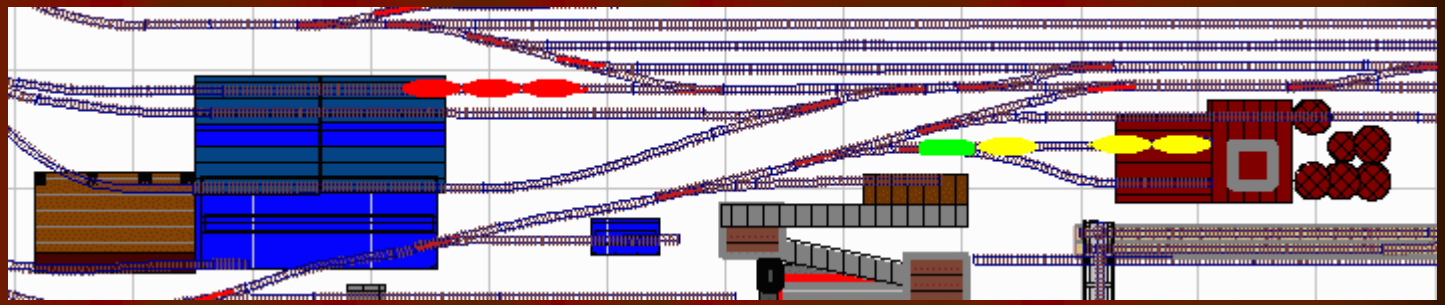


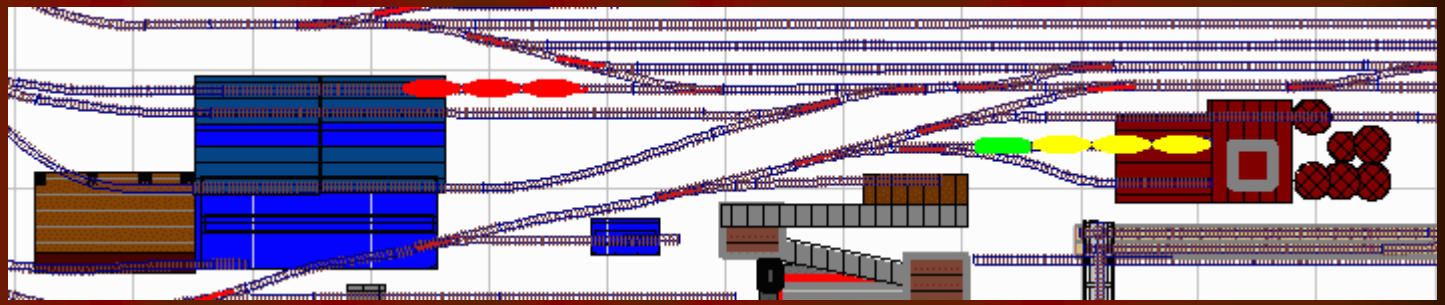


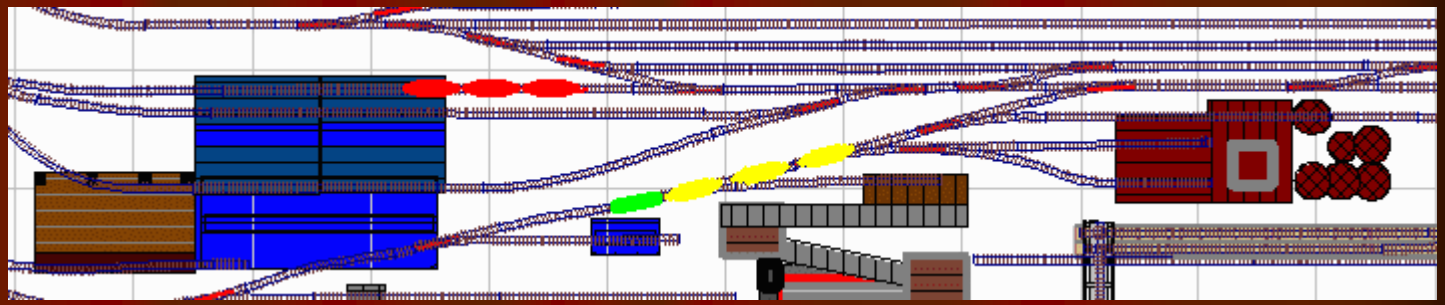


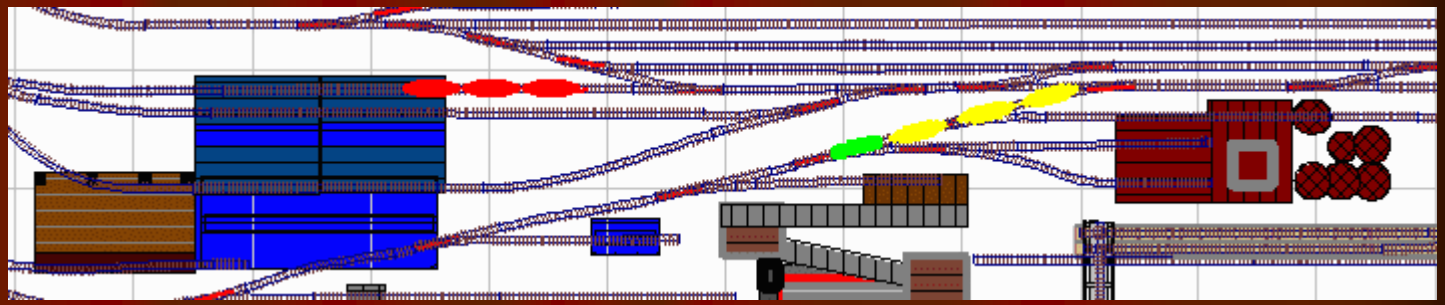


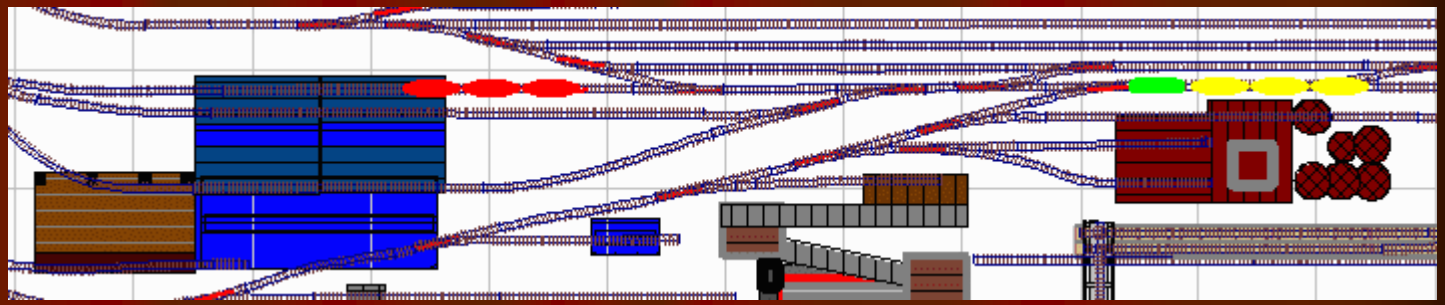


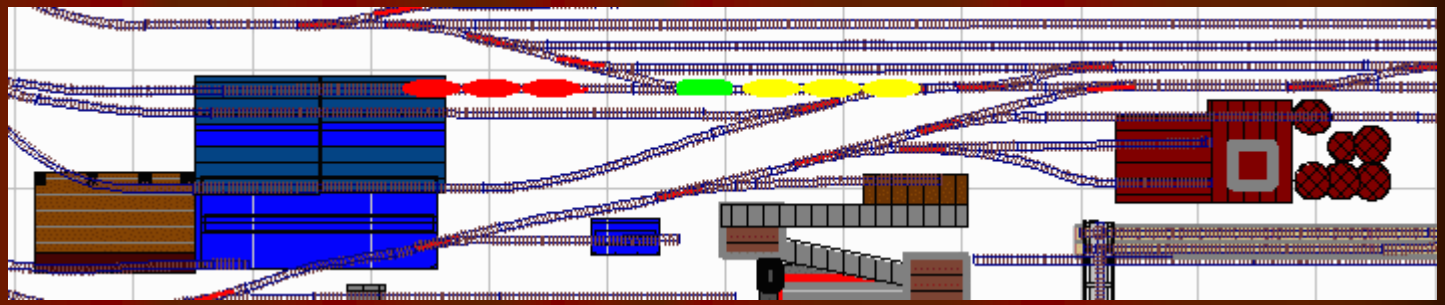


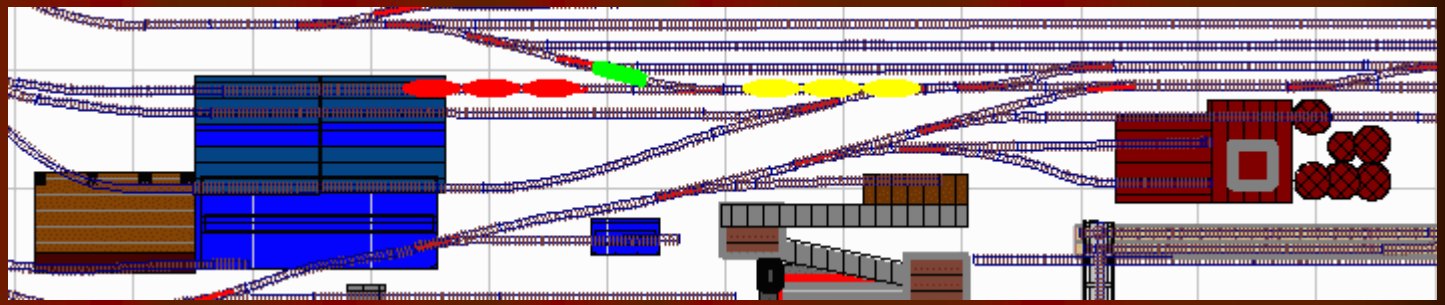


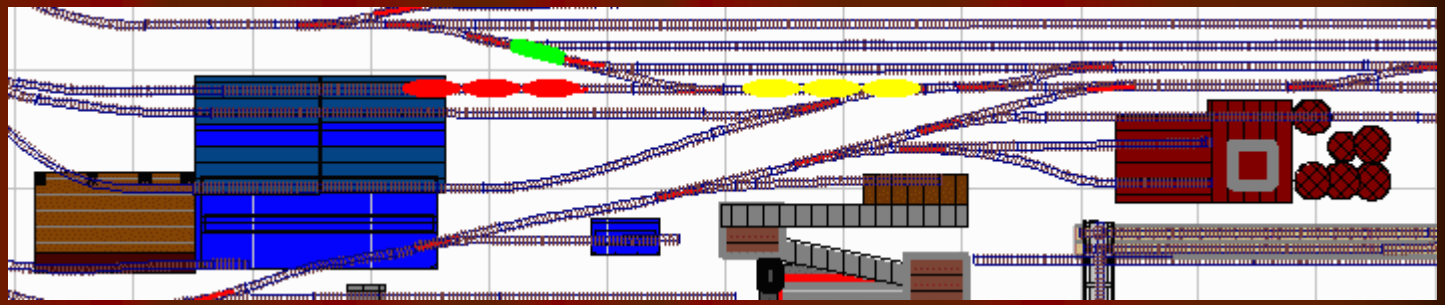


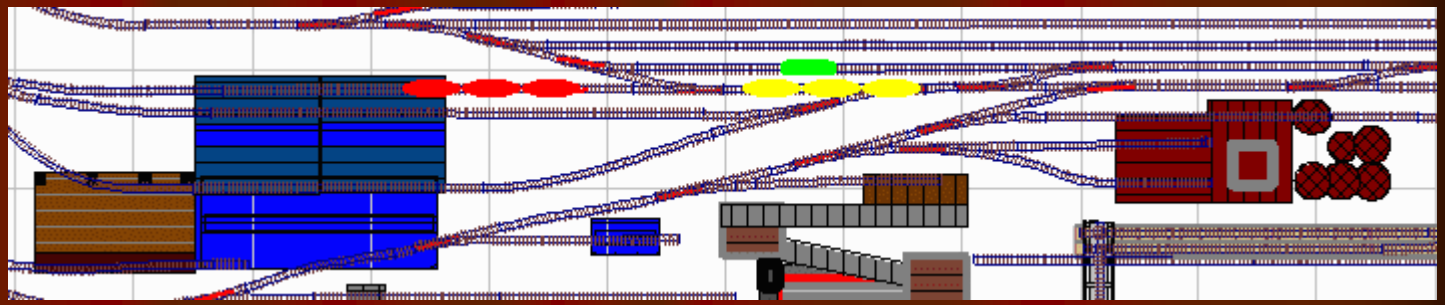


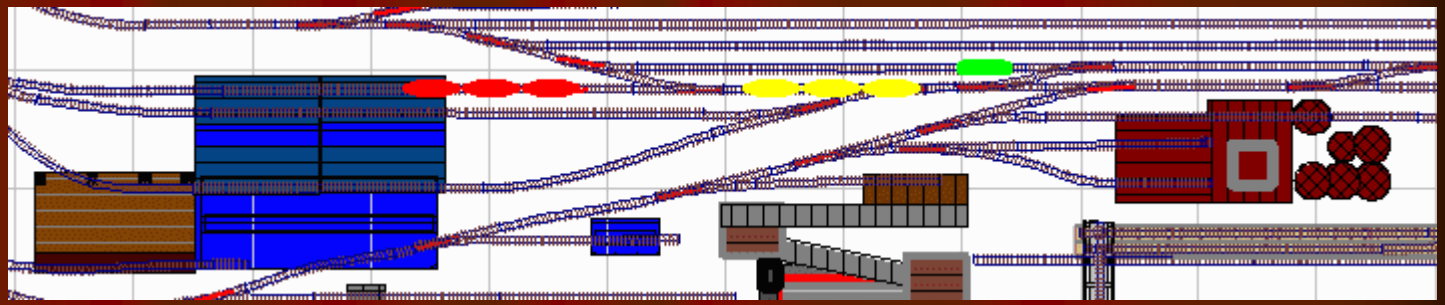


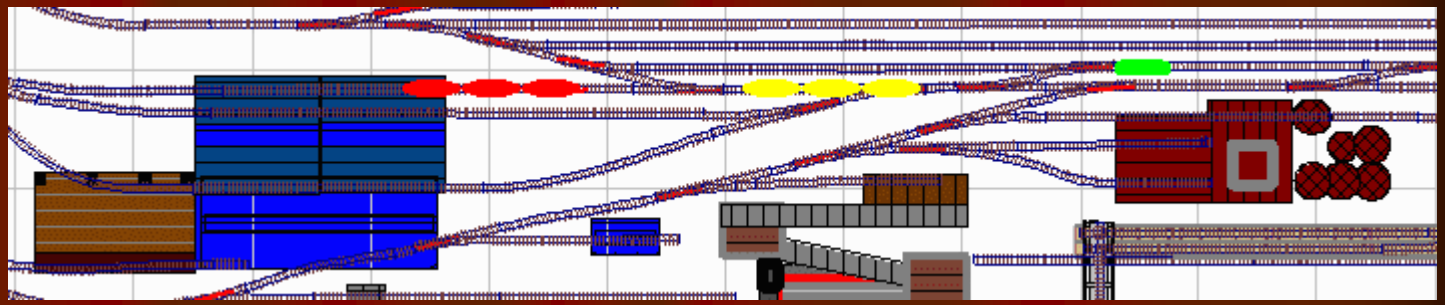


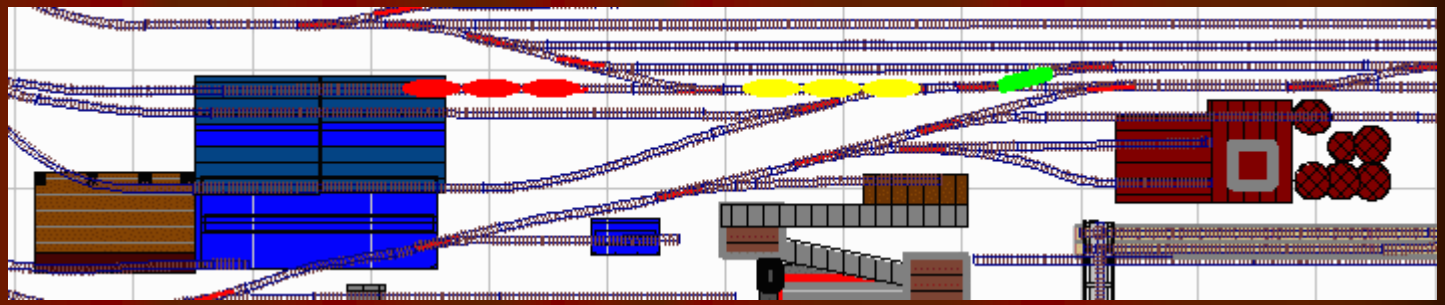


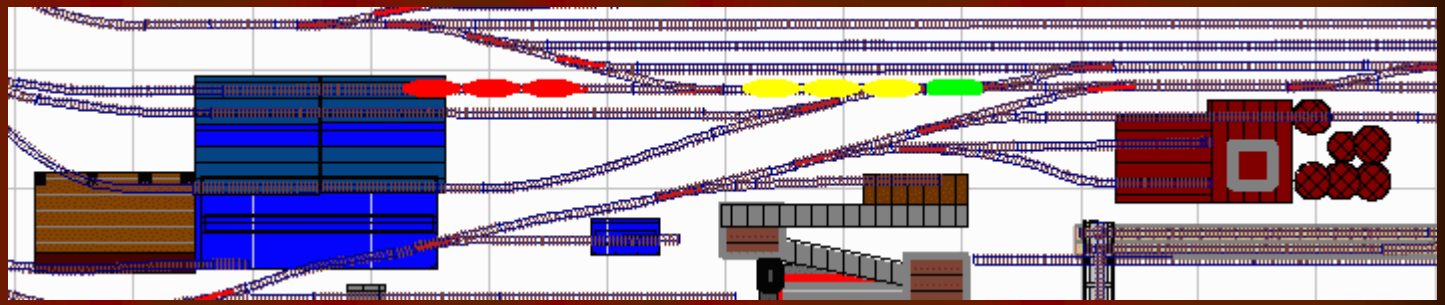


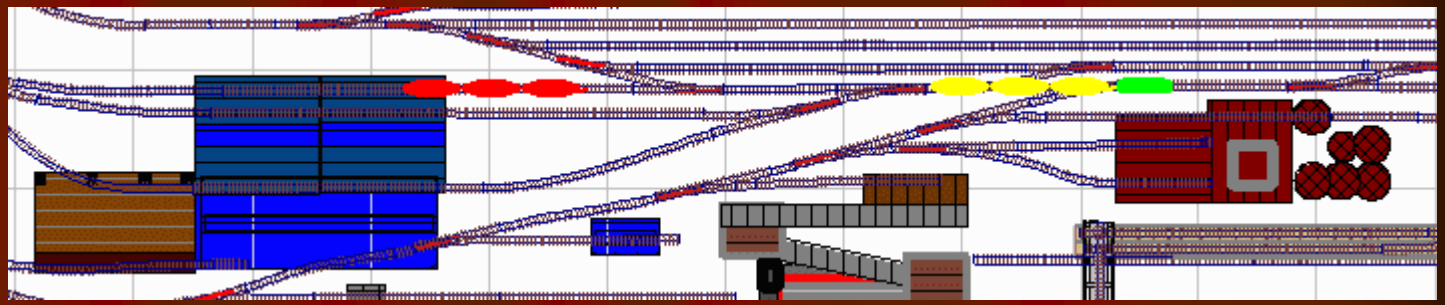


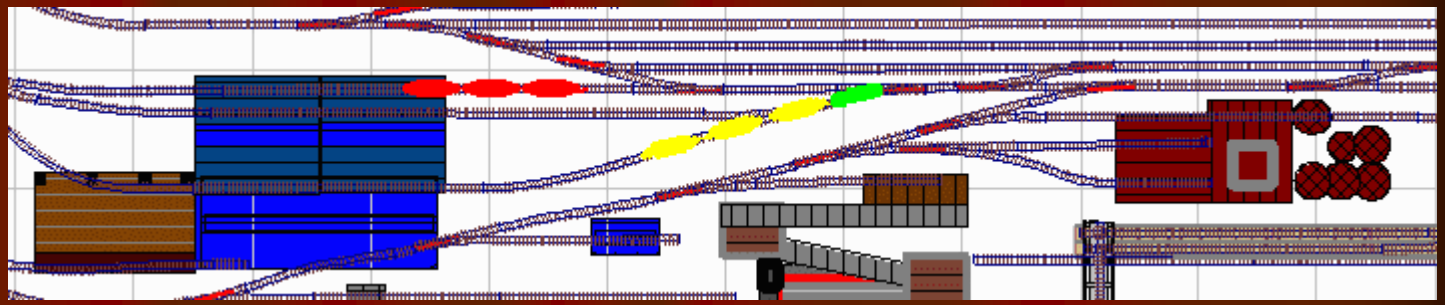


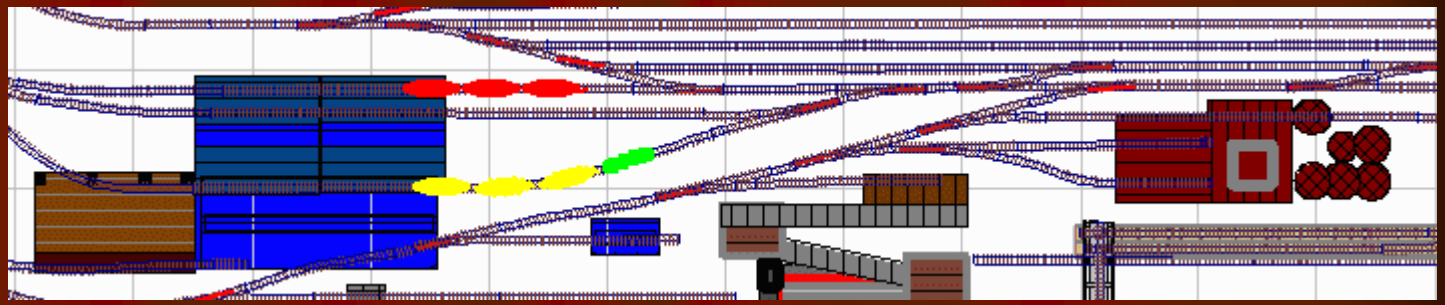


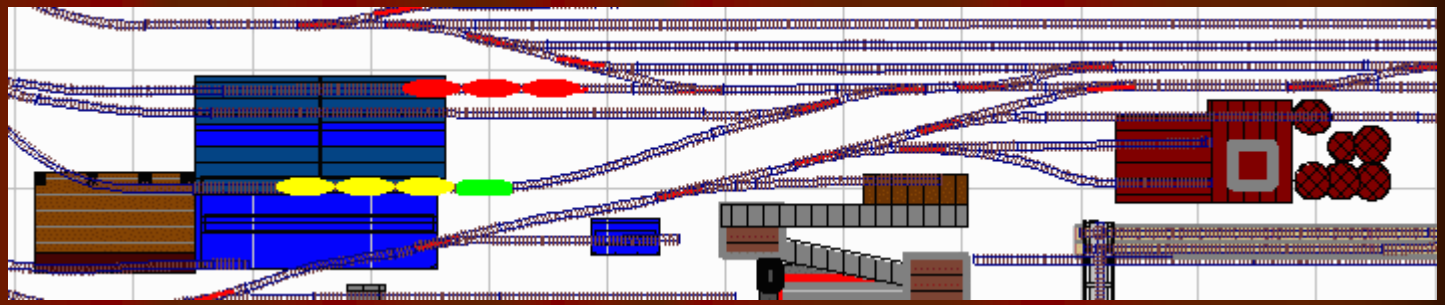












Bottle cars in point-to-point operation:
Origin, at blast furnace cast house

Bottle cars arriving at BOP

Ingot Buggies Point-to-Point: BOP to Stripper

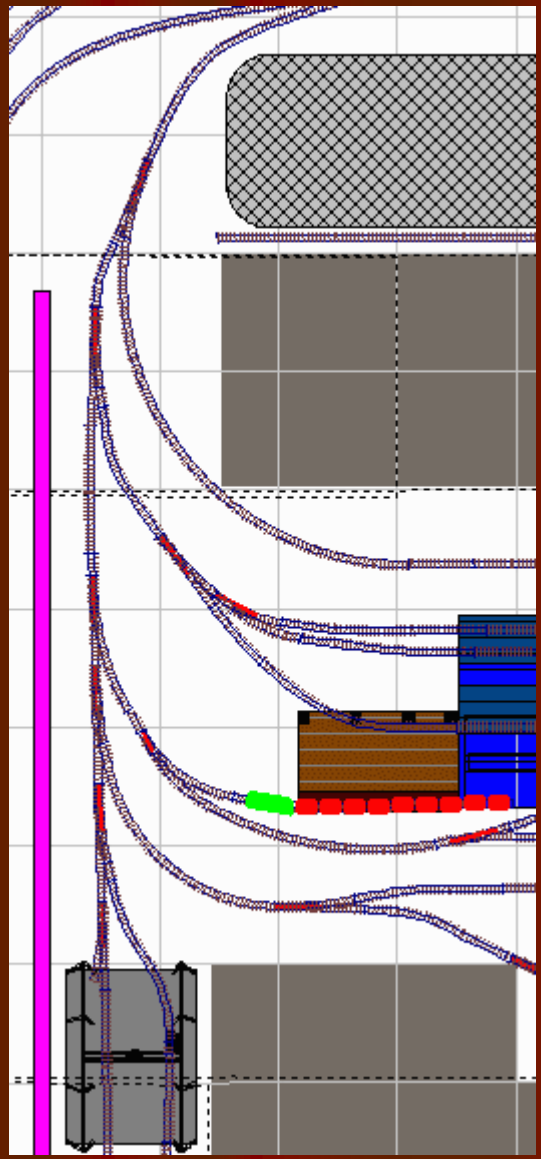
KEY:

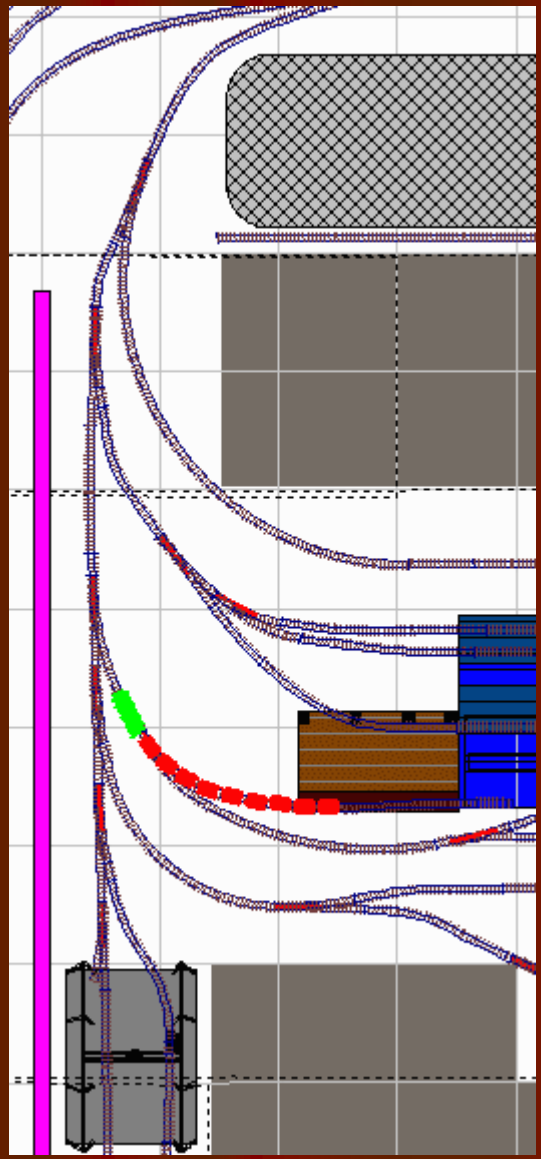
--- Locomotive

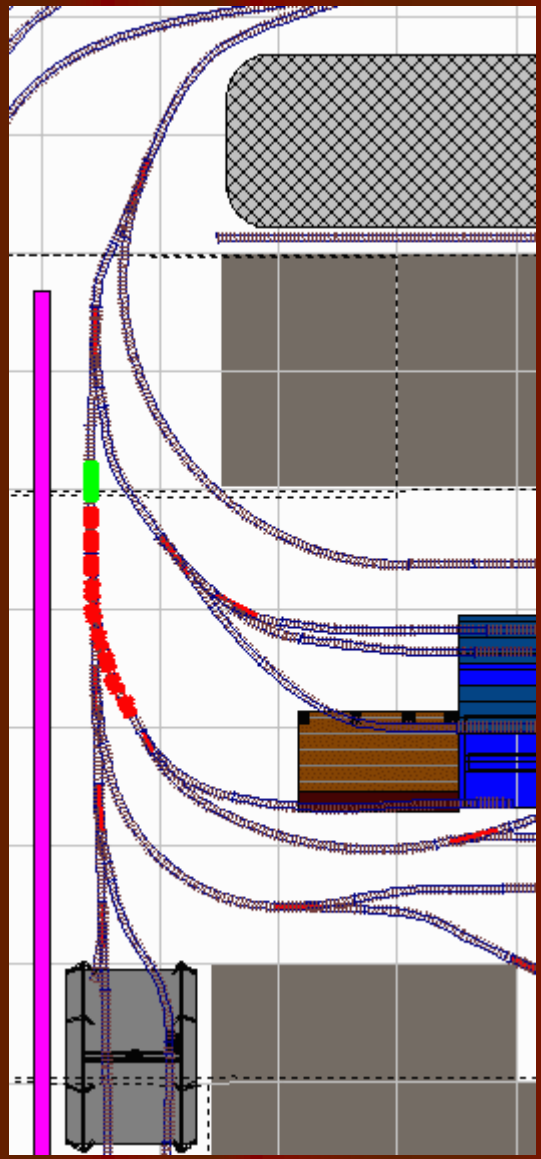
--- Ingot Buggy

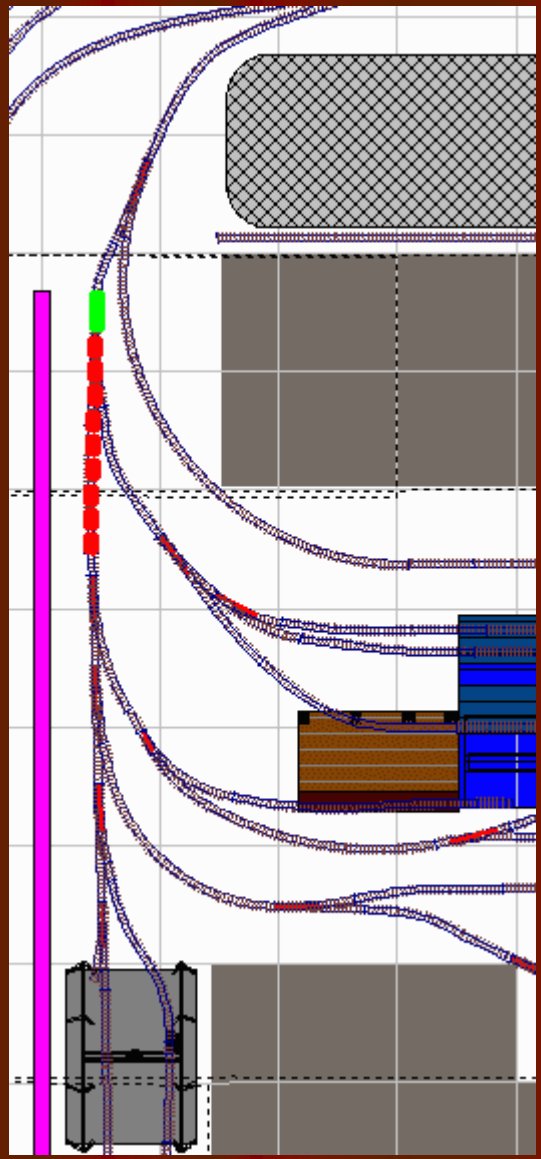
<u>NOTE</u>: For train movement diagrams to function smoothly, please shrink your display until the *entire slide* fits within 1 screen without the need for scroll bars.

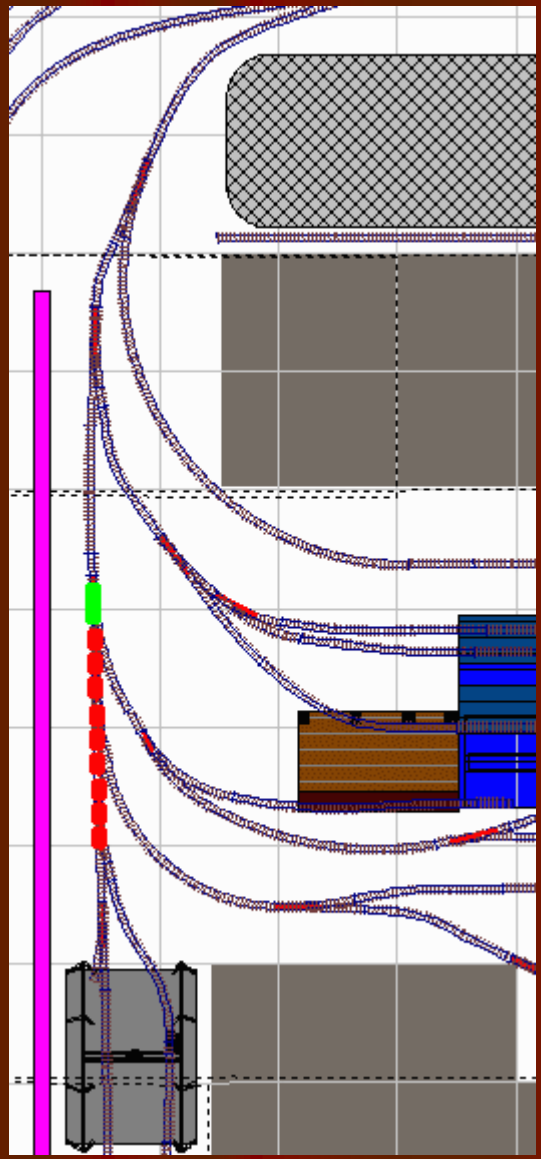
Use *Page-Dn* and *Page-Up* keys to navigate between slides.

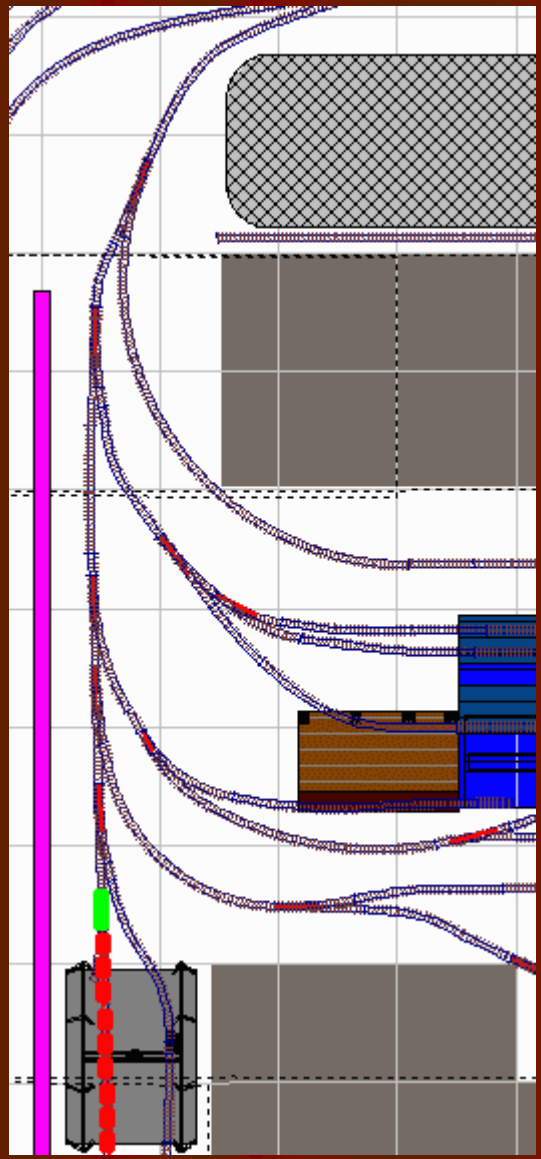












Ingot buggies at BOP teeming area

Ingot buggies at stripper crane

Slag Pots Point-to-Point: Blast Furnace to Dumping Pit

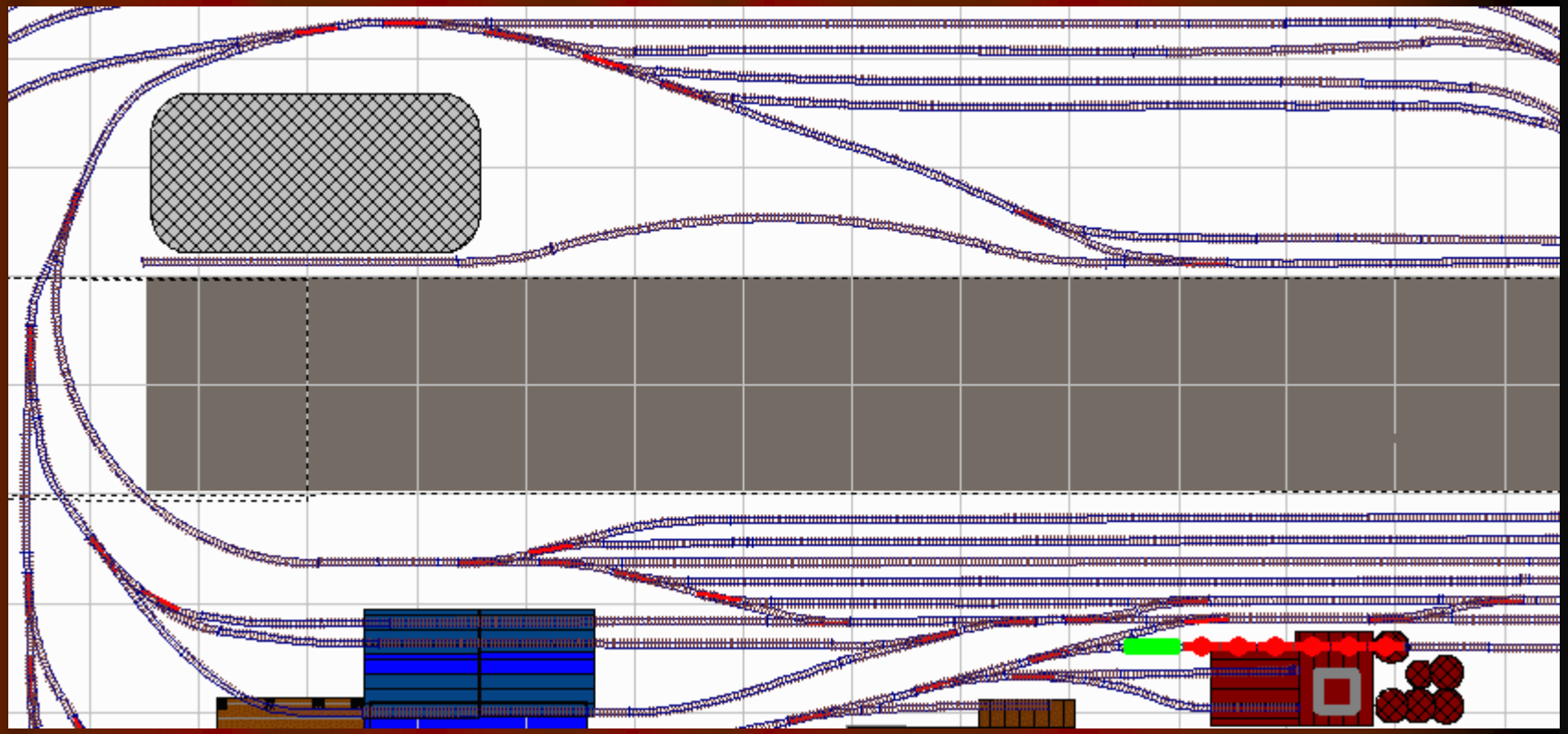
KEY:

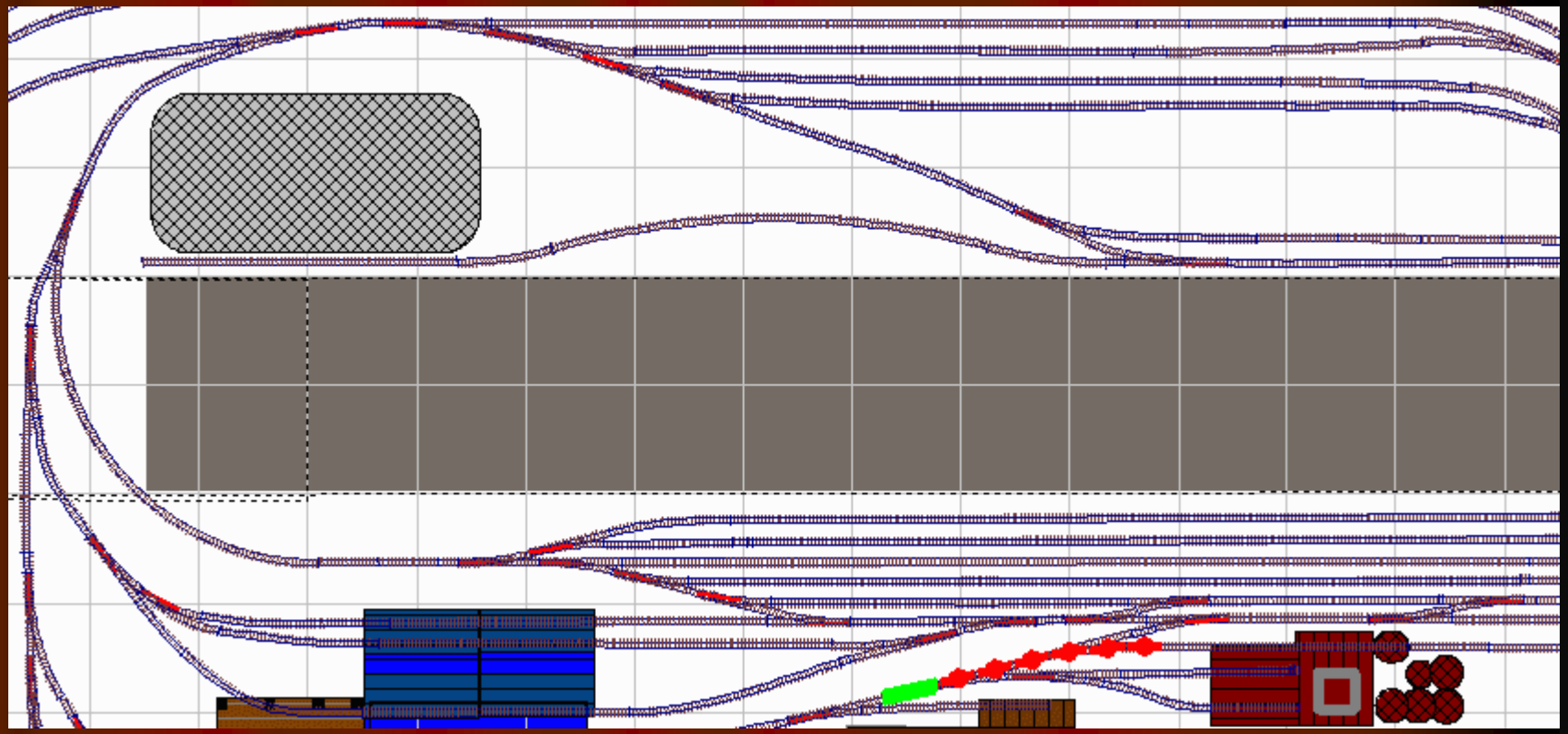
--- Locomotive

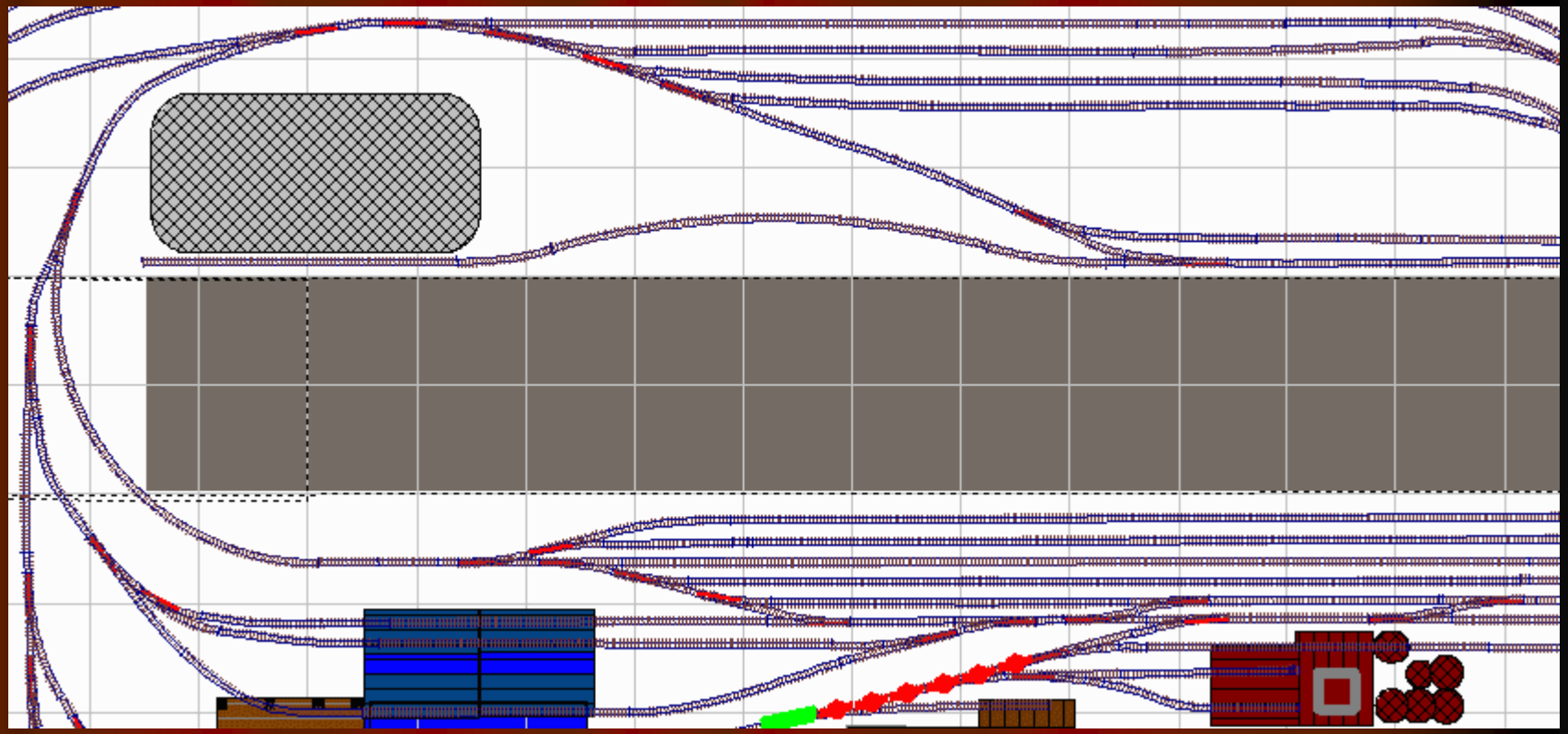
--- Slag Pot

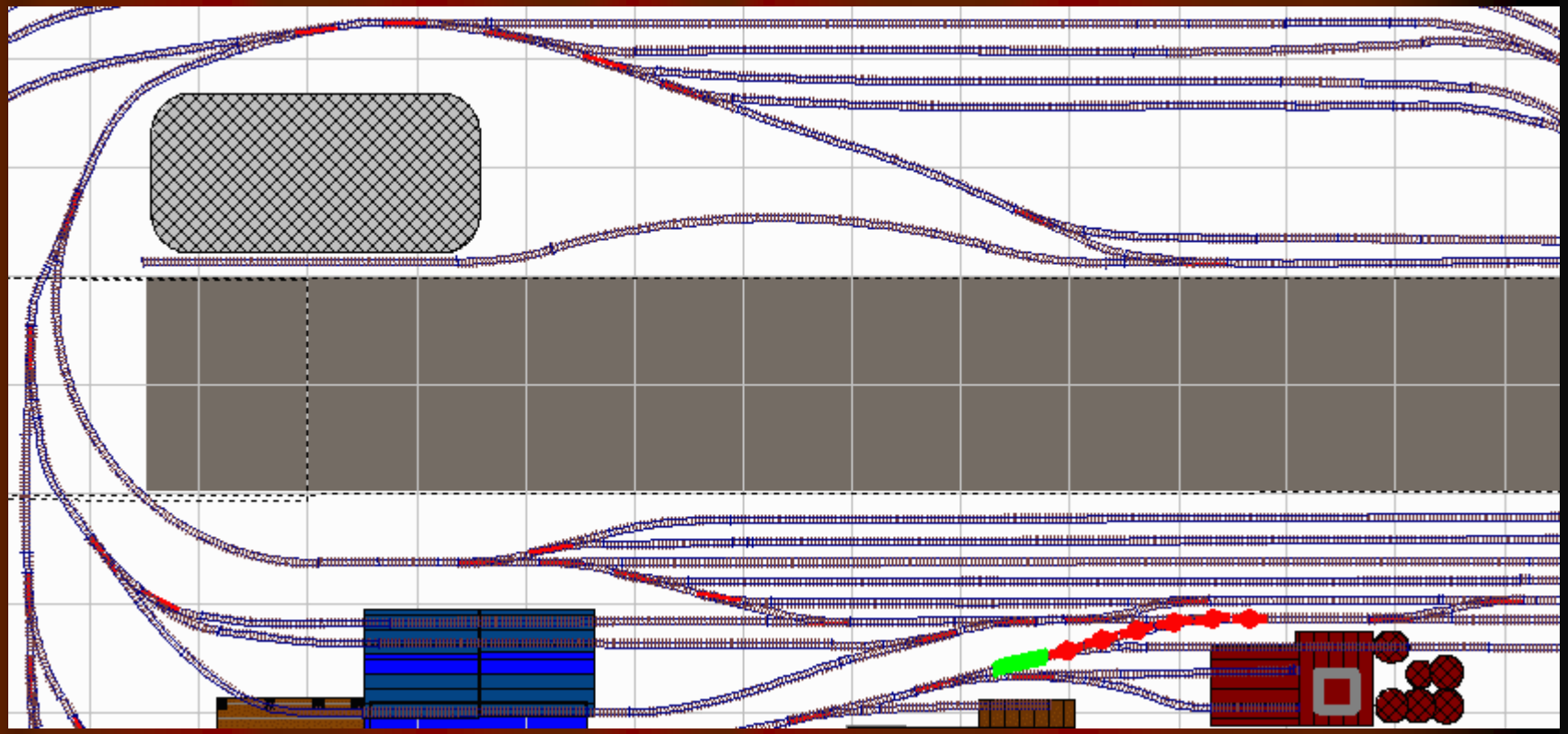
NOTE: For train movement diagrams to function smoothly, please shrink your display until the *entire slide* fits within 1 screen without the need for scroll bars.

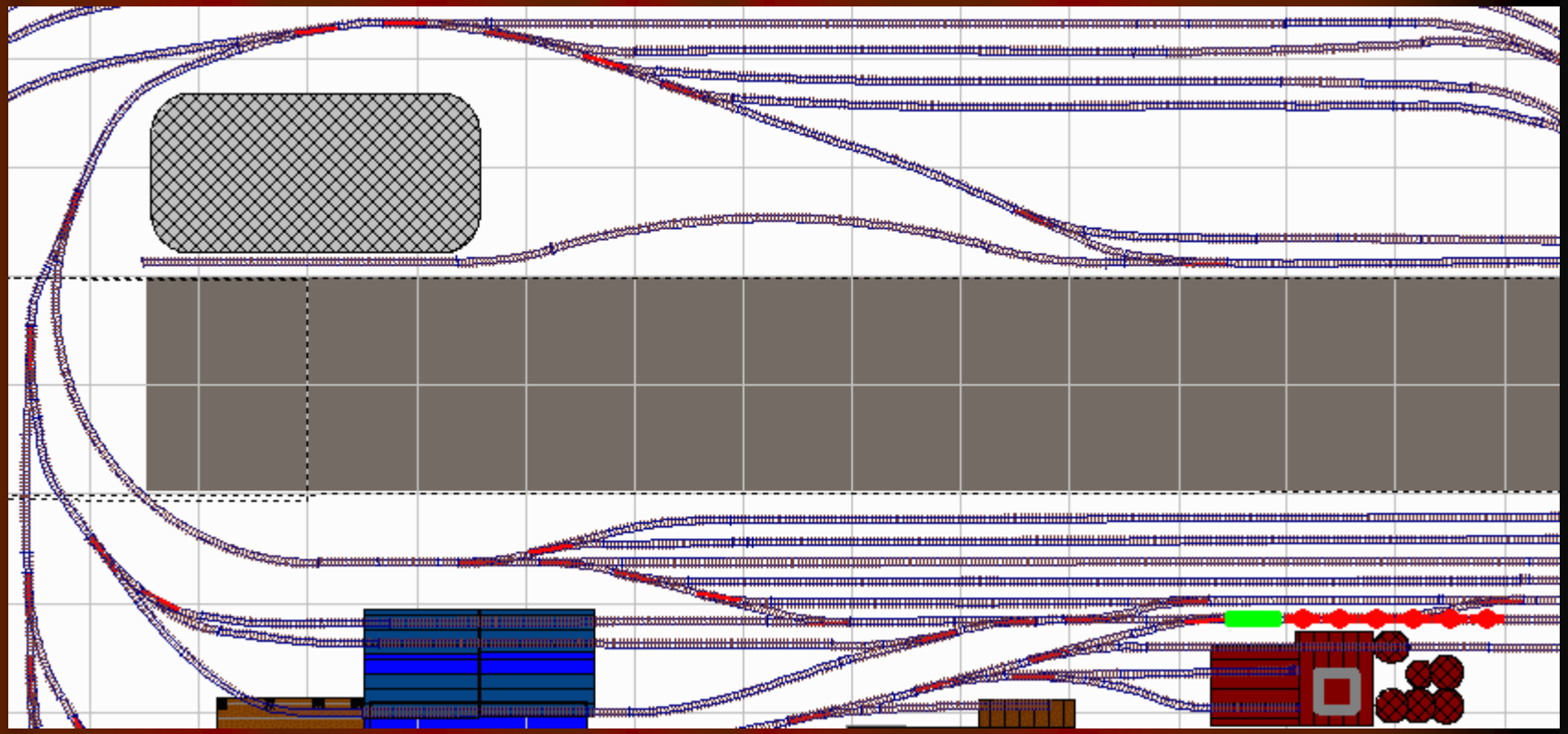
Use *Page-Dn* and *Page-Up* keys to navigate between slides.

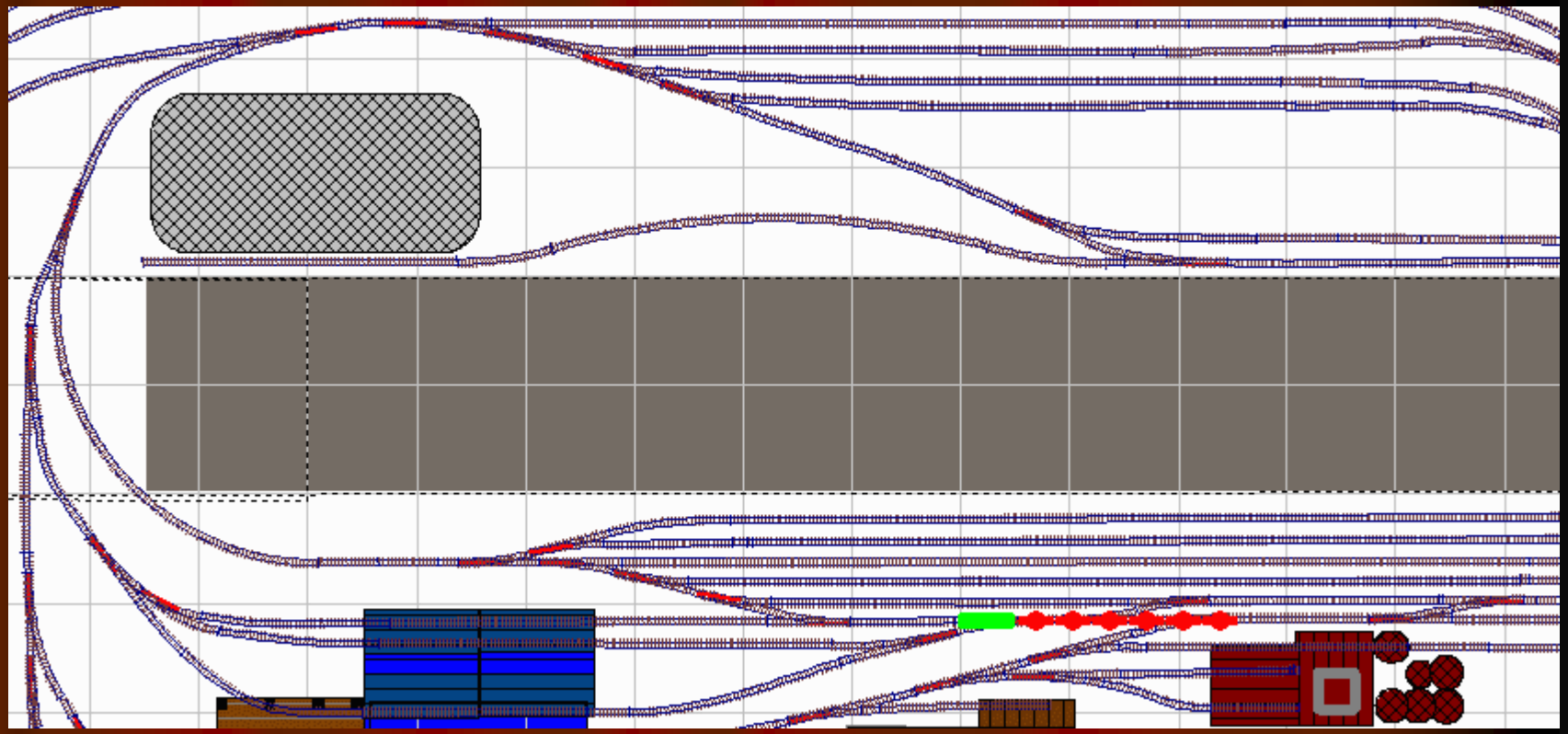


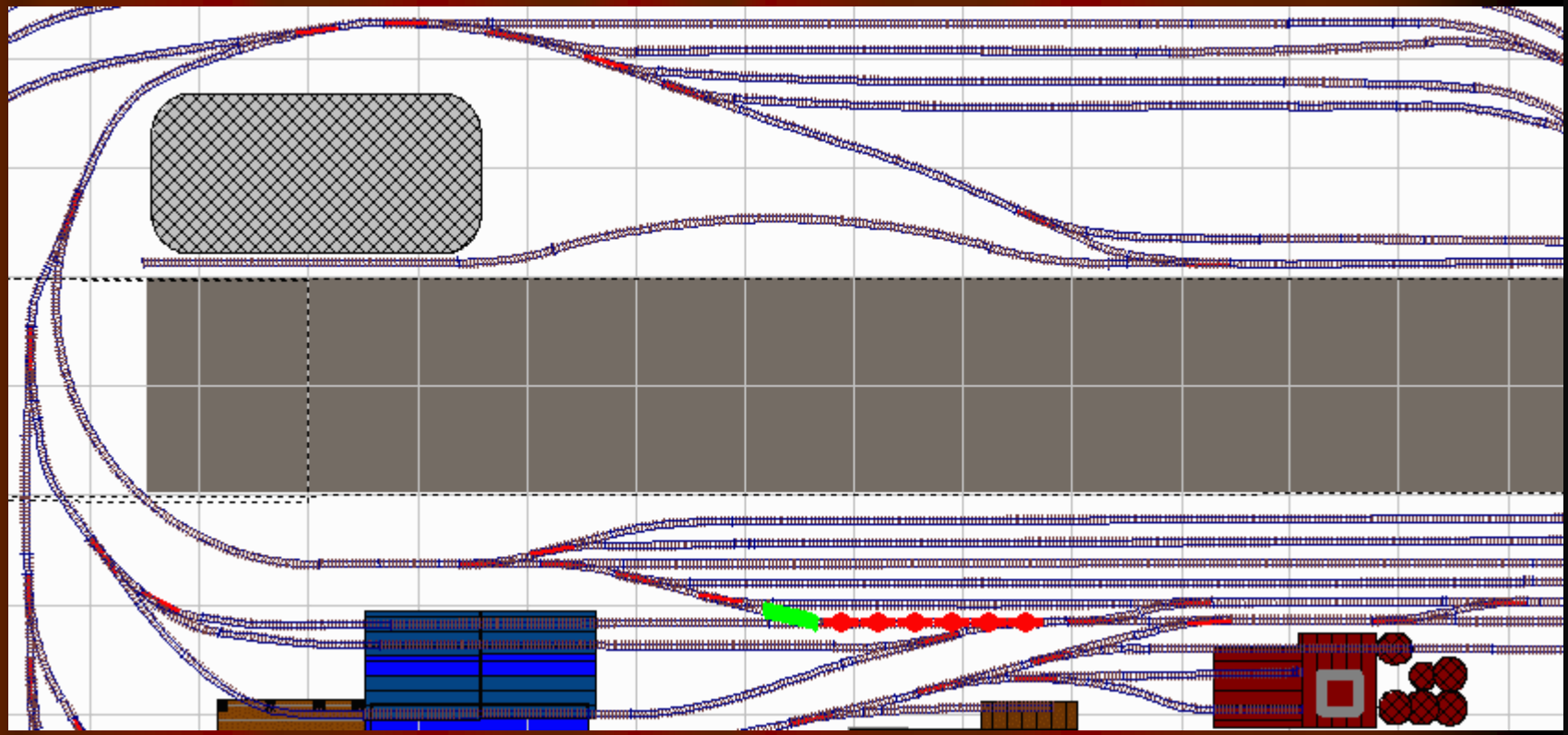


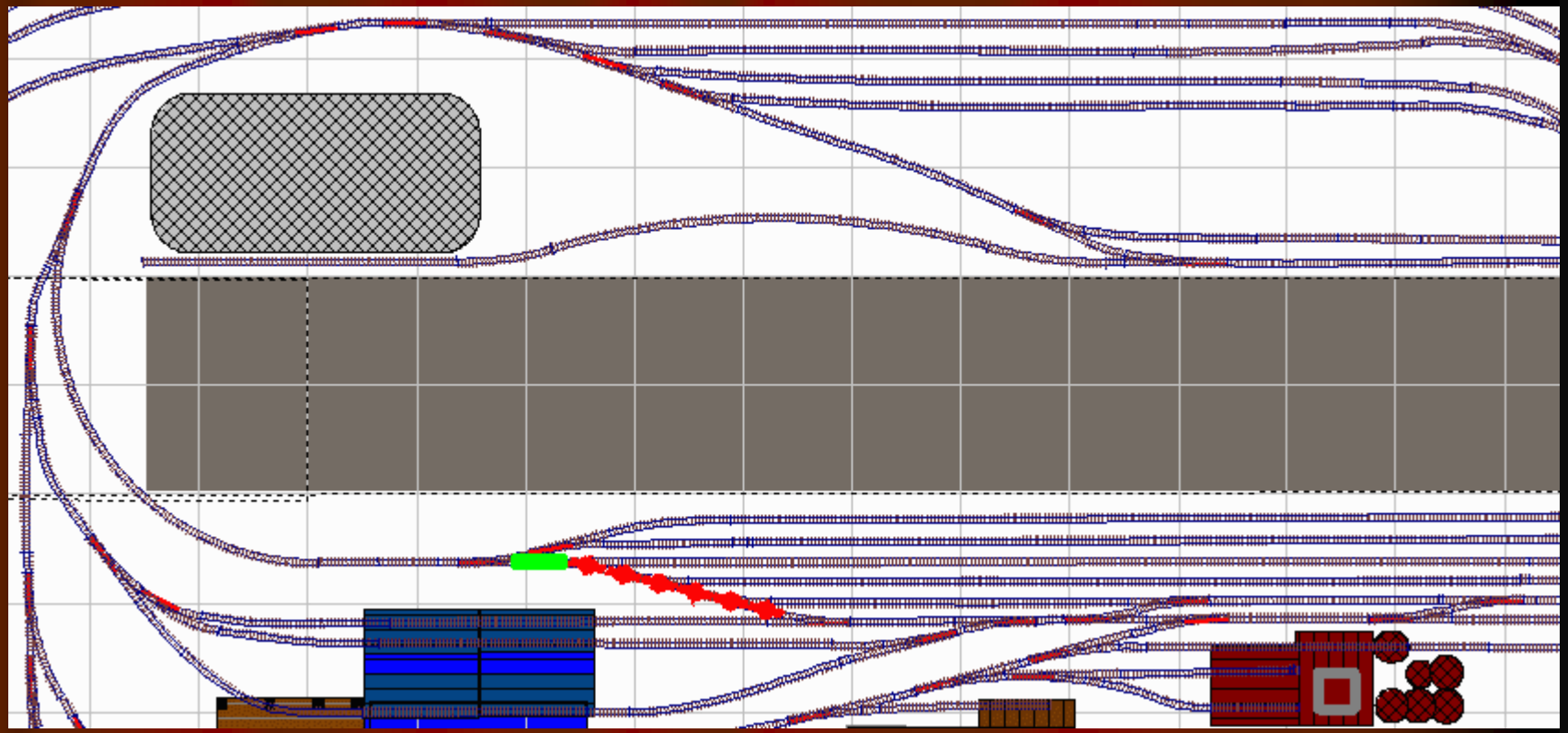


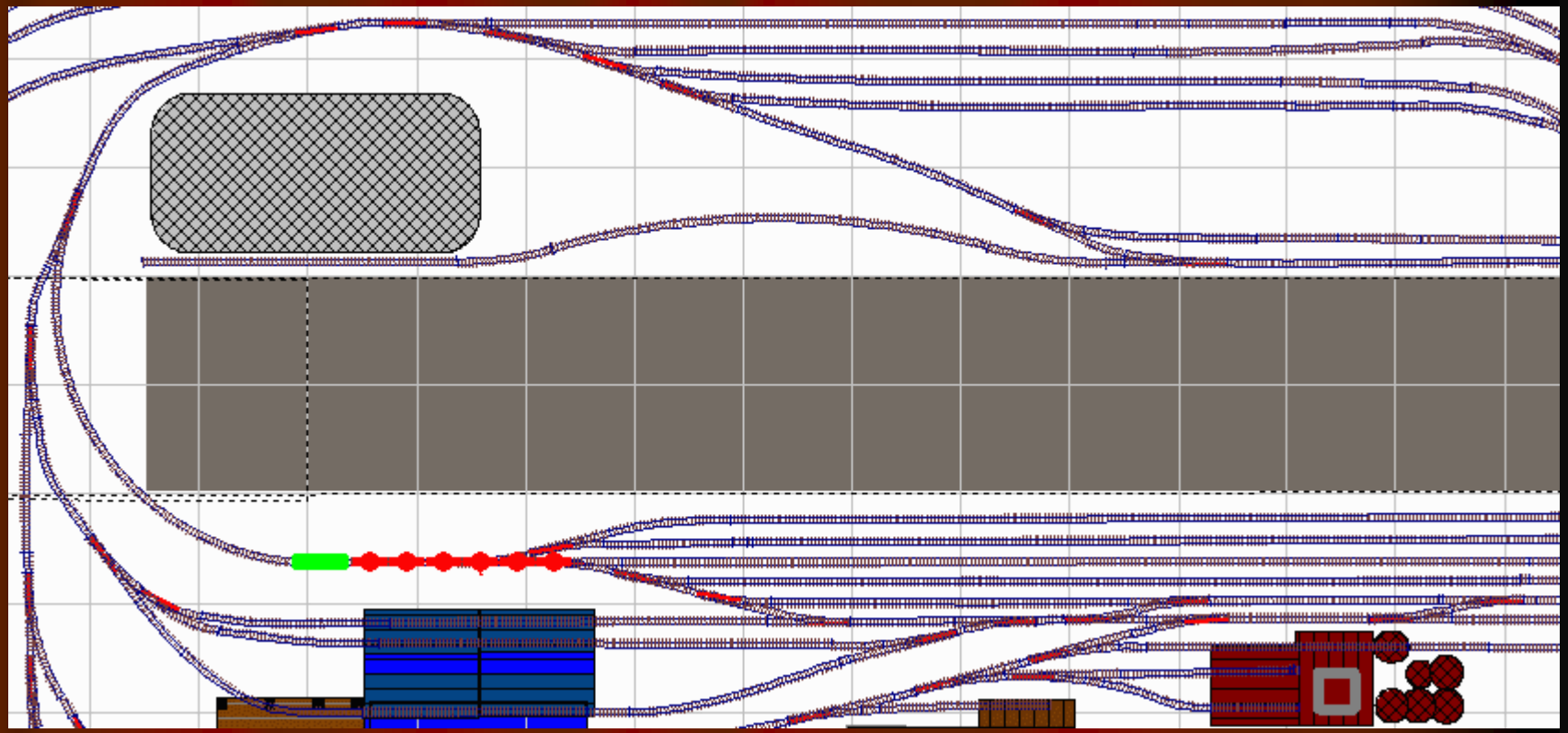


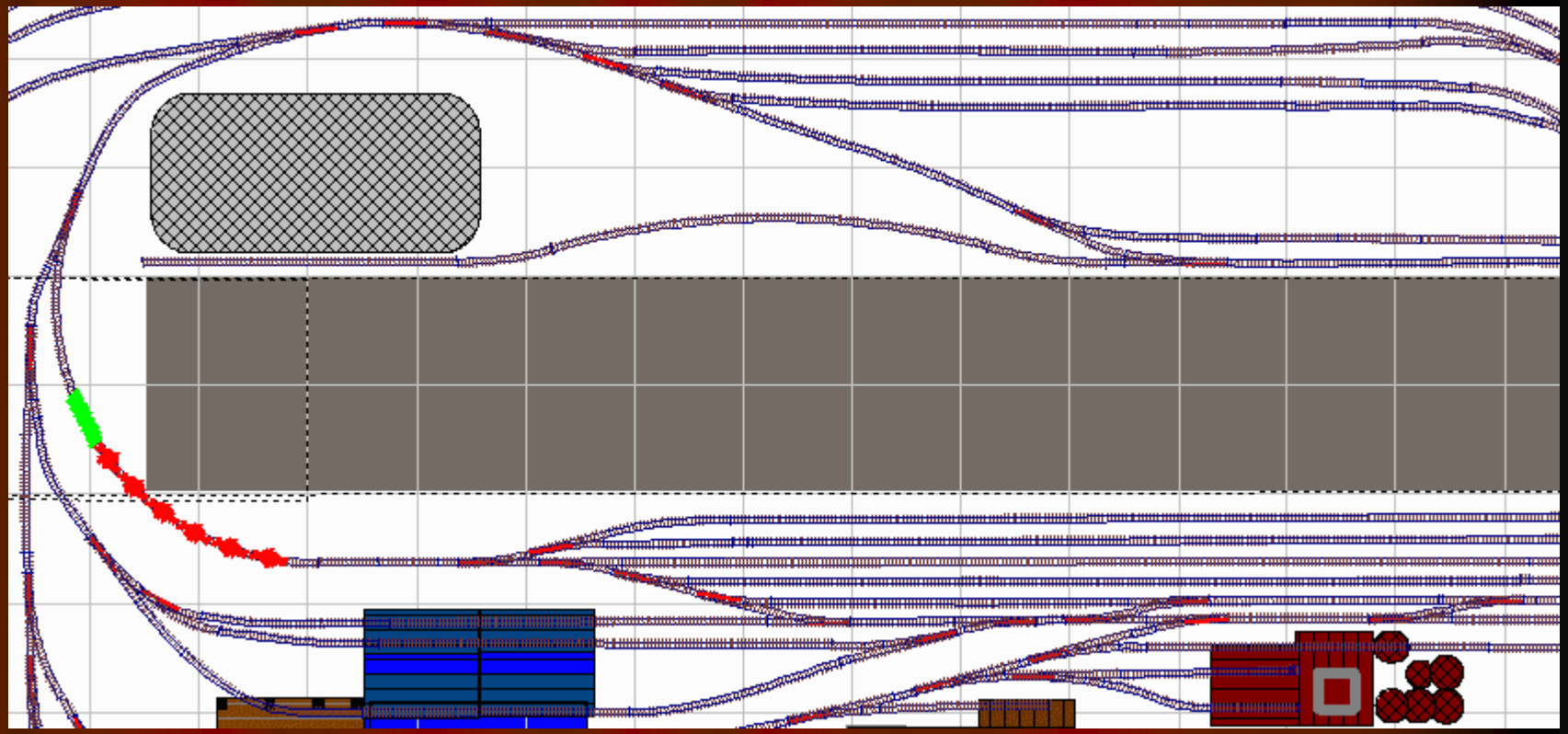


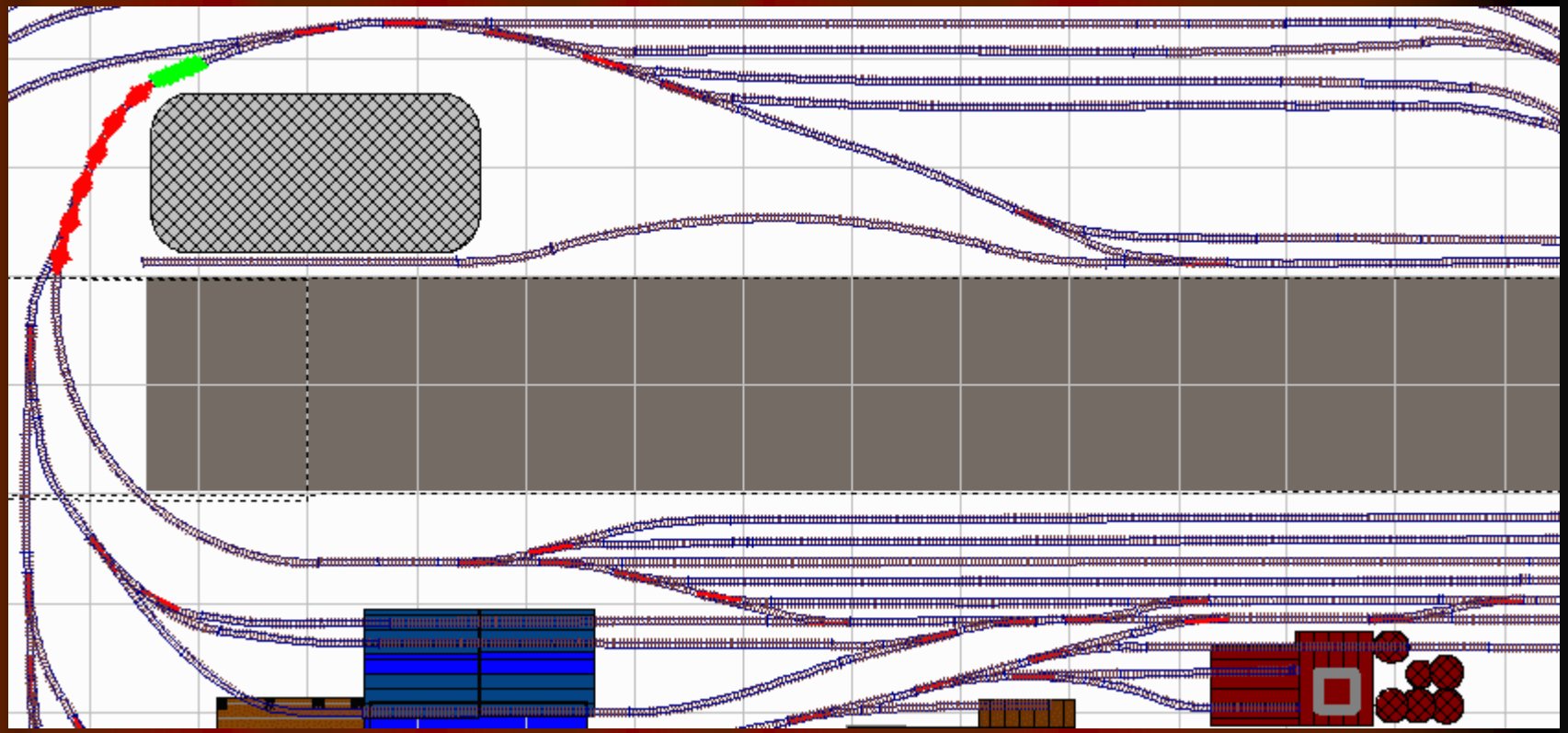


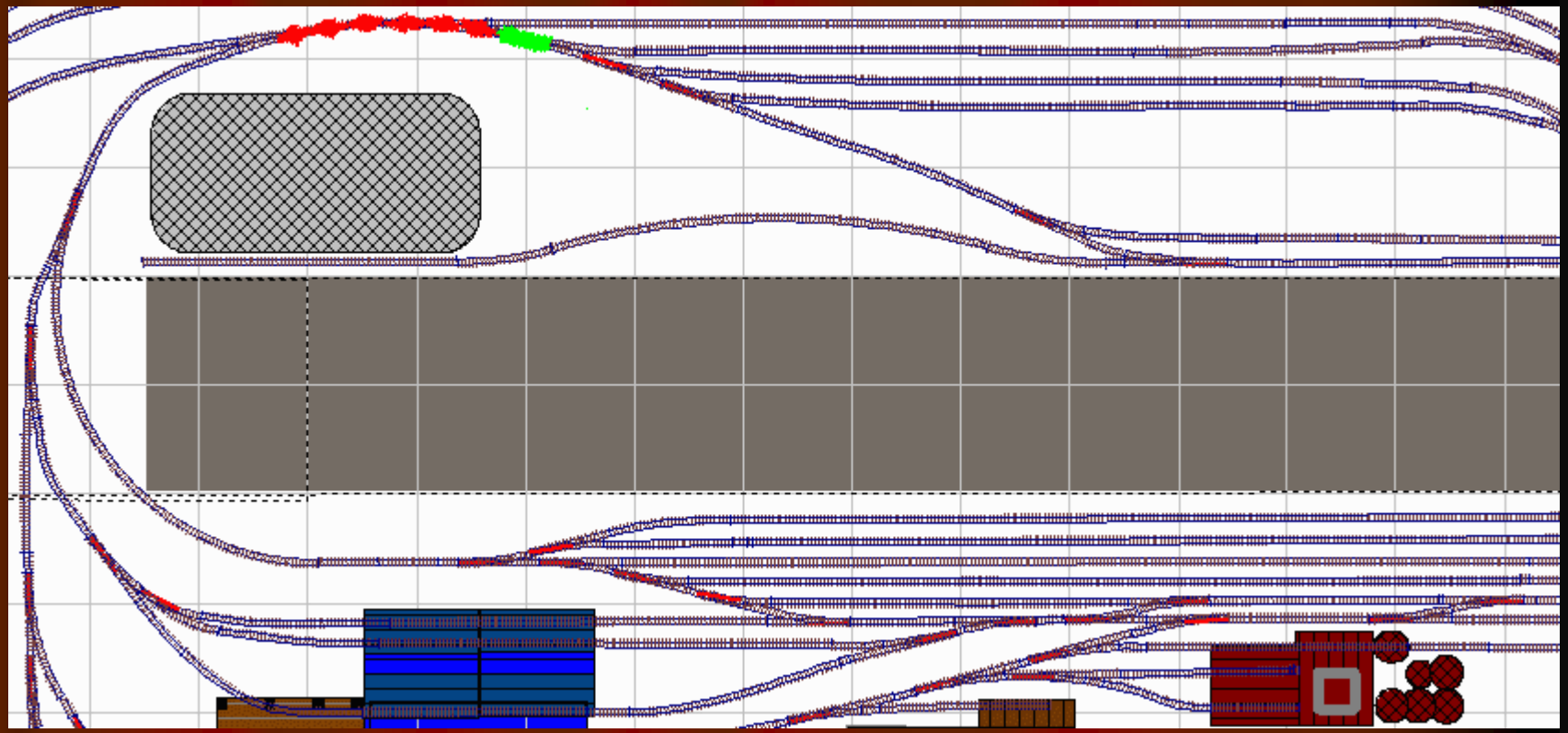


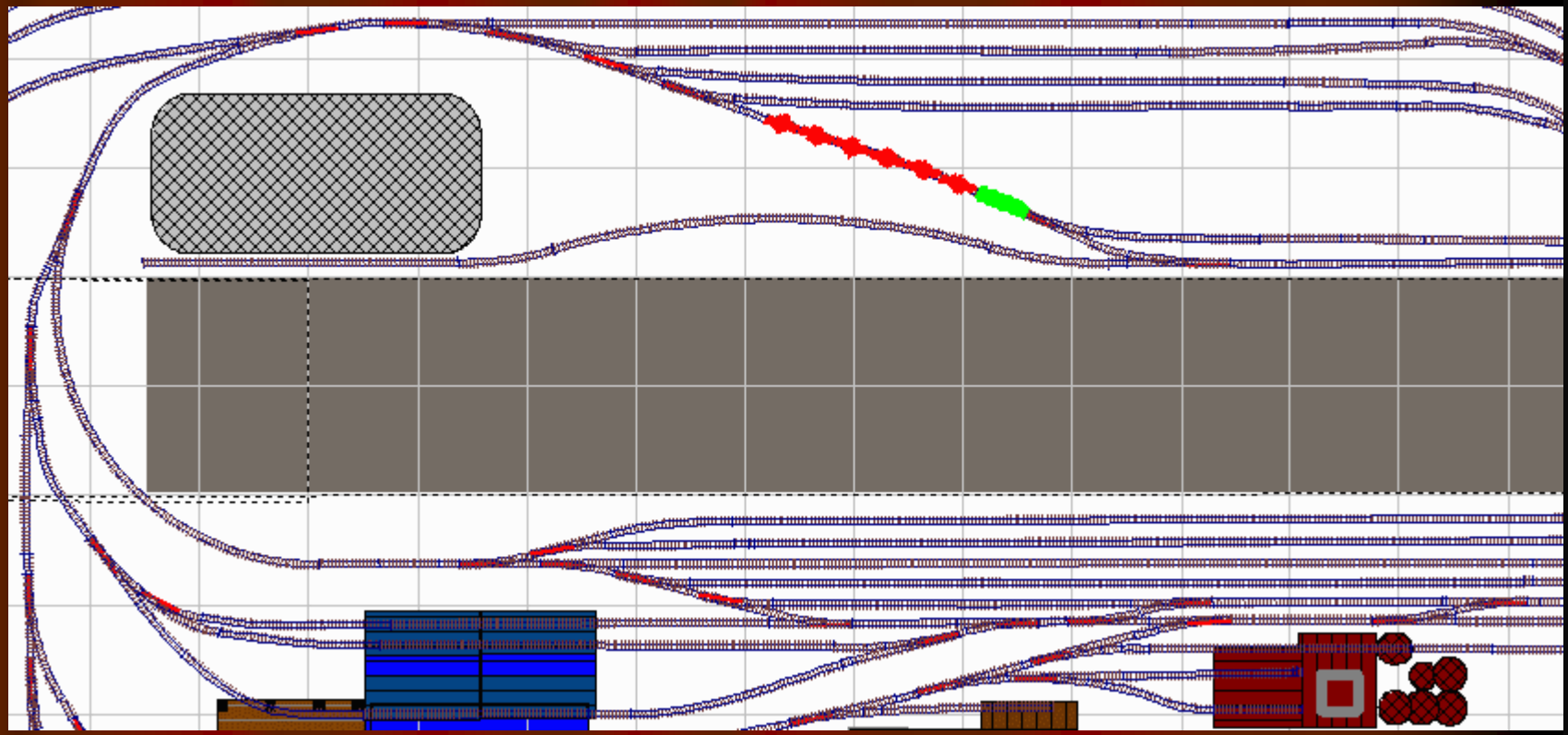


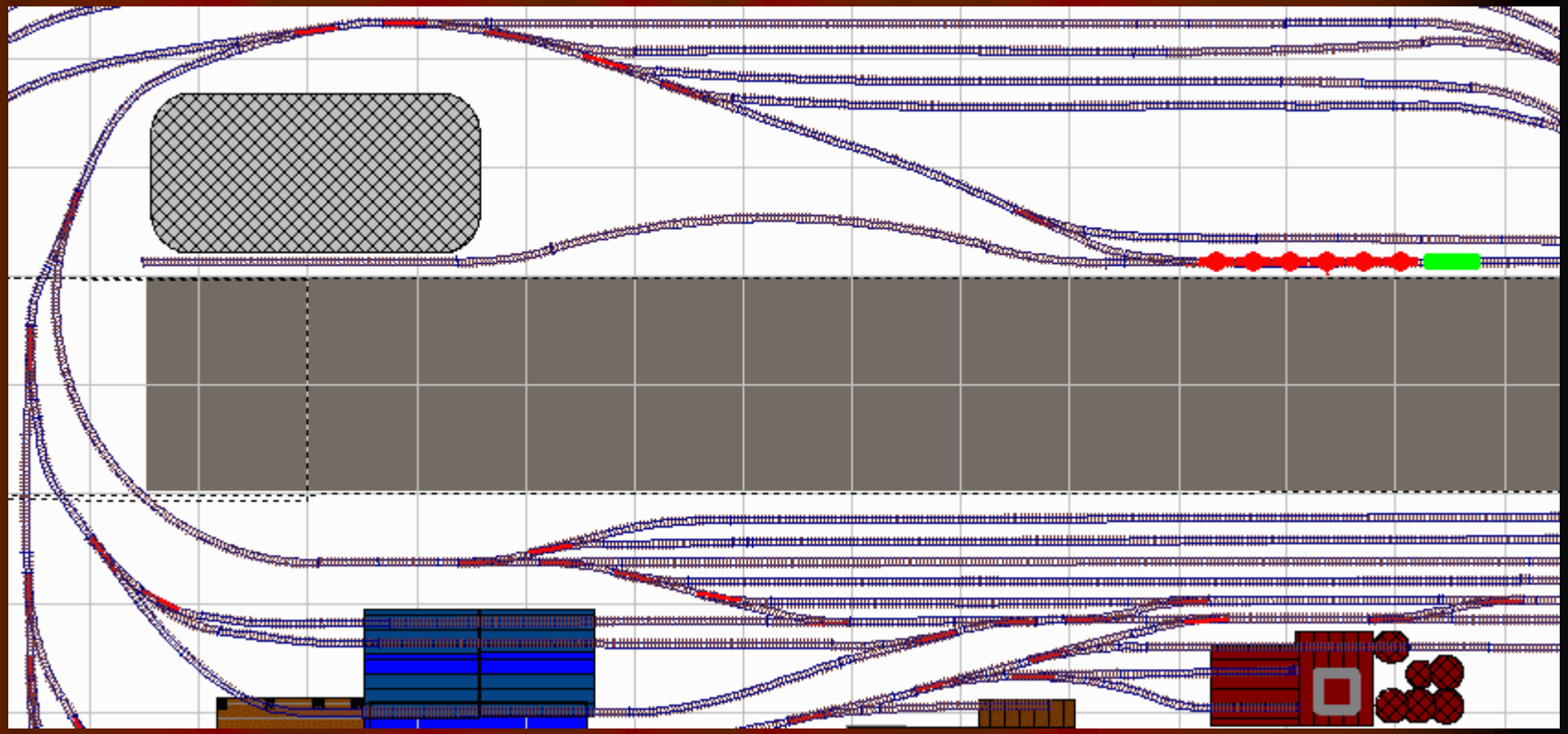


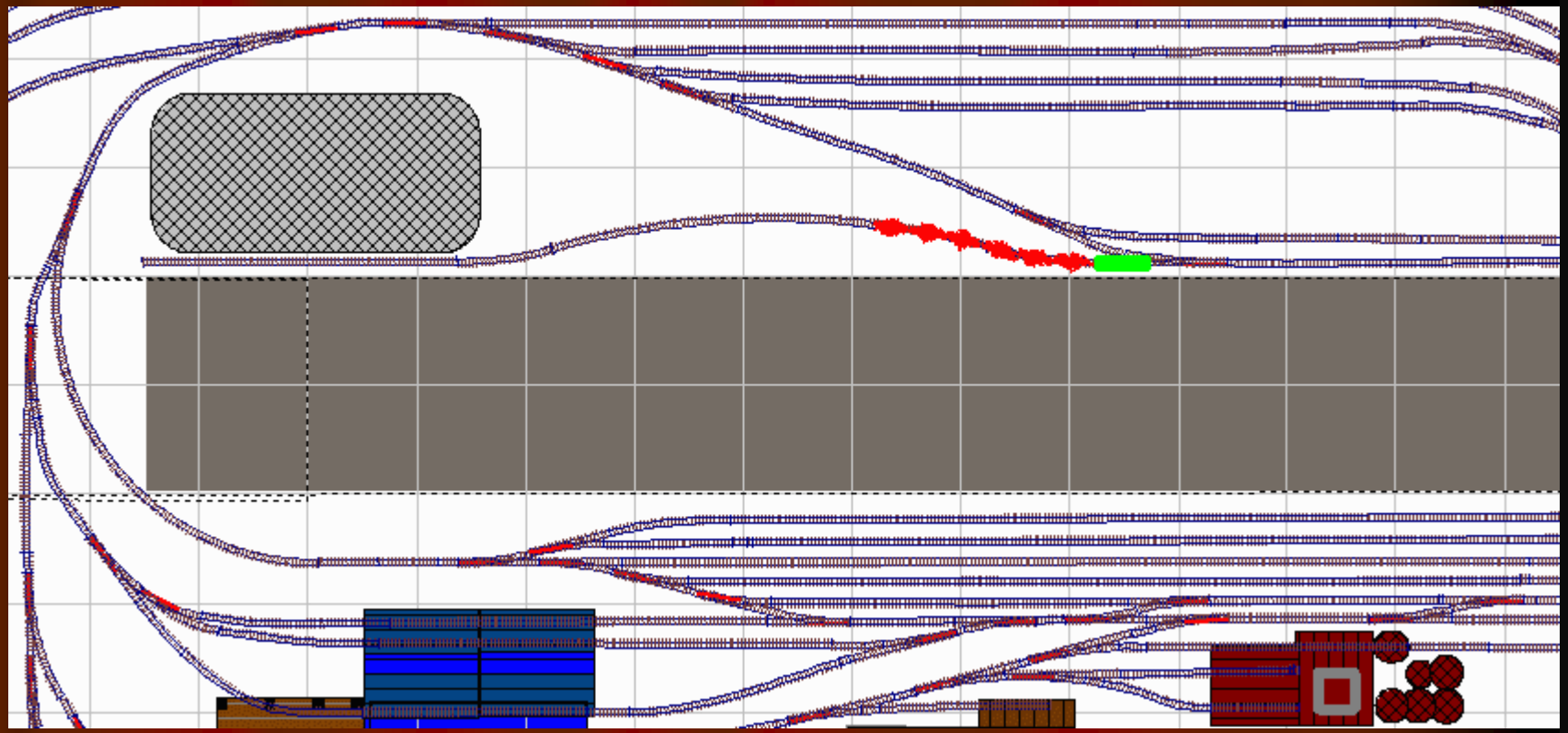


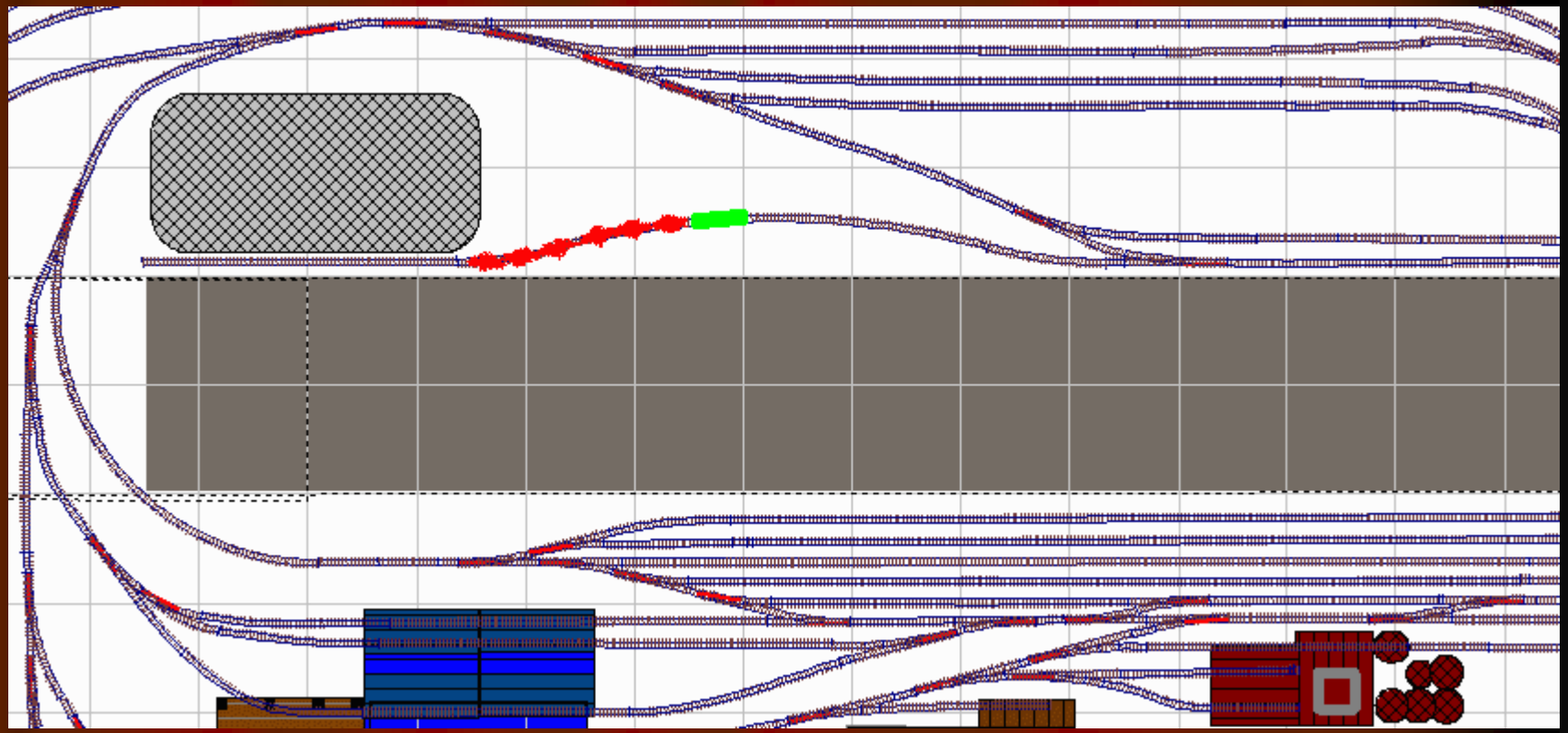


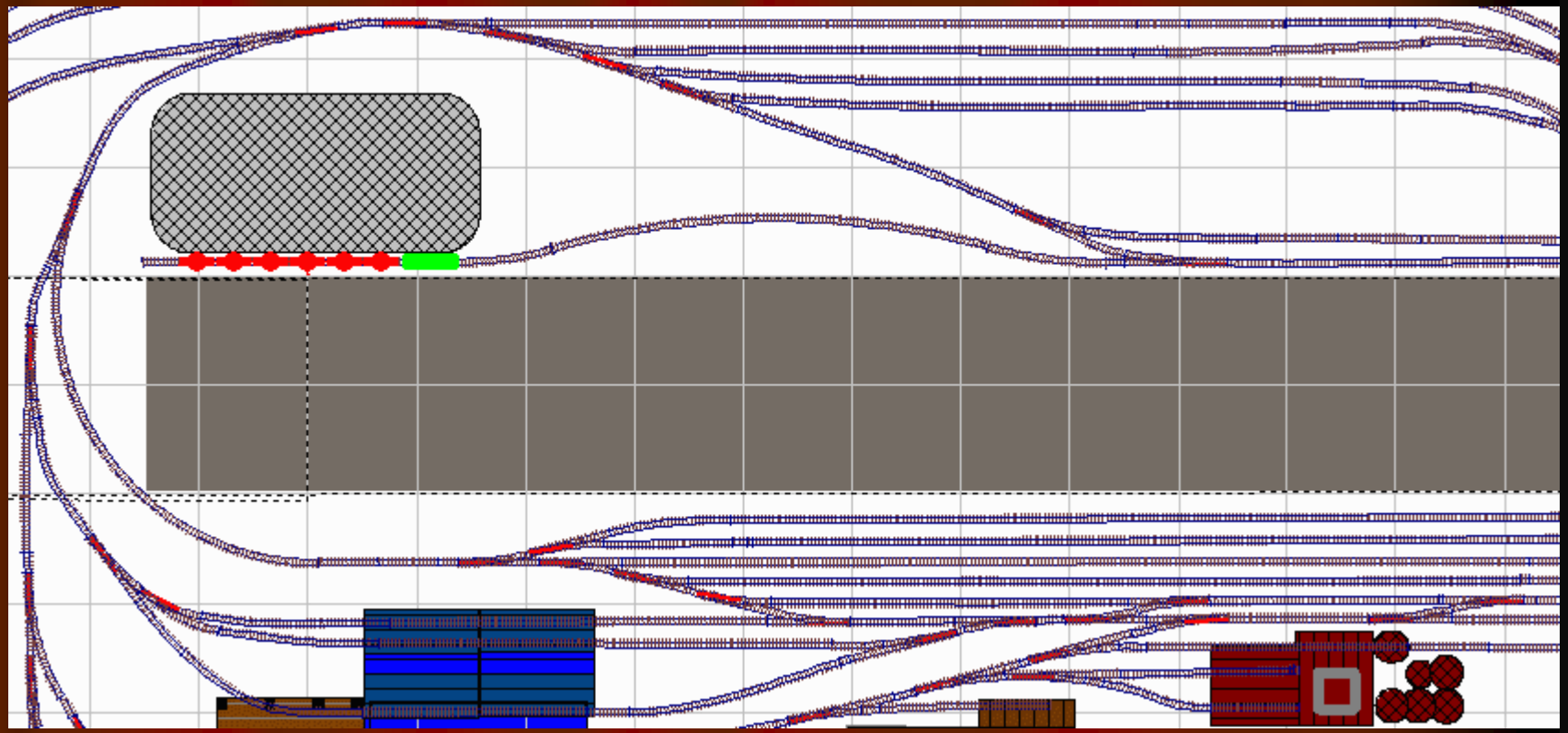












Slag pots in point-to-point operation:
Origin, at blast furnace cast house

Slag pots at dumping pit

Heavy machinery at slag dumping pit

Car Spotting Points Within the Mill

Packaged supplies receiving warehouse (near BOP)

BOP bulk additives receiving facility

Scrap metal gondolas at BOP – loads in, empties out

Classification yard, filled with inbound and outbound coil cars that currently have no place to go...

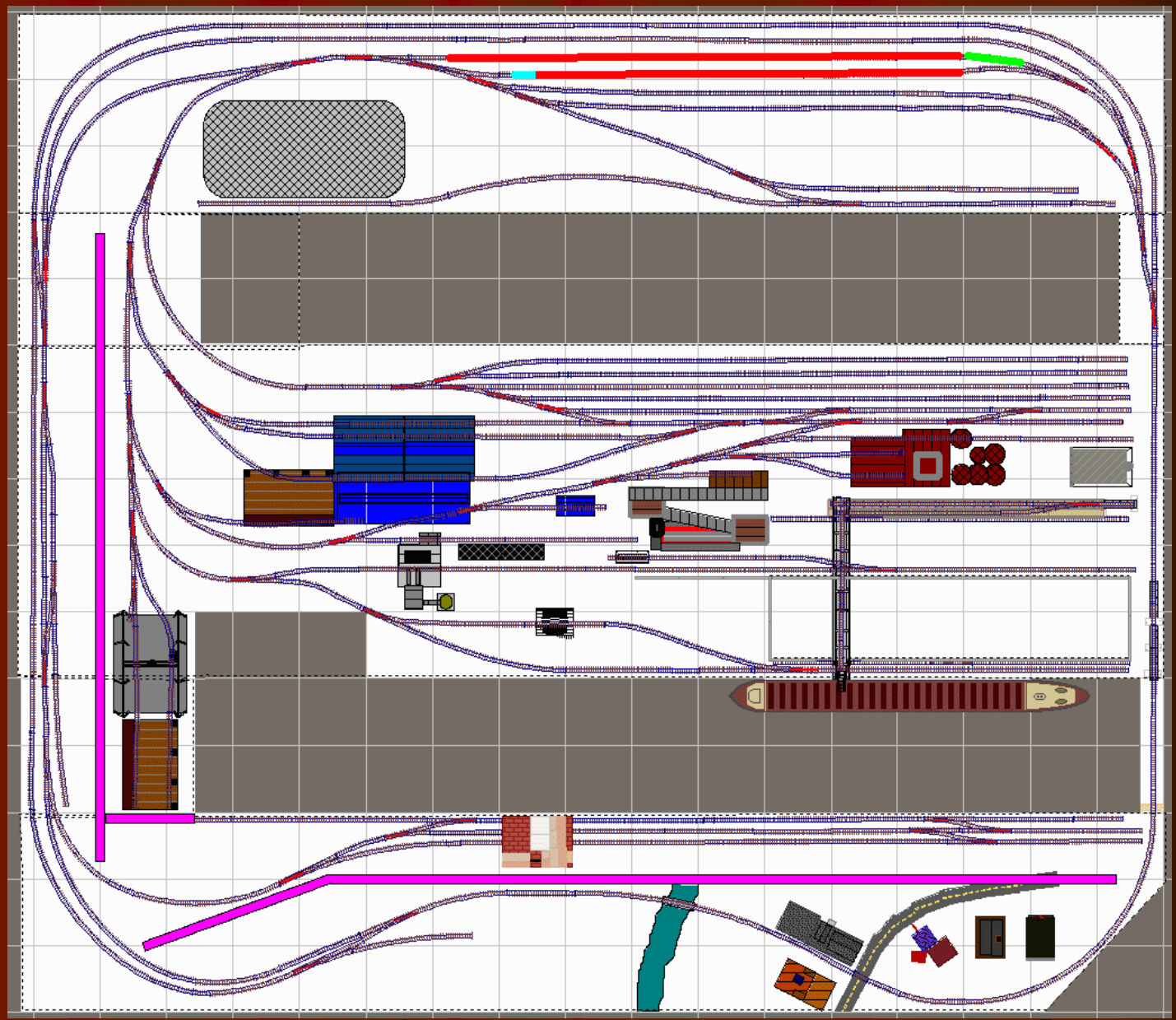
Future site of *locomotive servicing* facility
(originally planned for coil shipment warehouse)

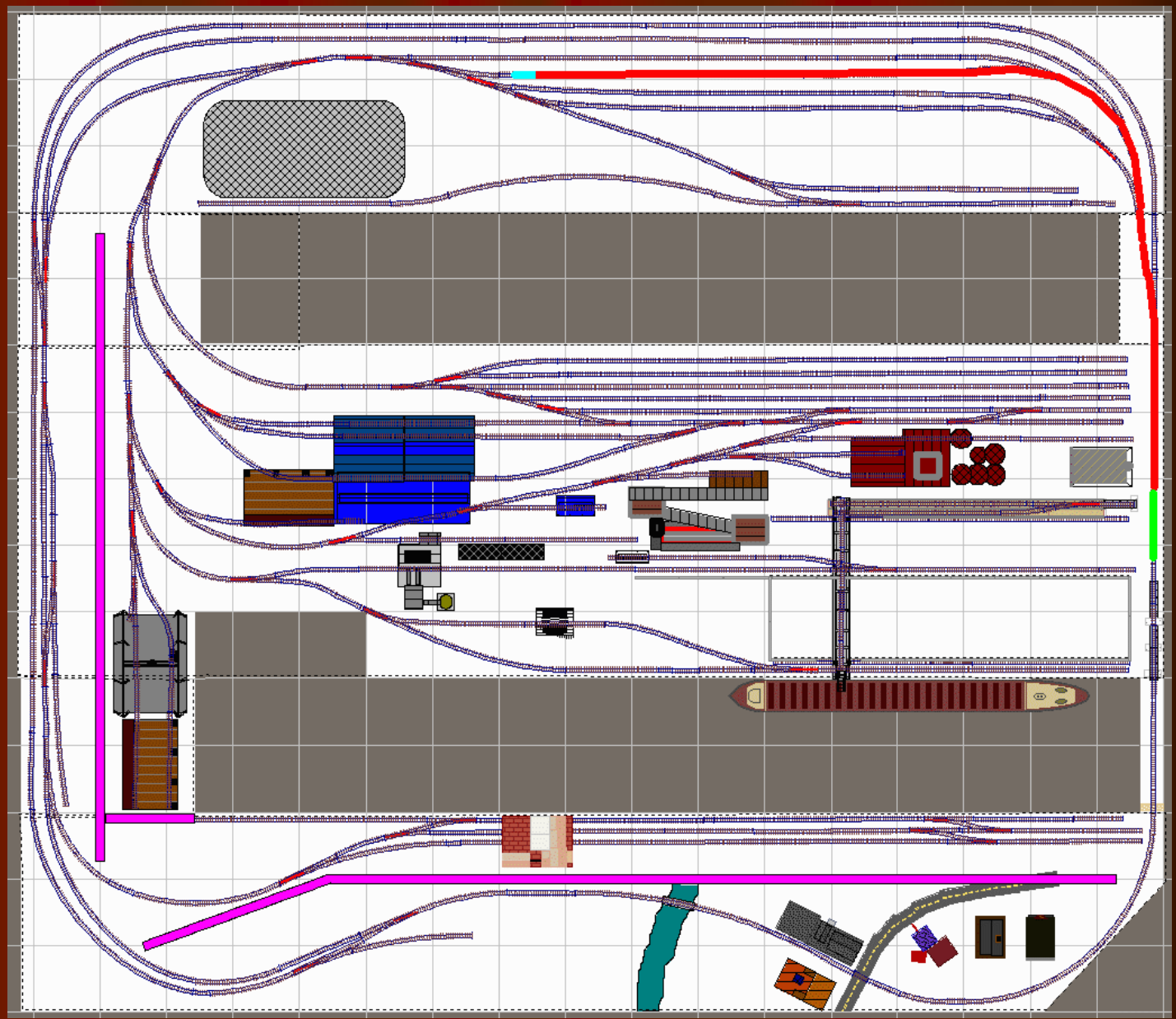
Operating Scenario 1, Part A:

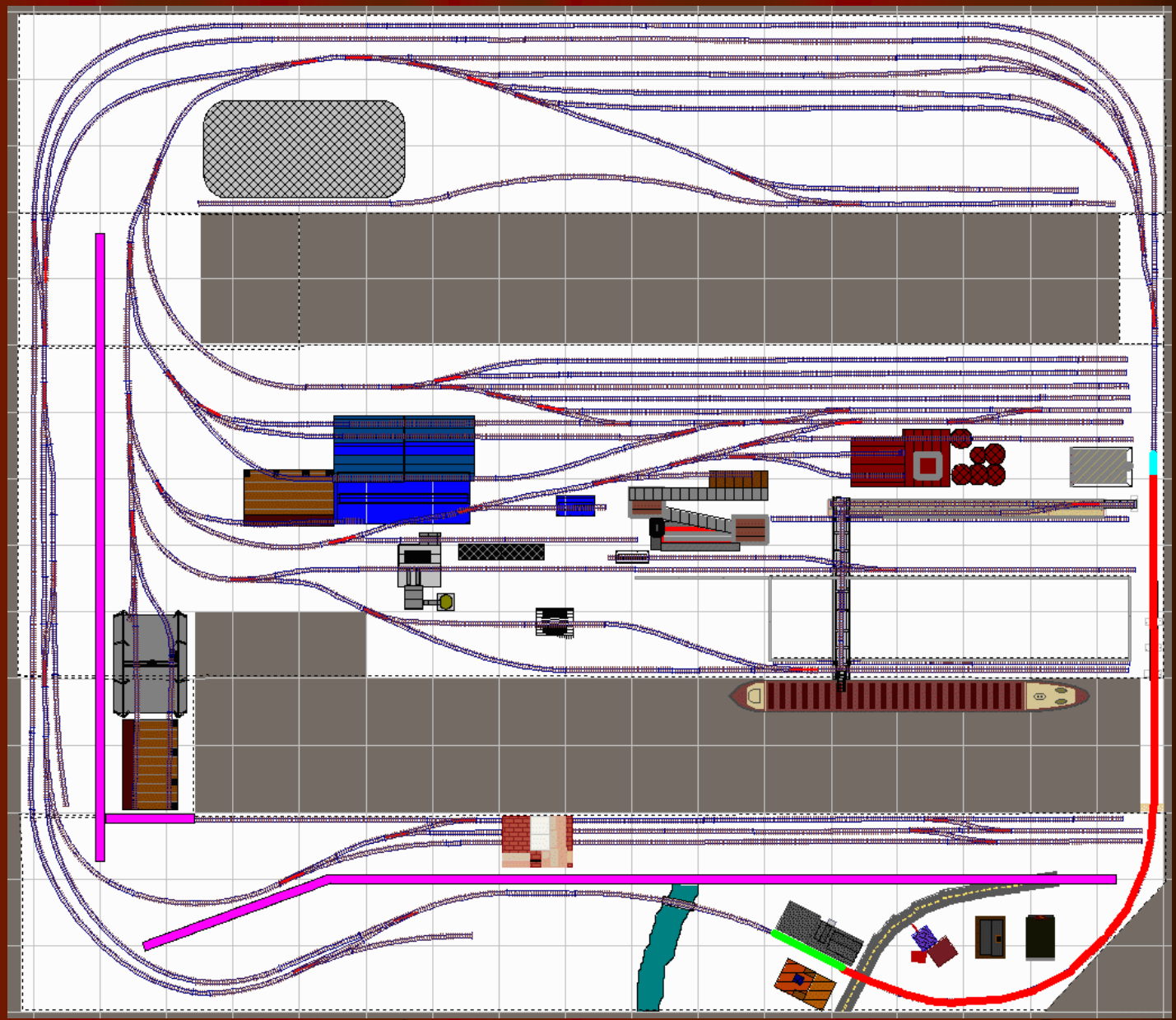
Coal Mine to Staging Yard

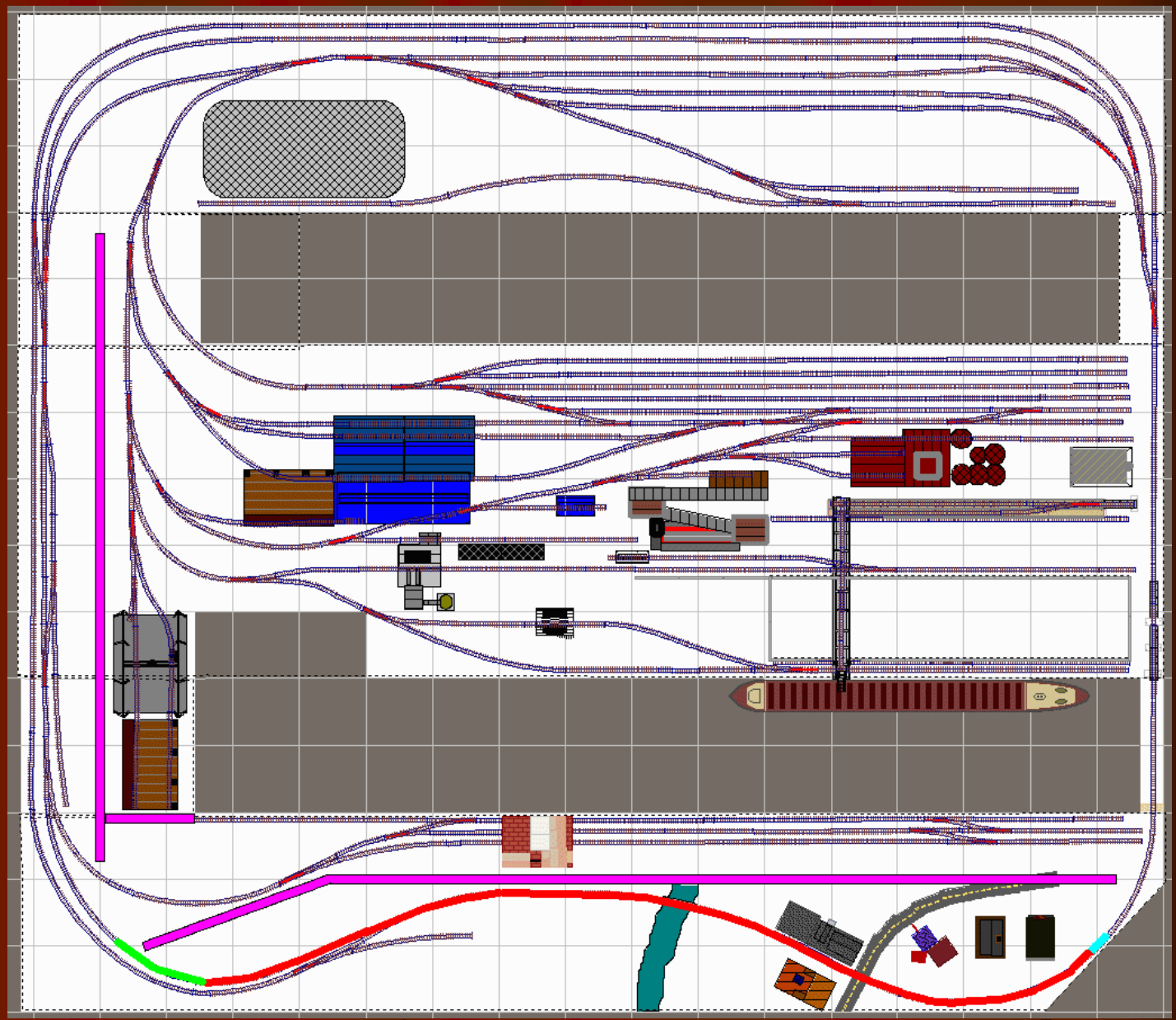
NOTE: For train movement diagrams to function smoothly, please shrink your display until the *entire slide* fits within 1 screen without the need for scroll bars.

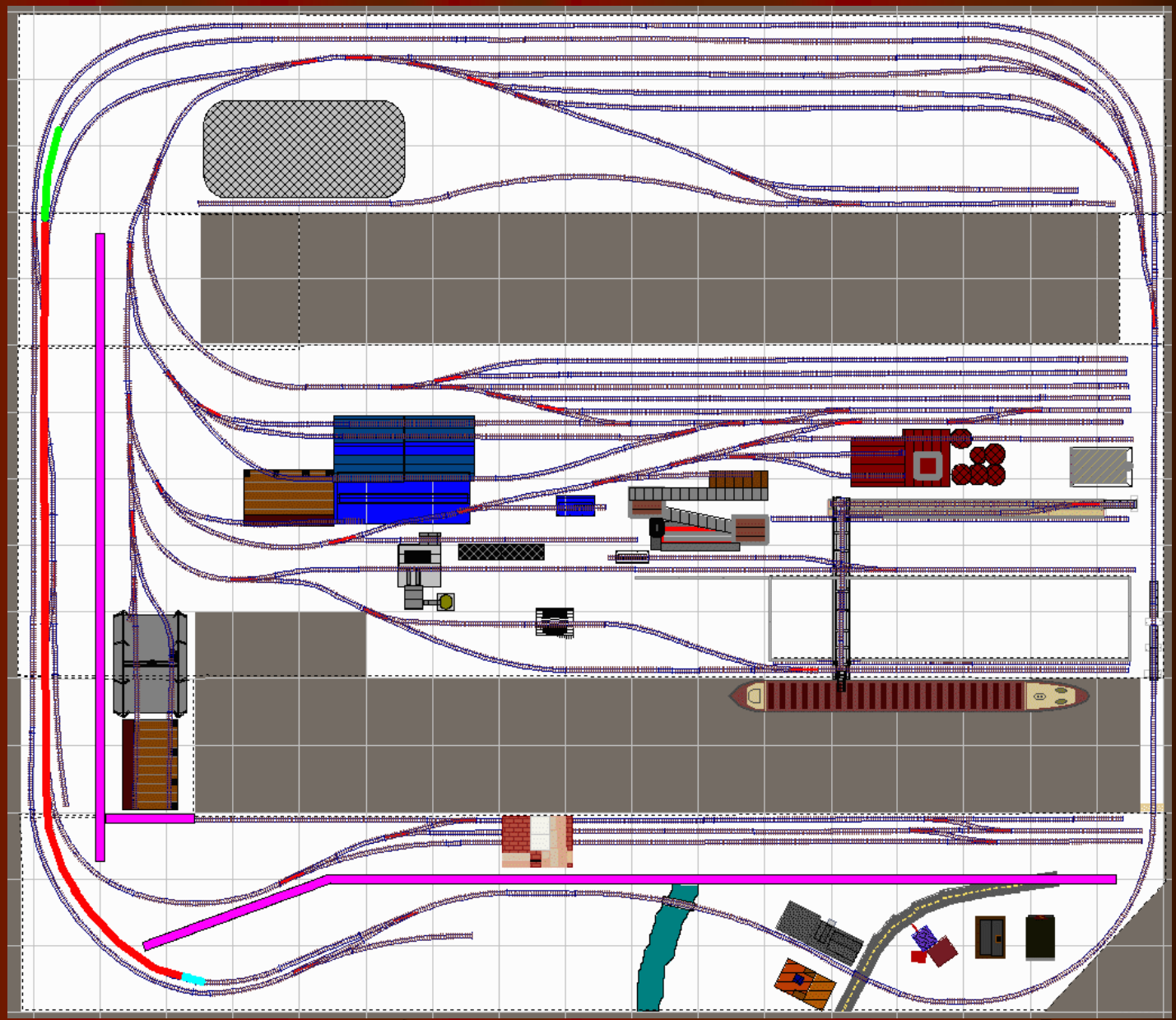
Use *Page-Dn* and *Page-Up* keys to navigate between slides.

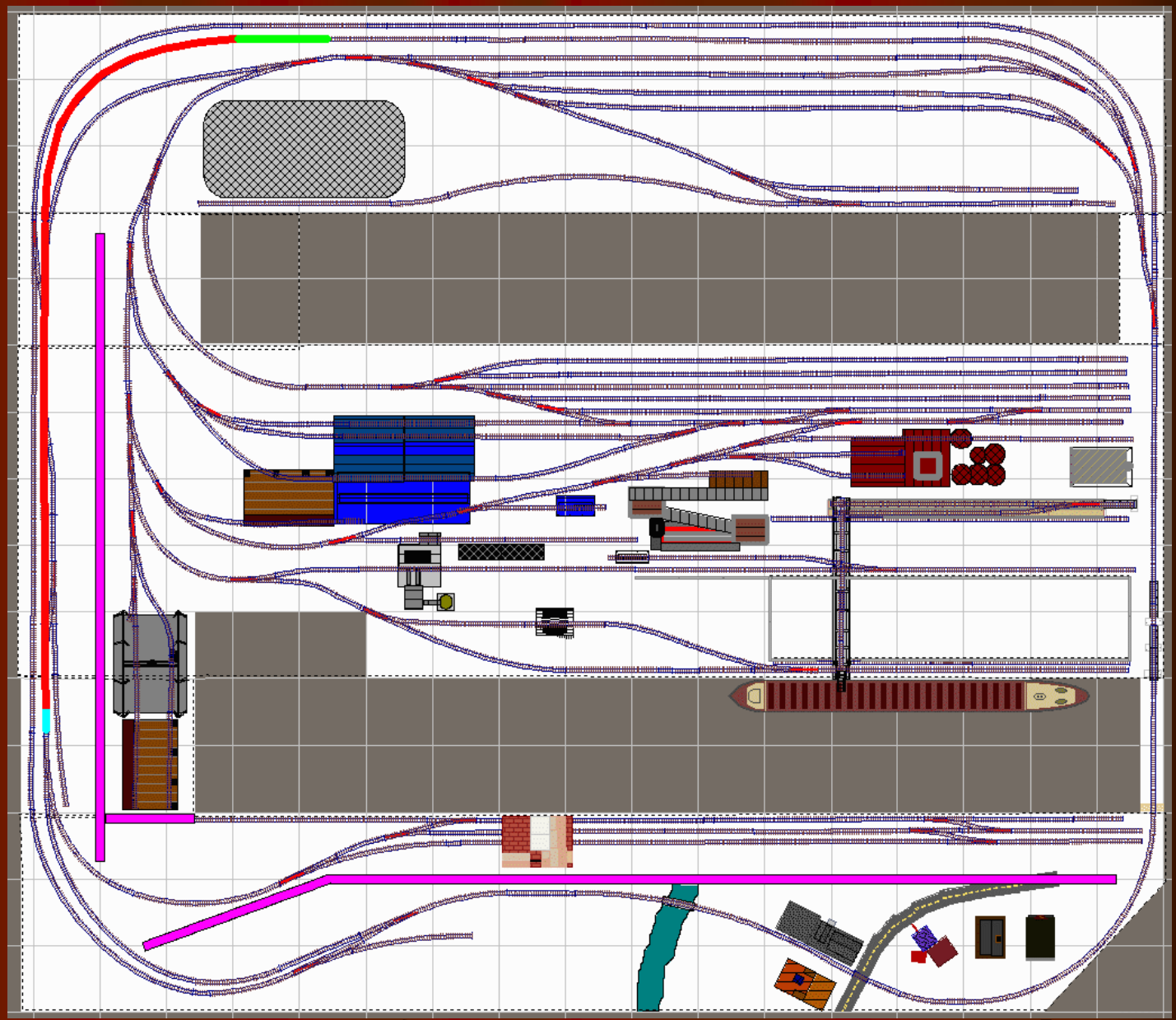


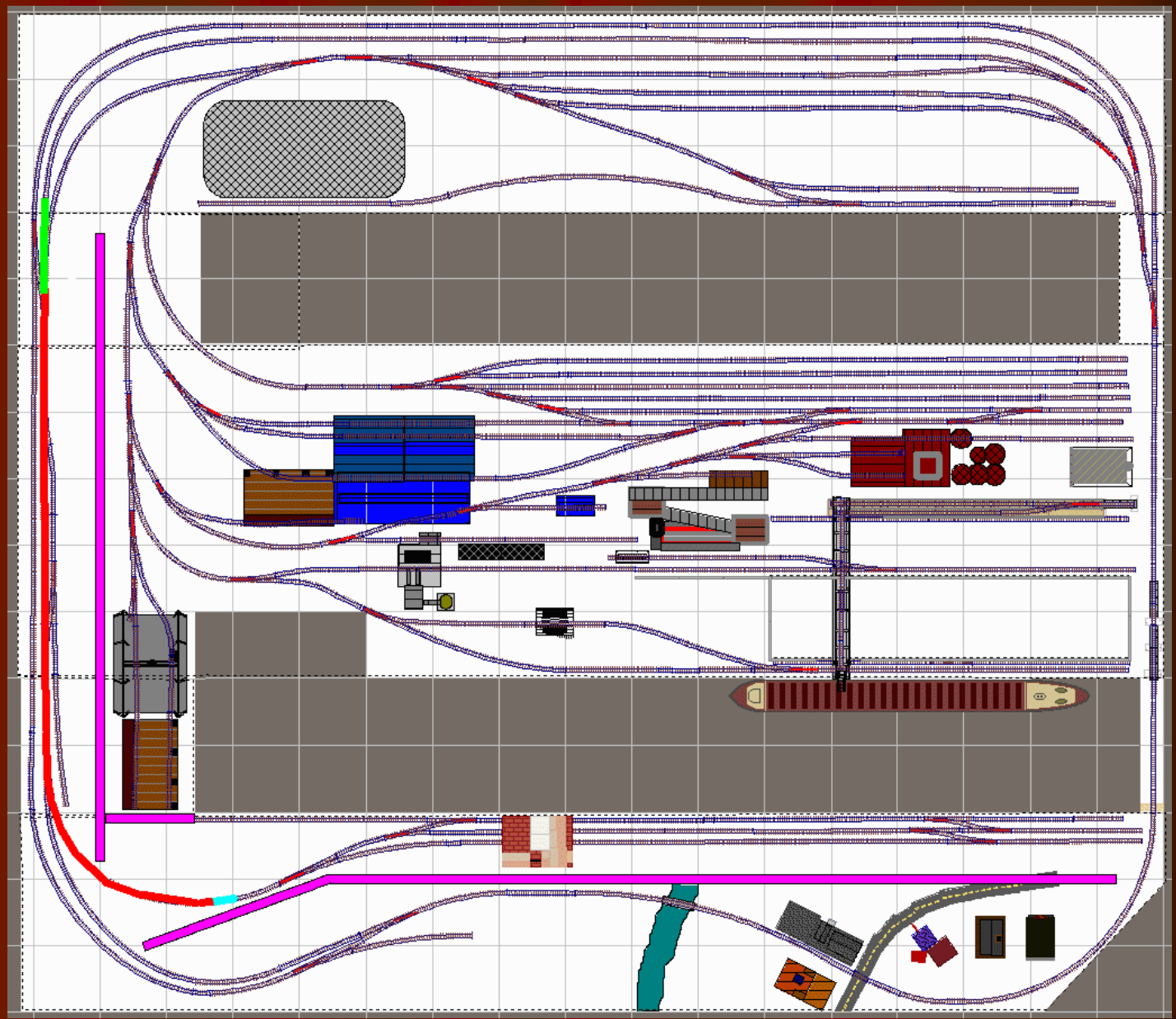


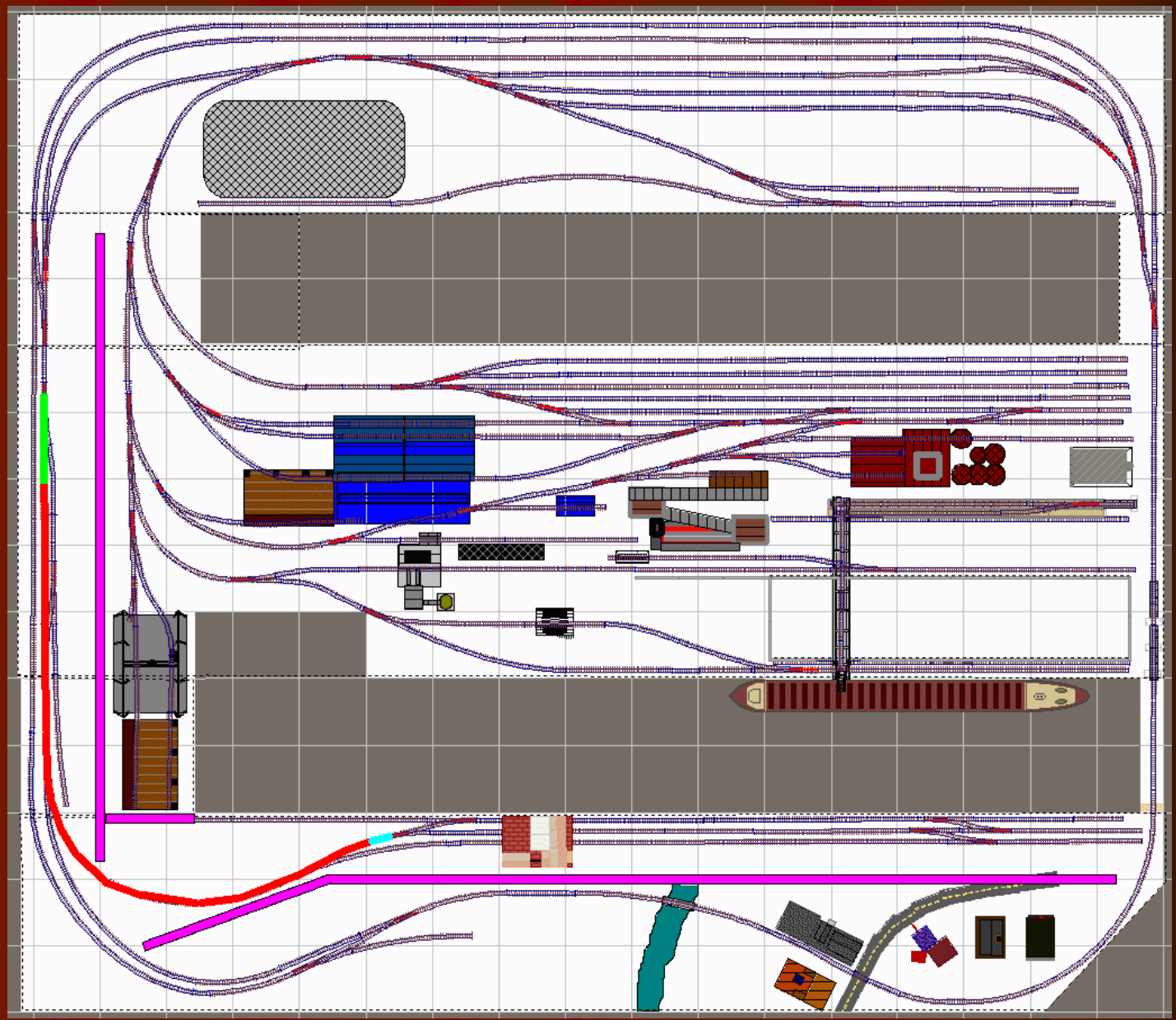


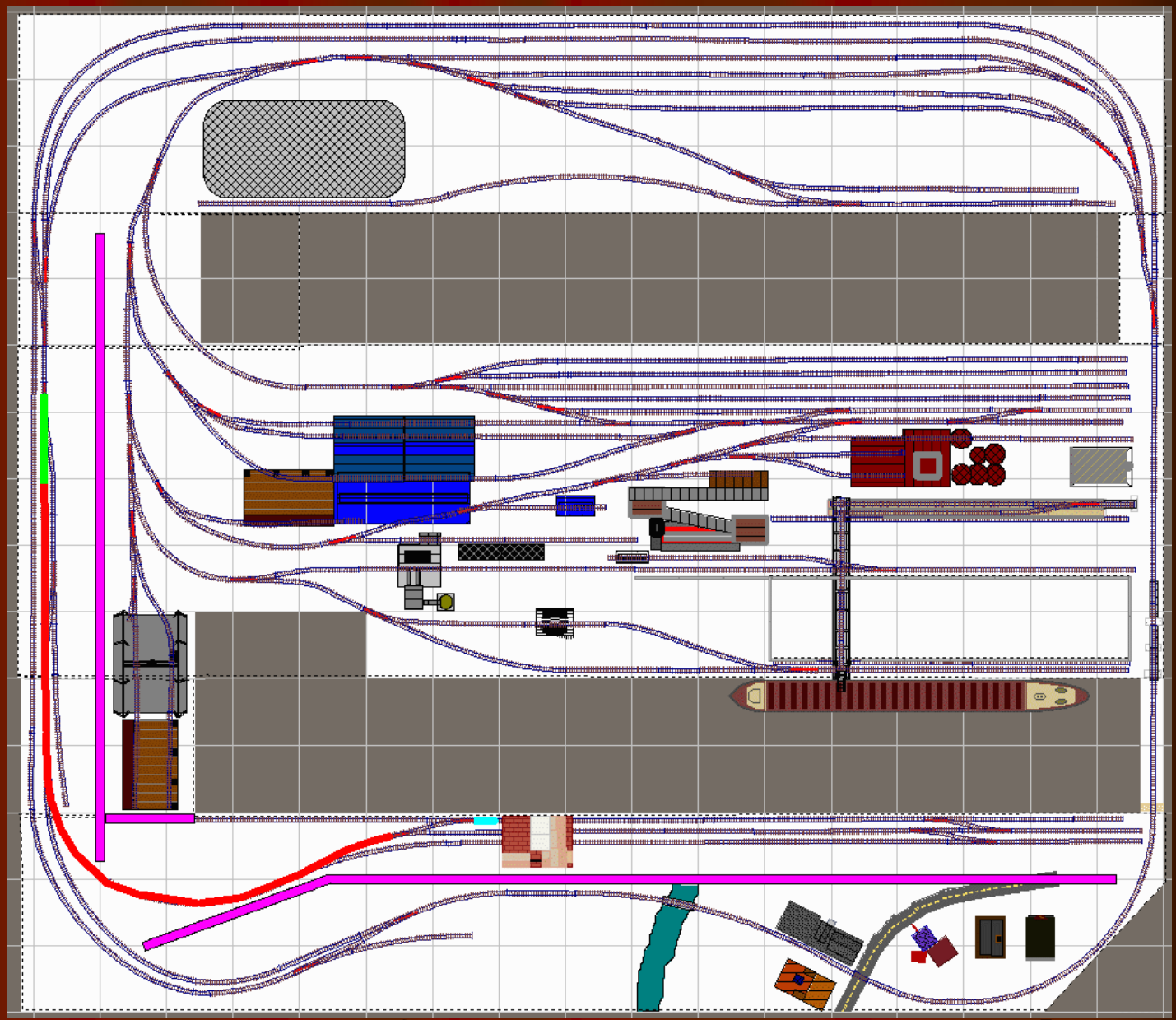


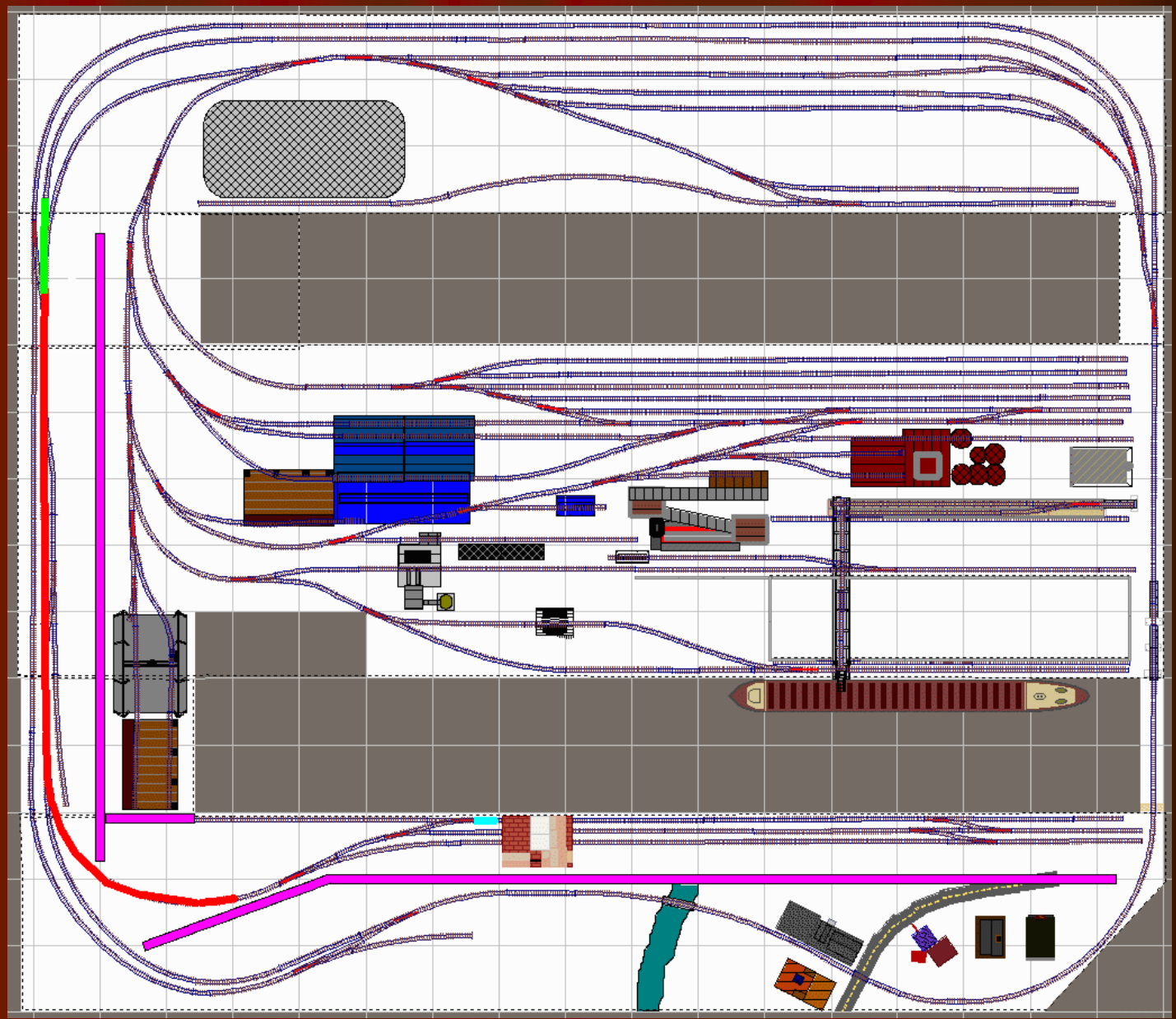


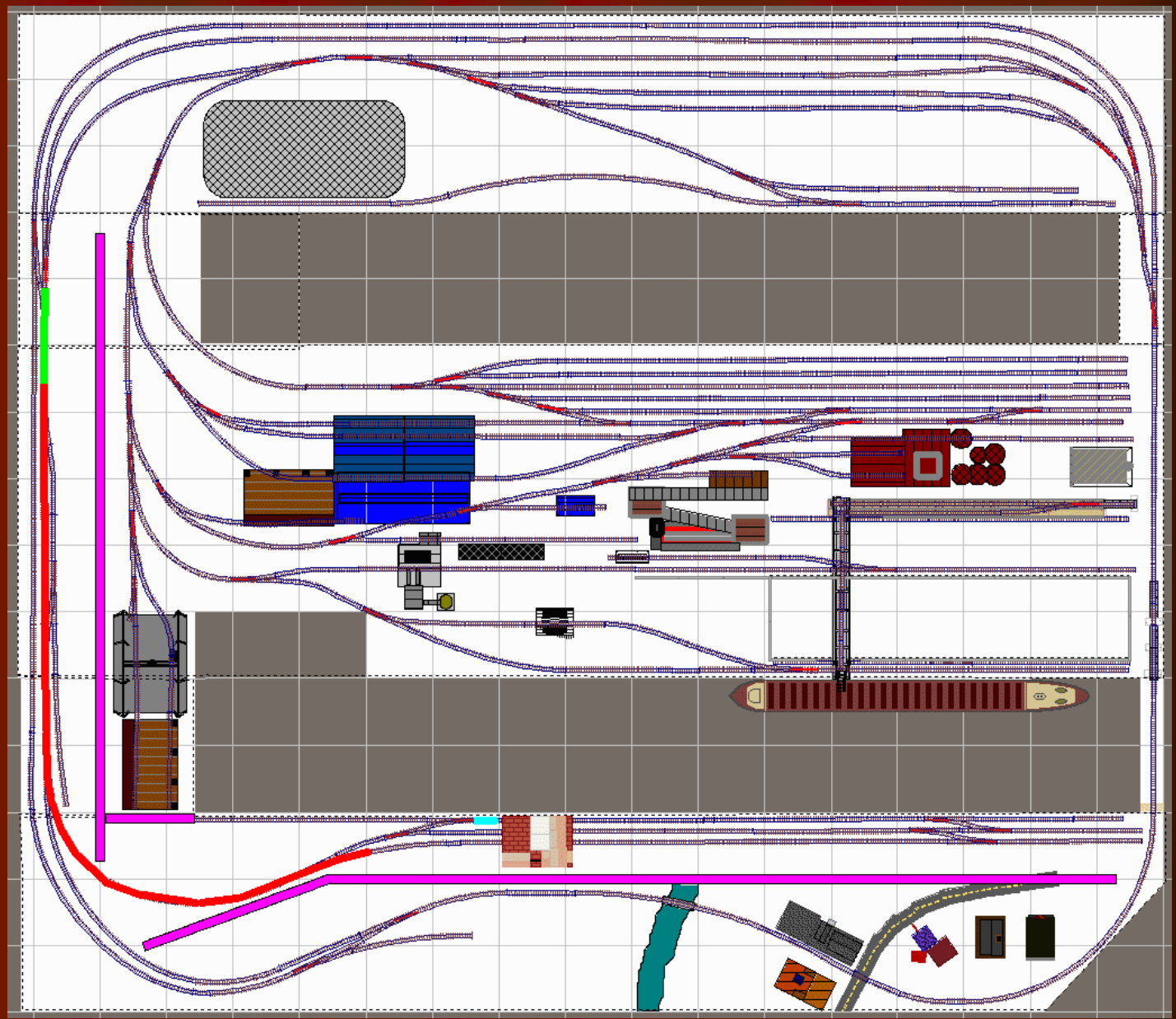


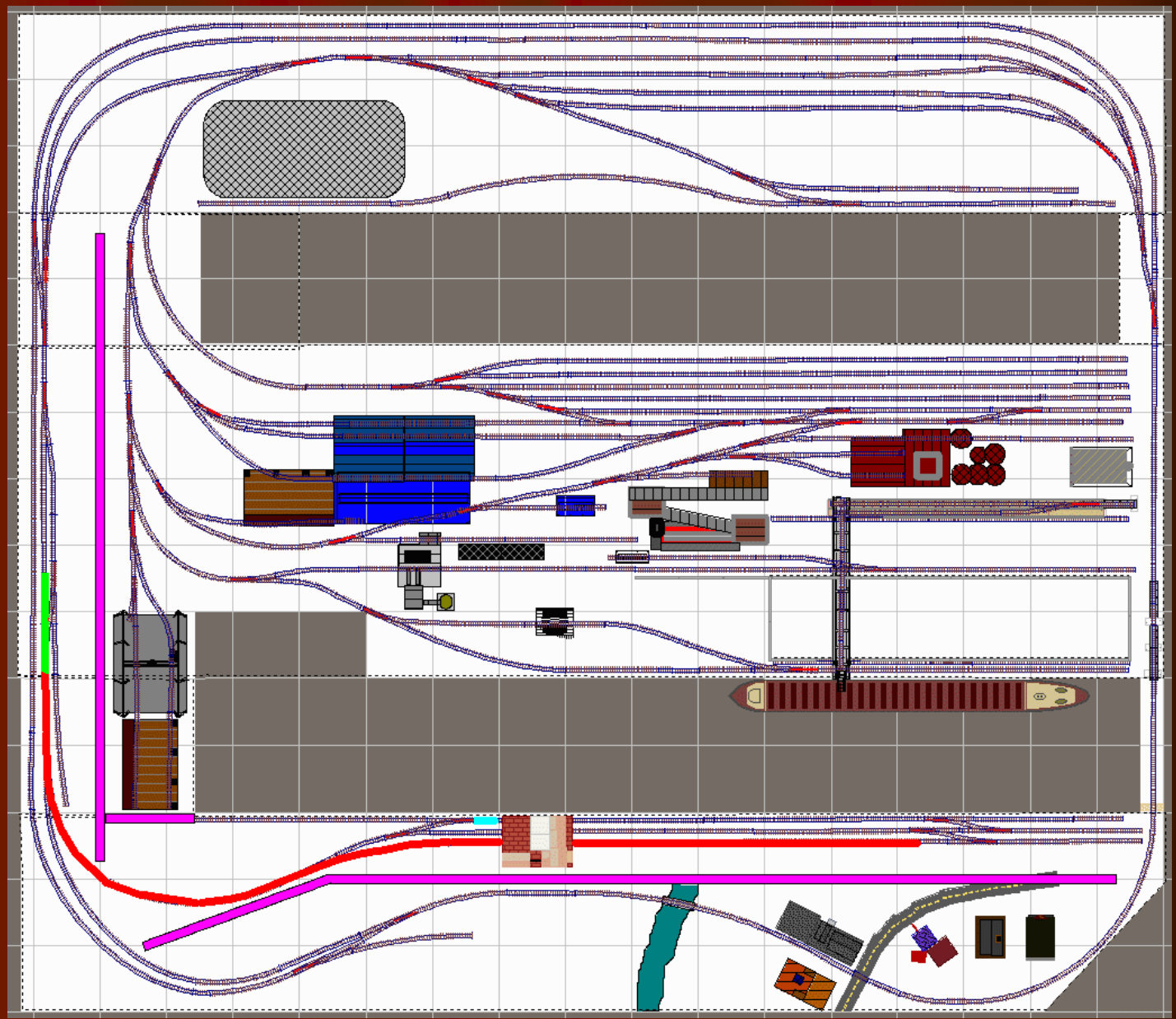


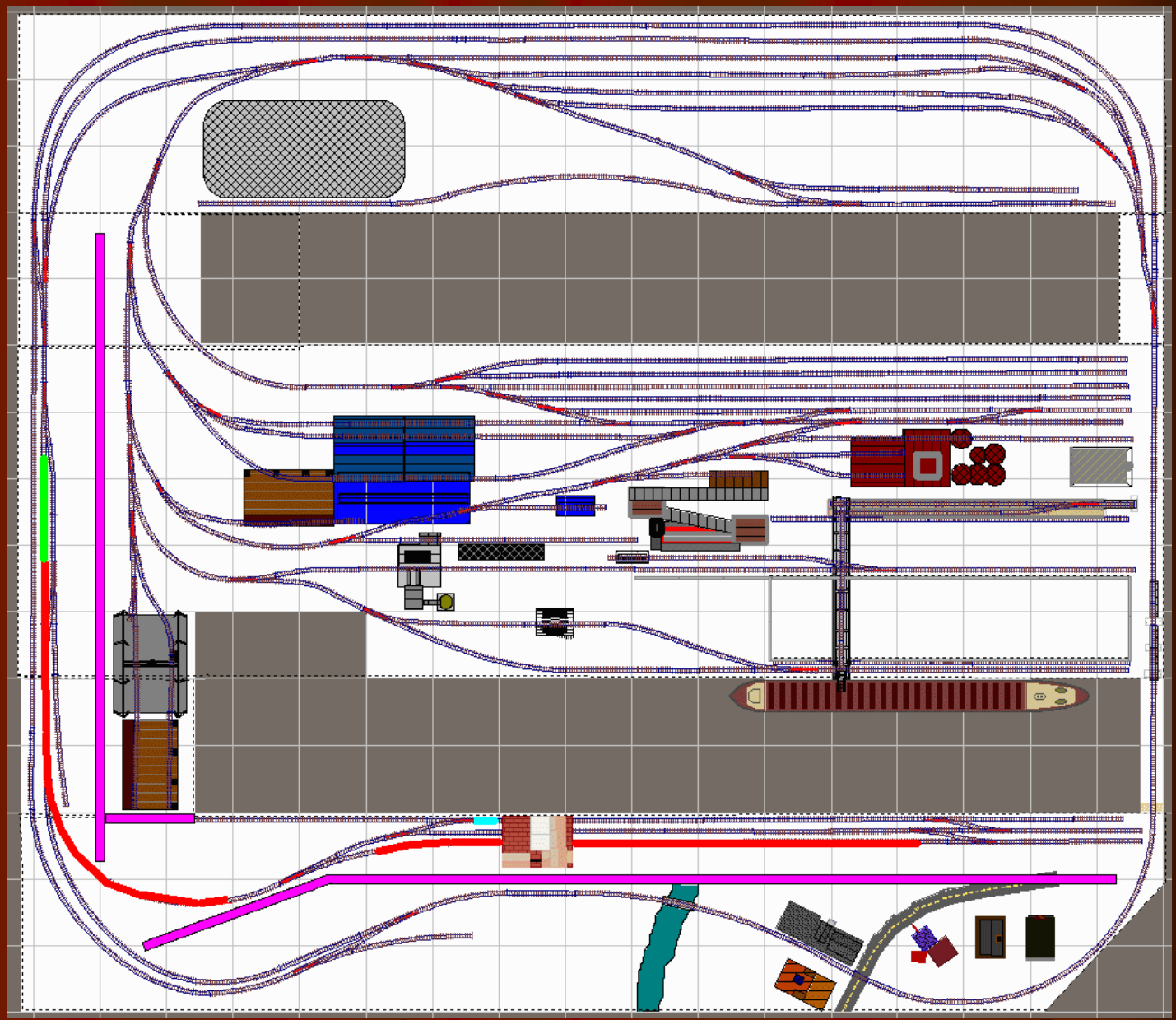


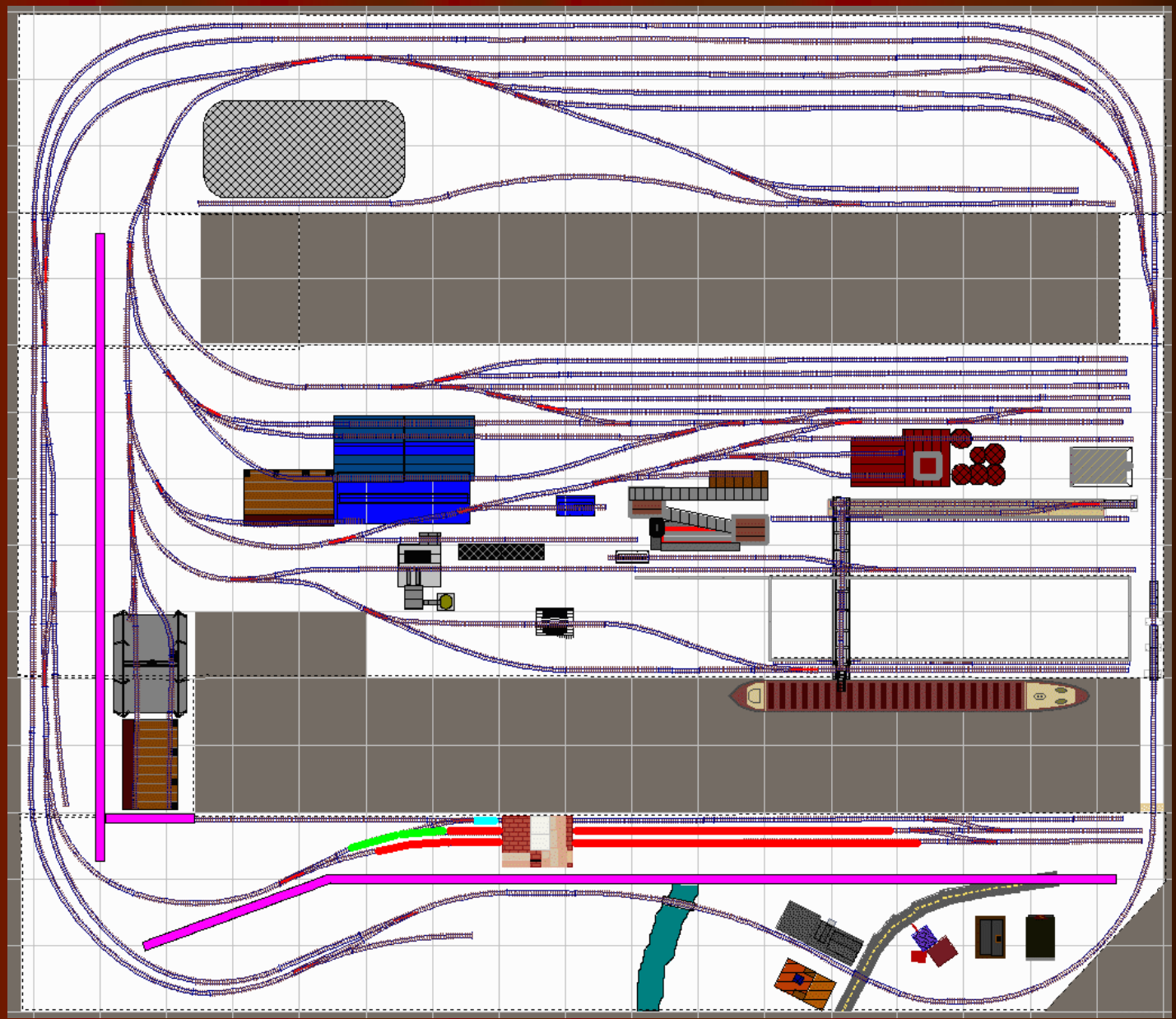


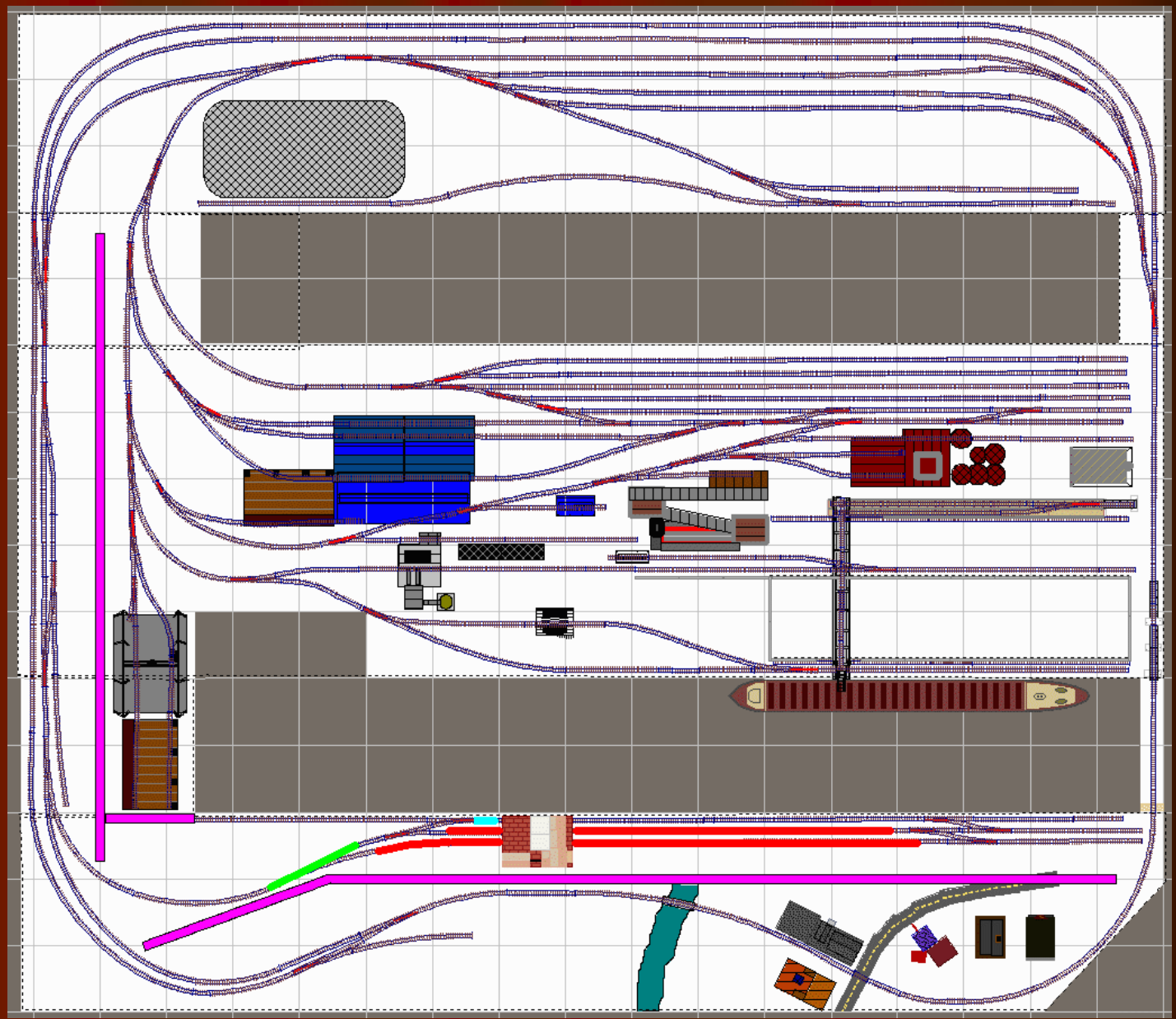


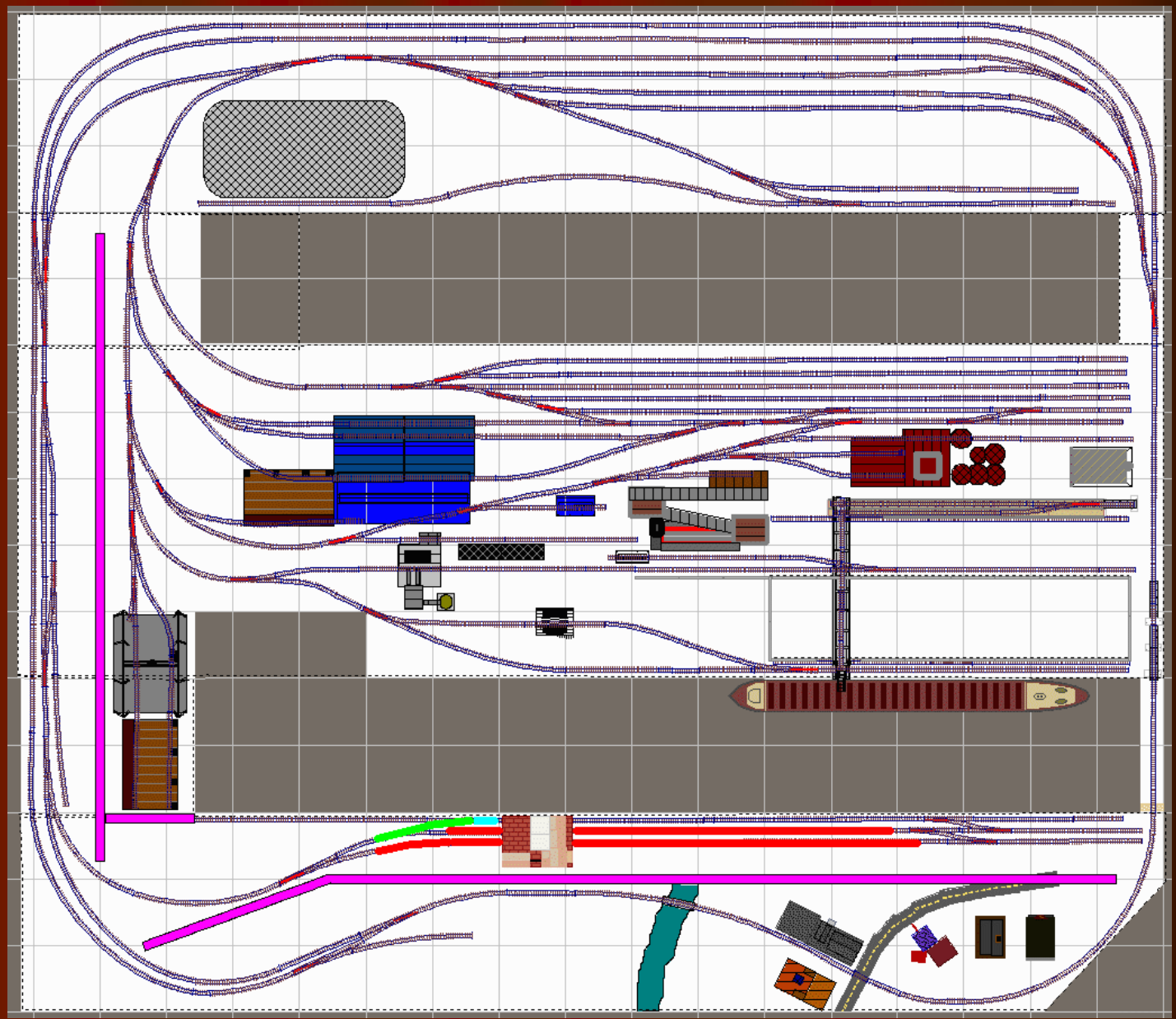


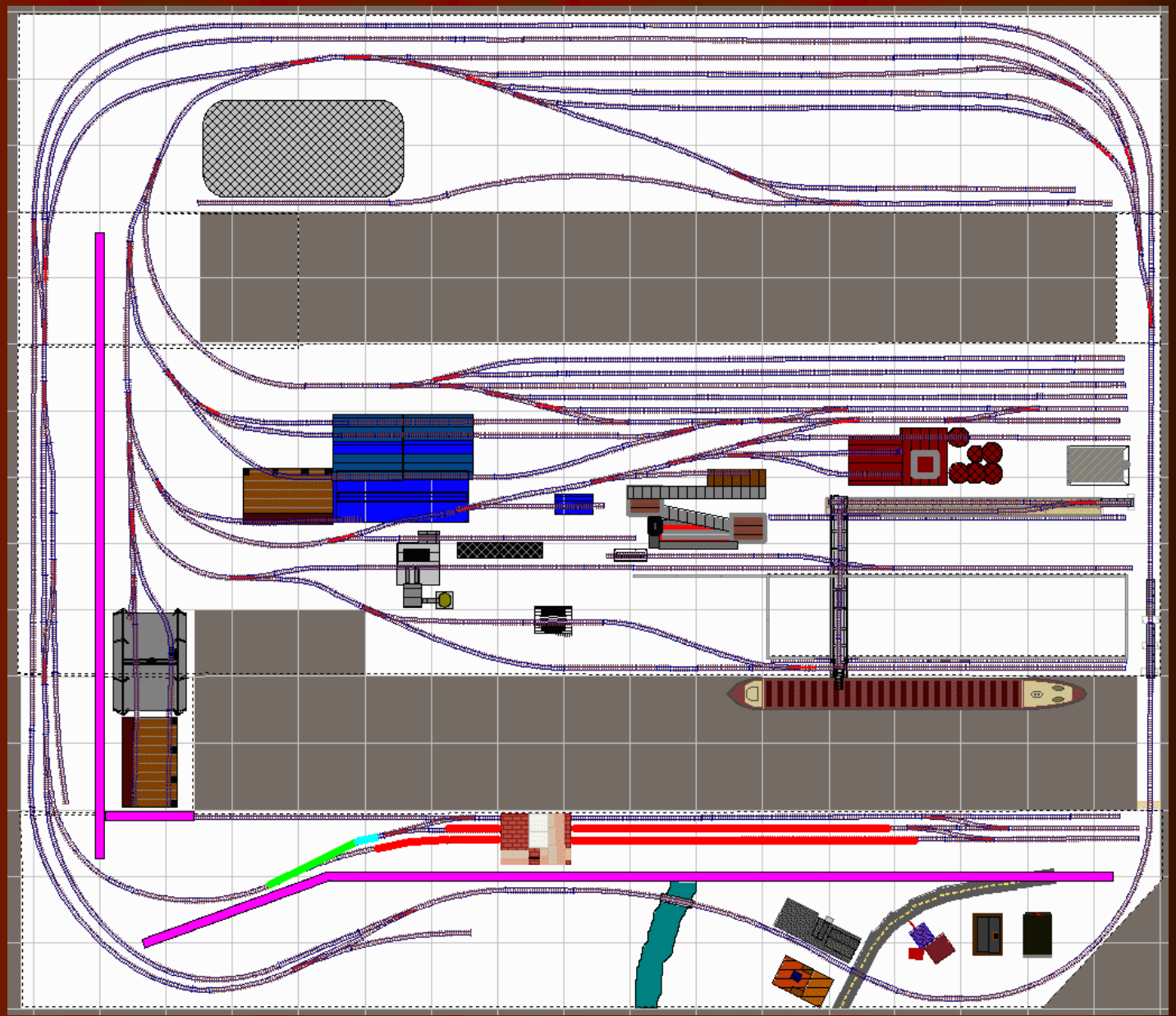


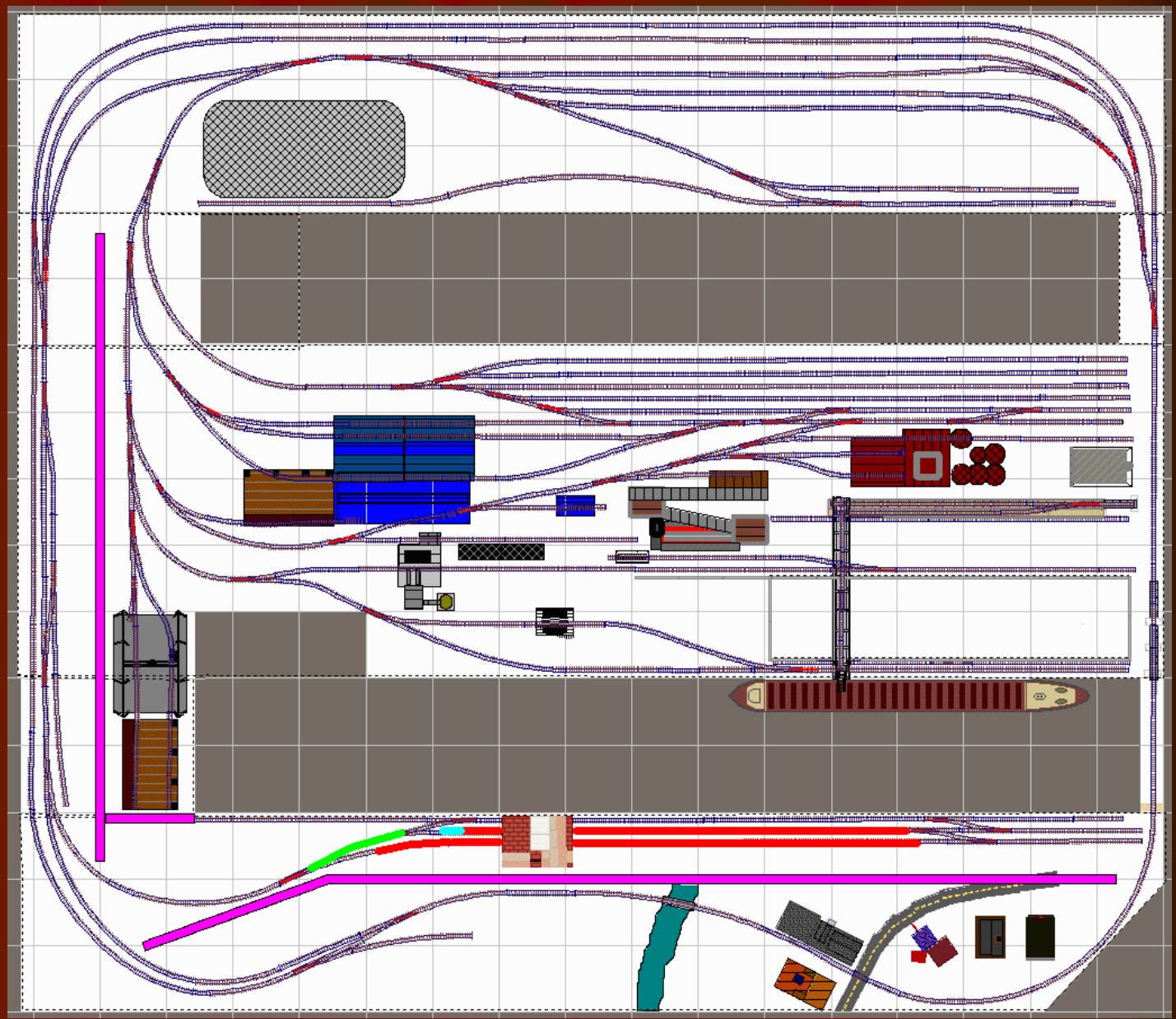


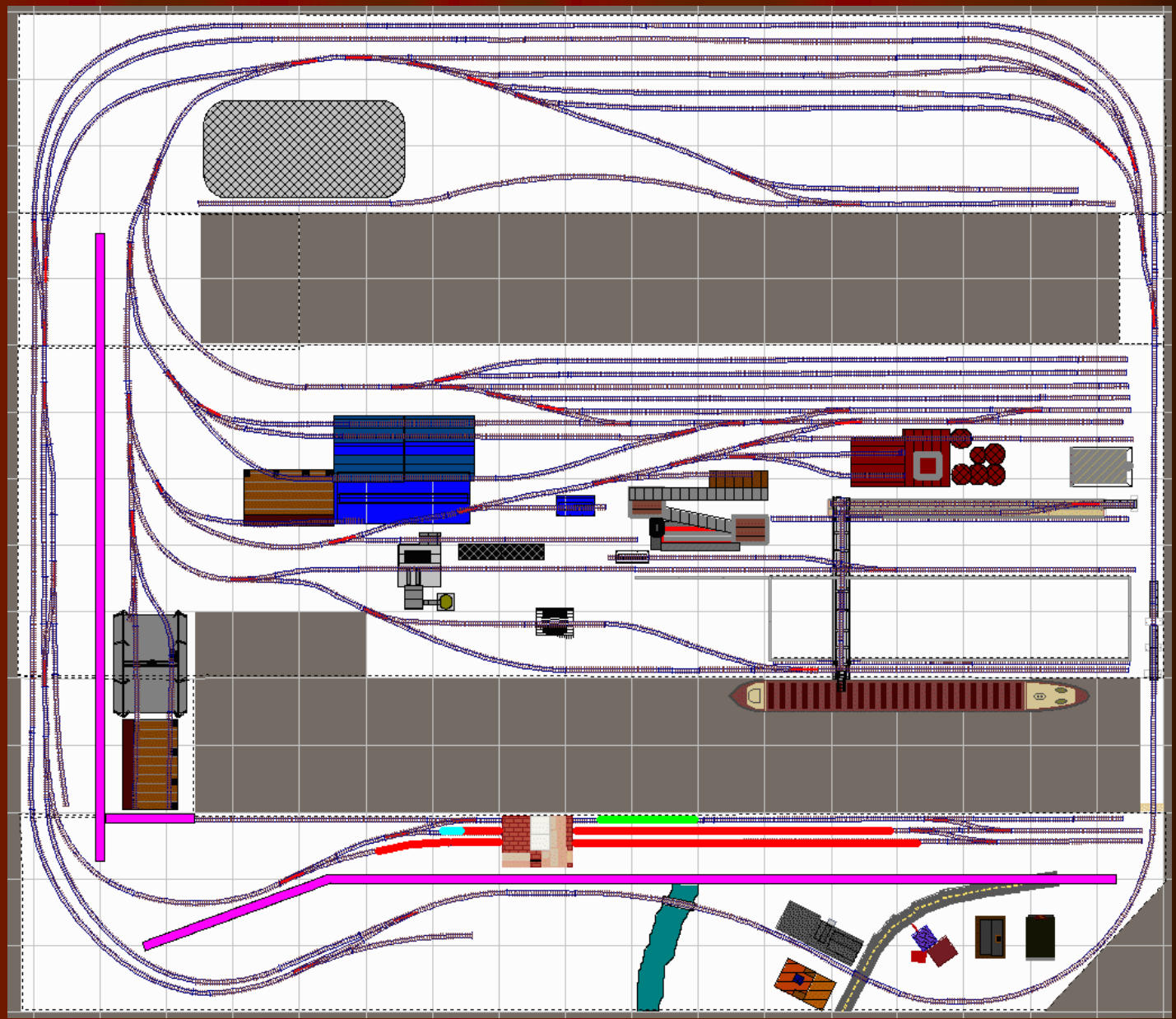


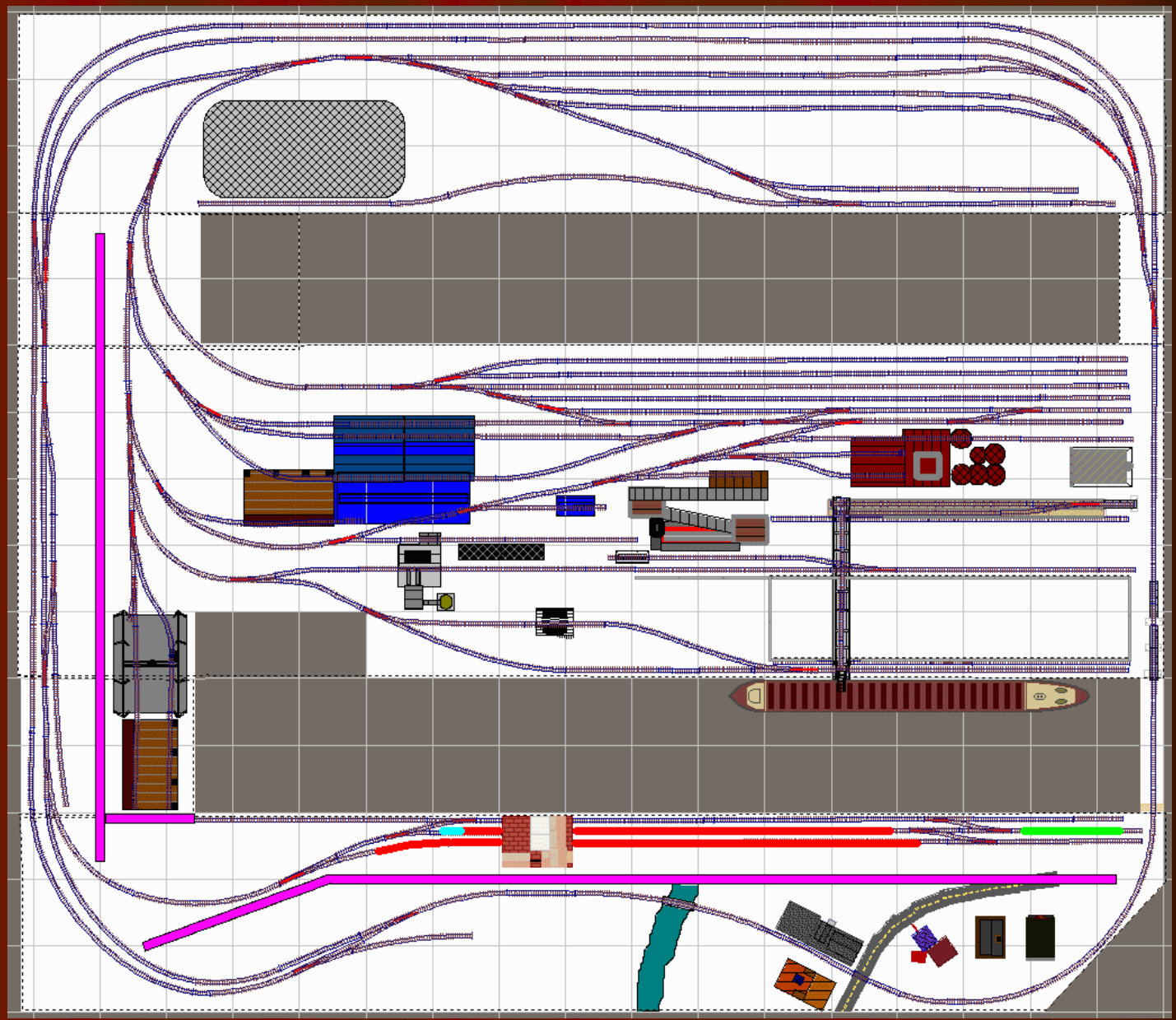


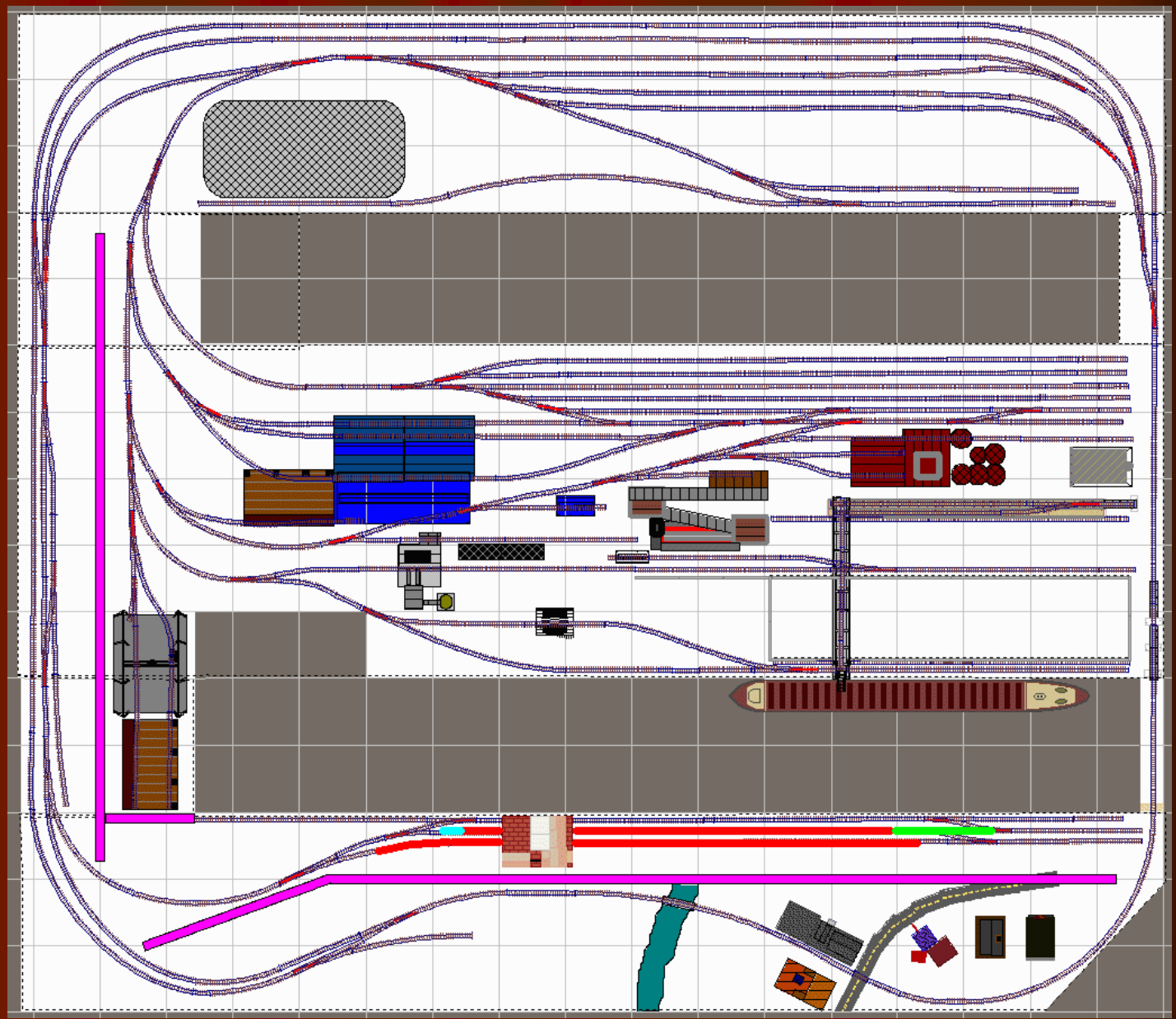


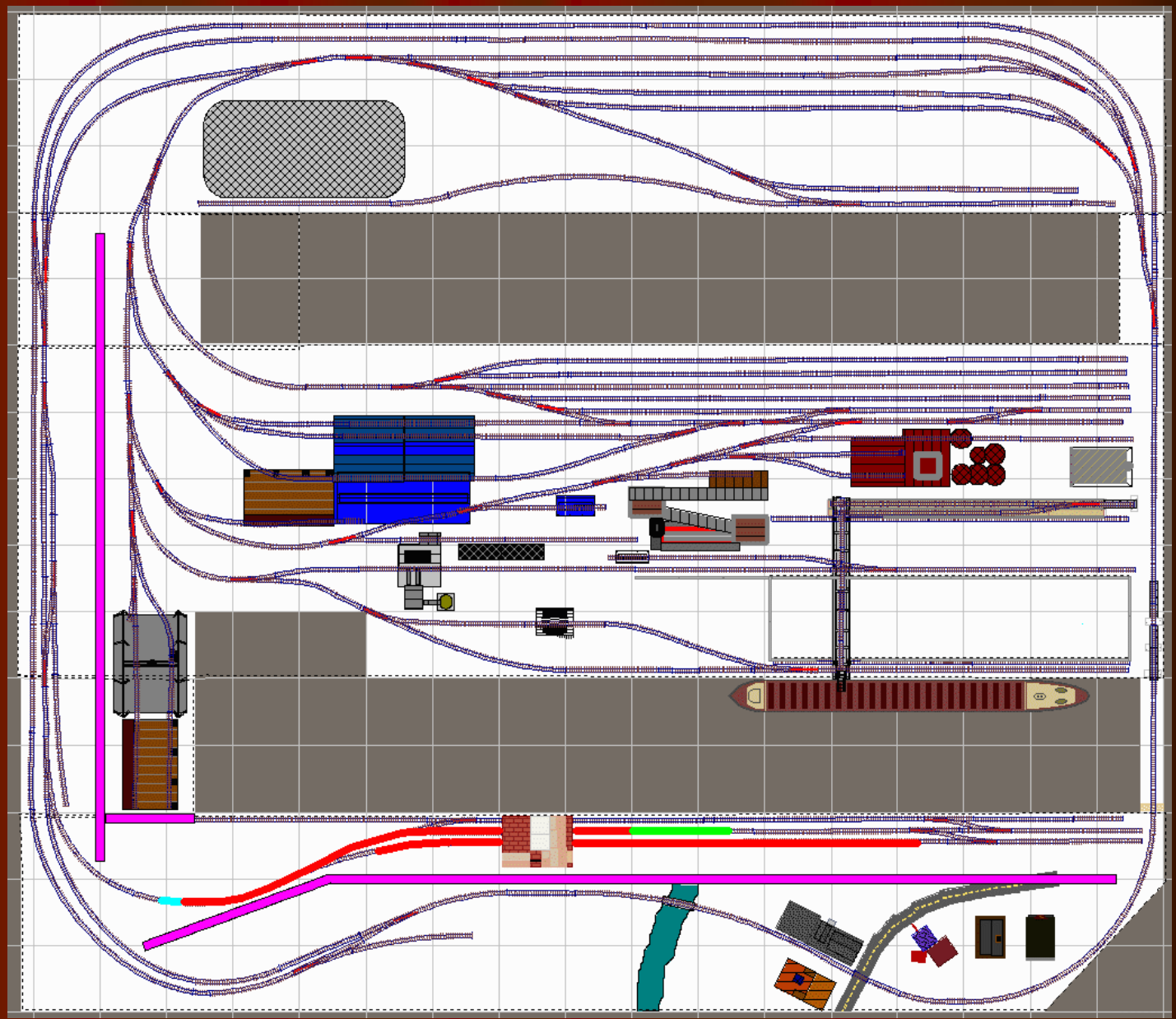


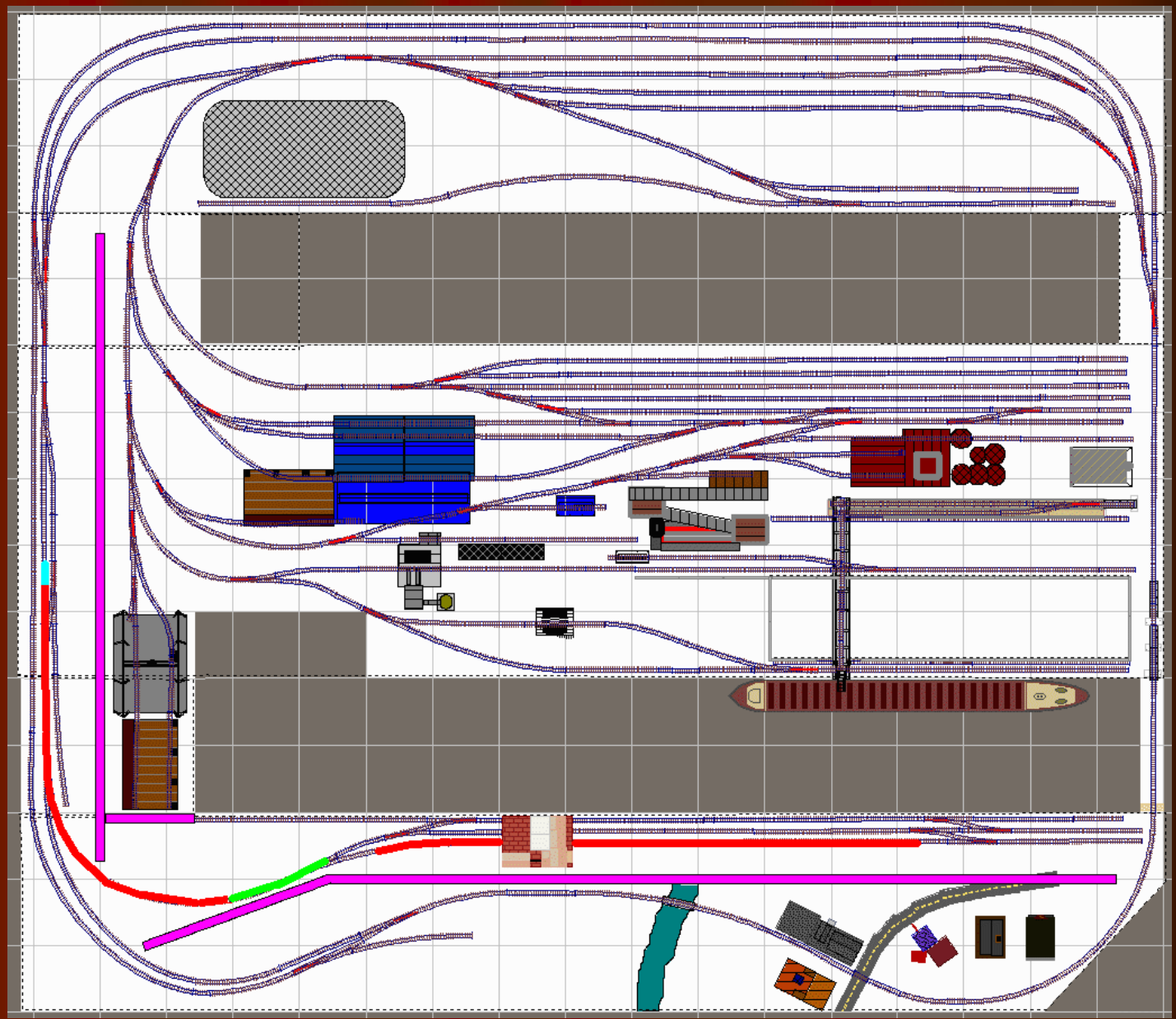


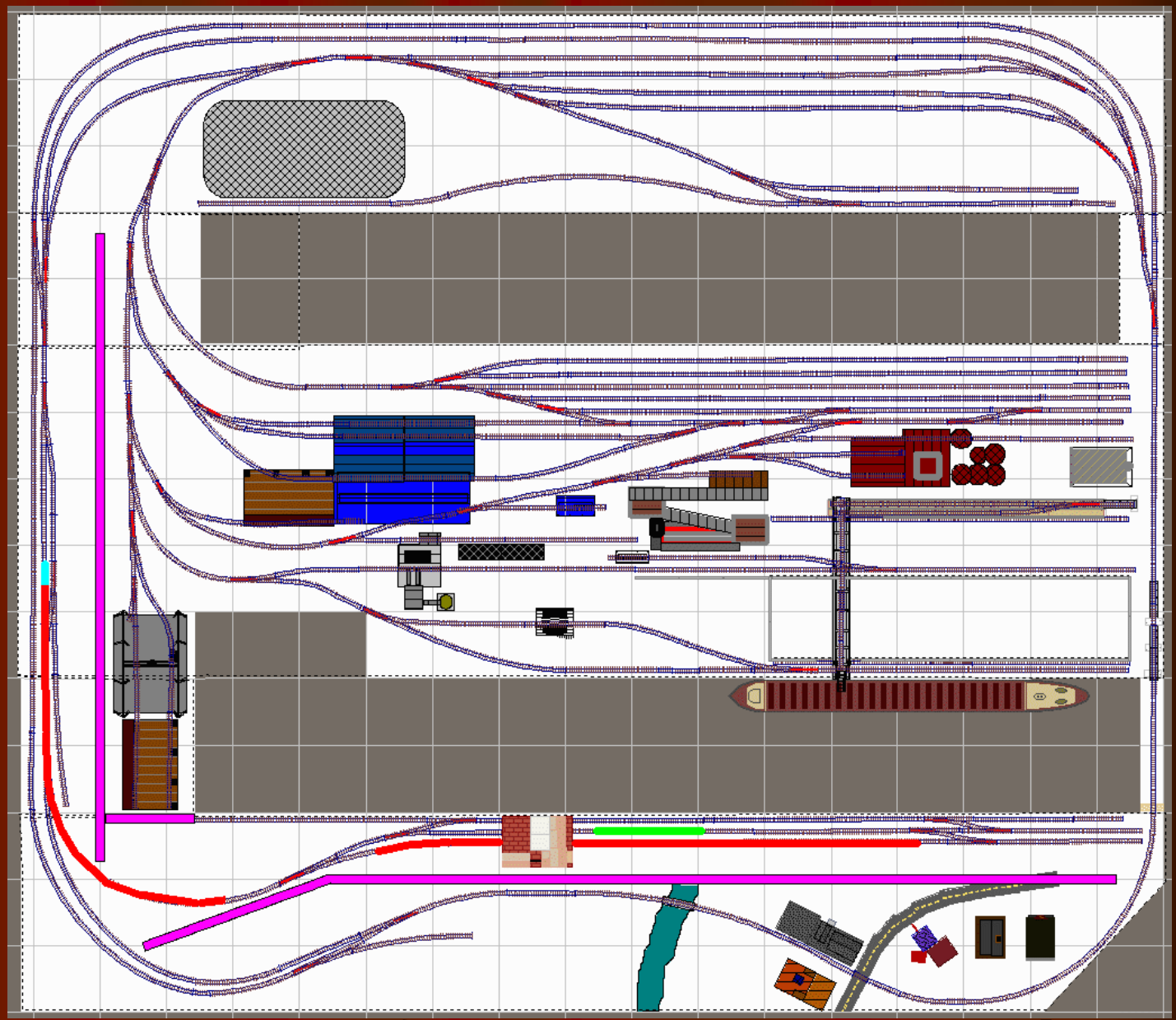


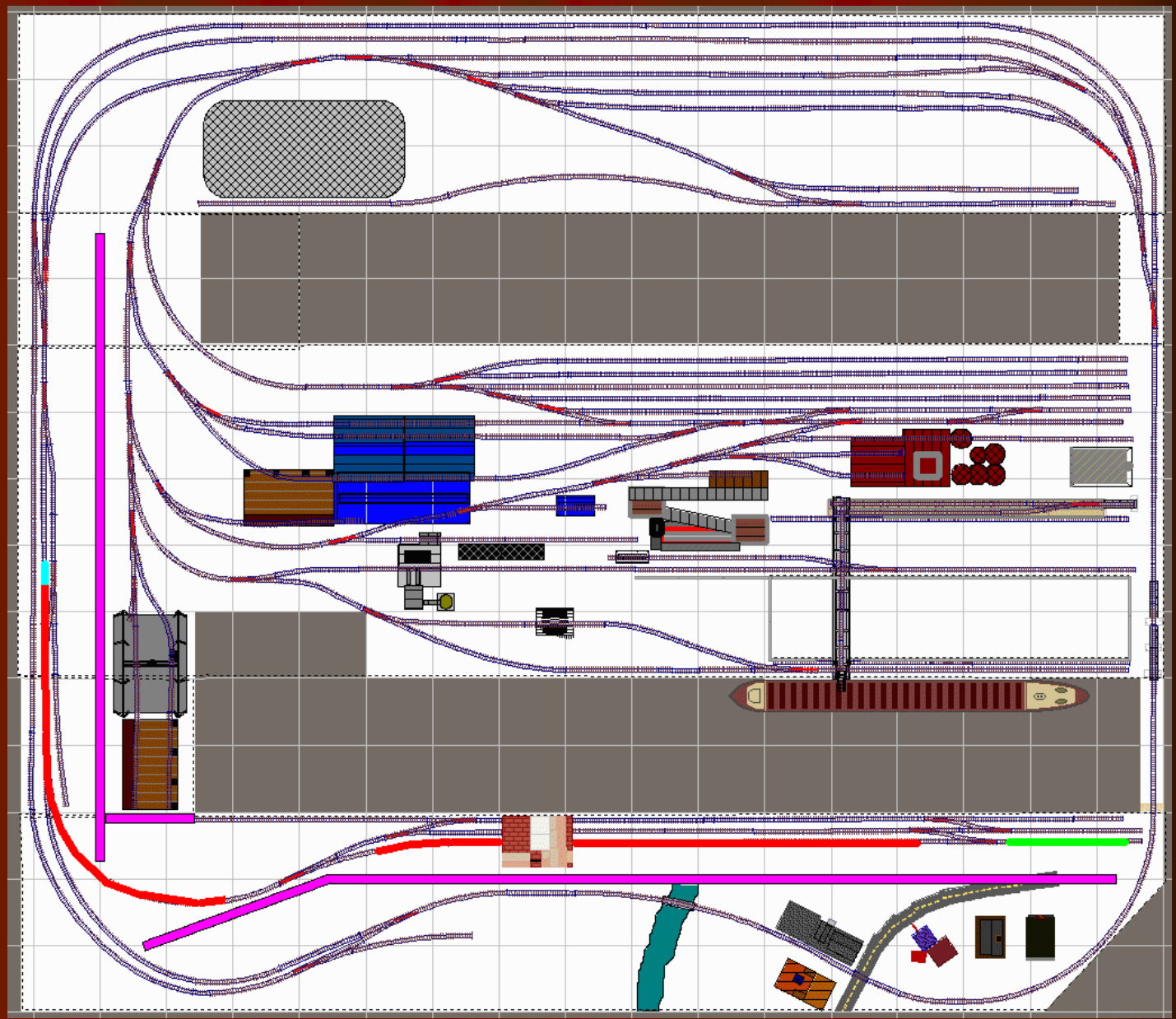


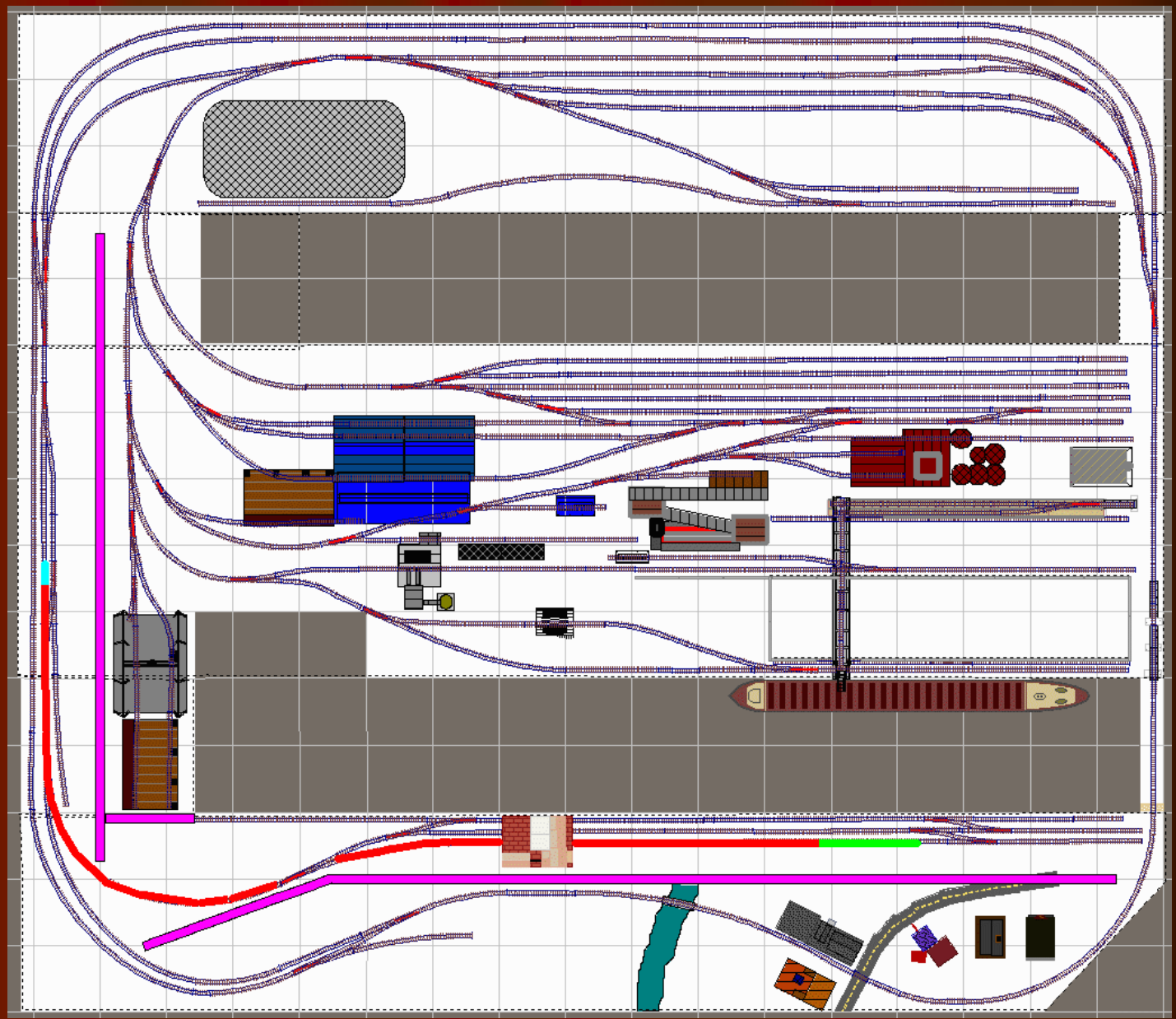


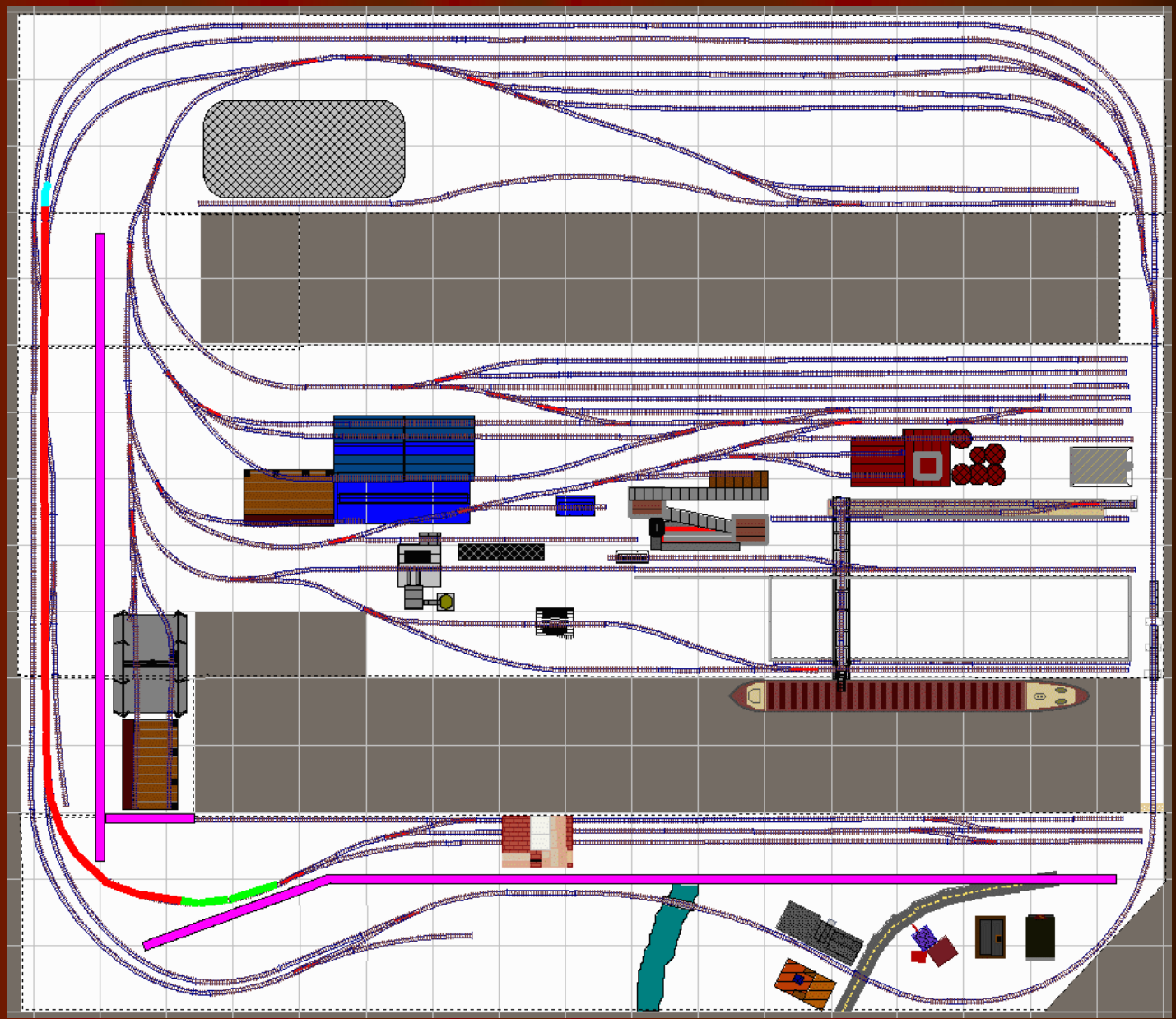


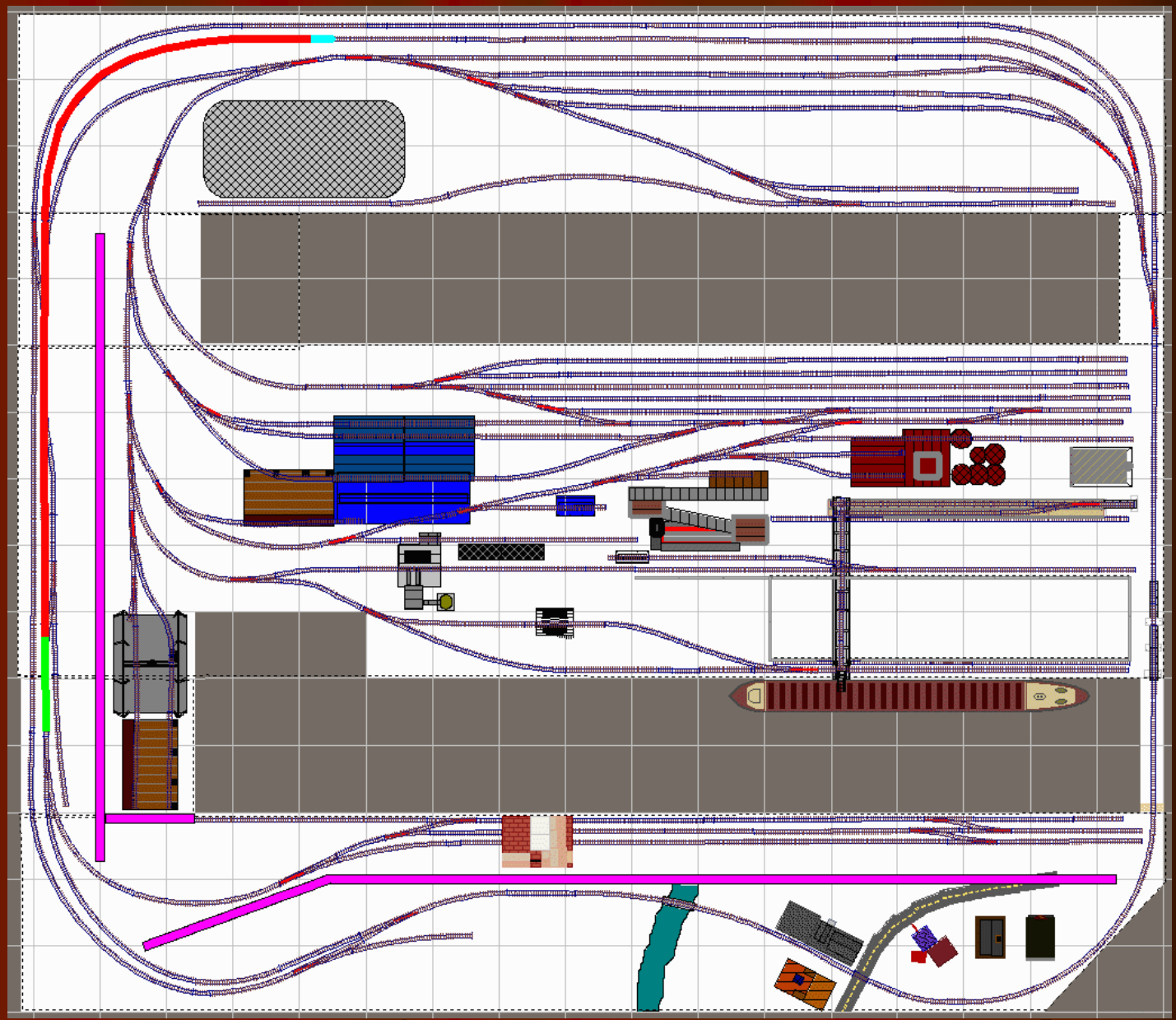


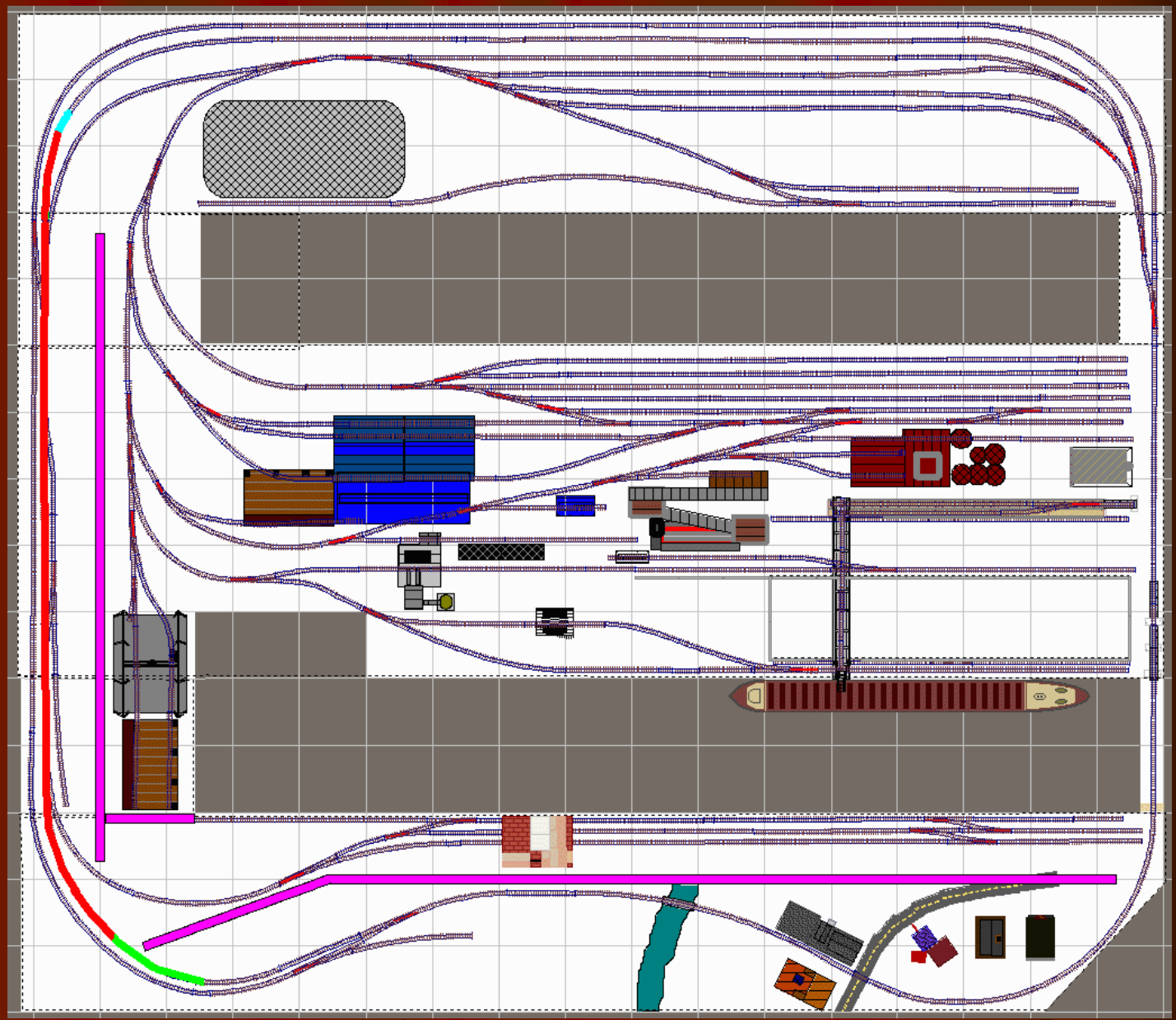


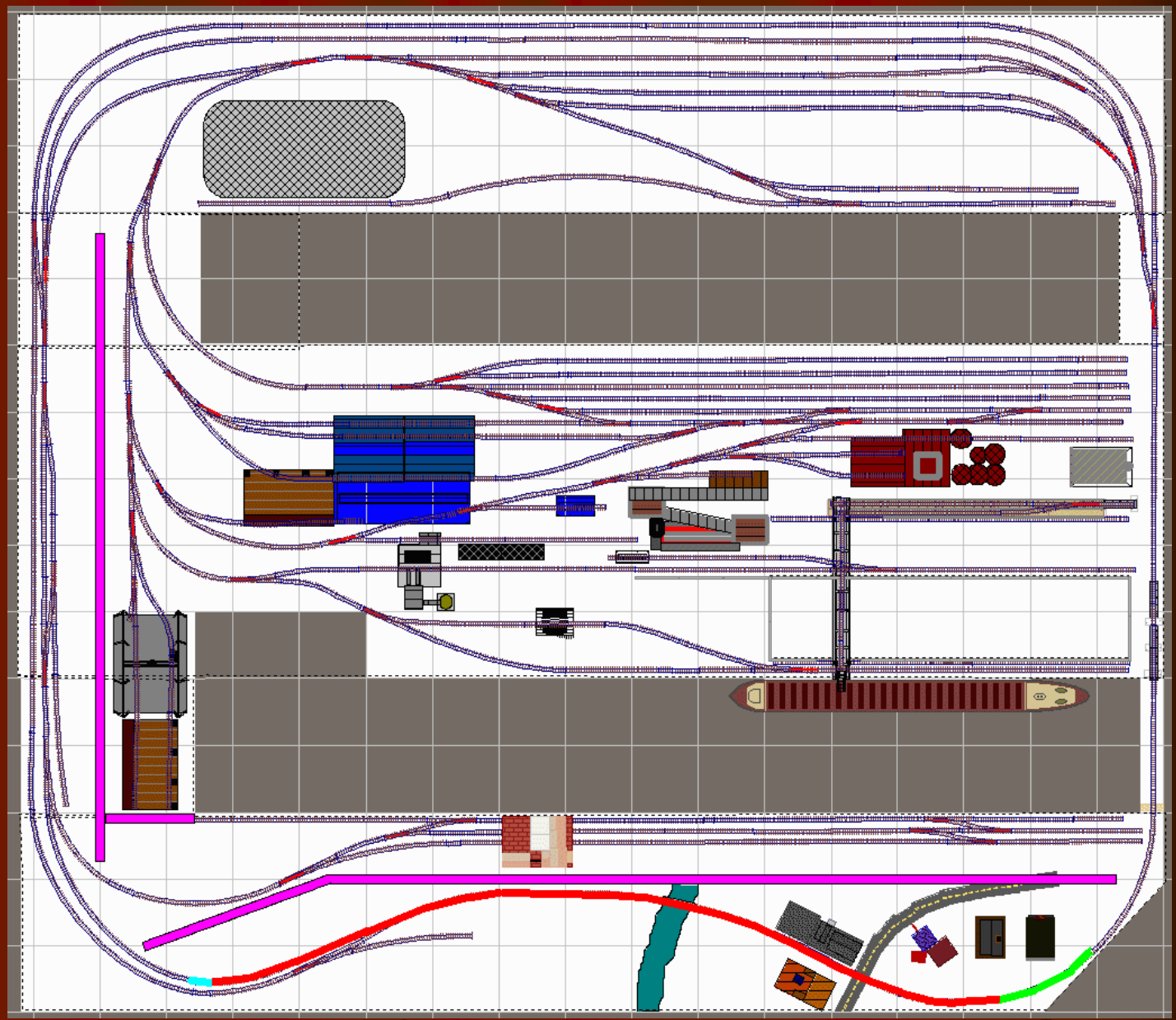


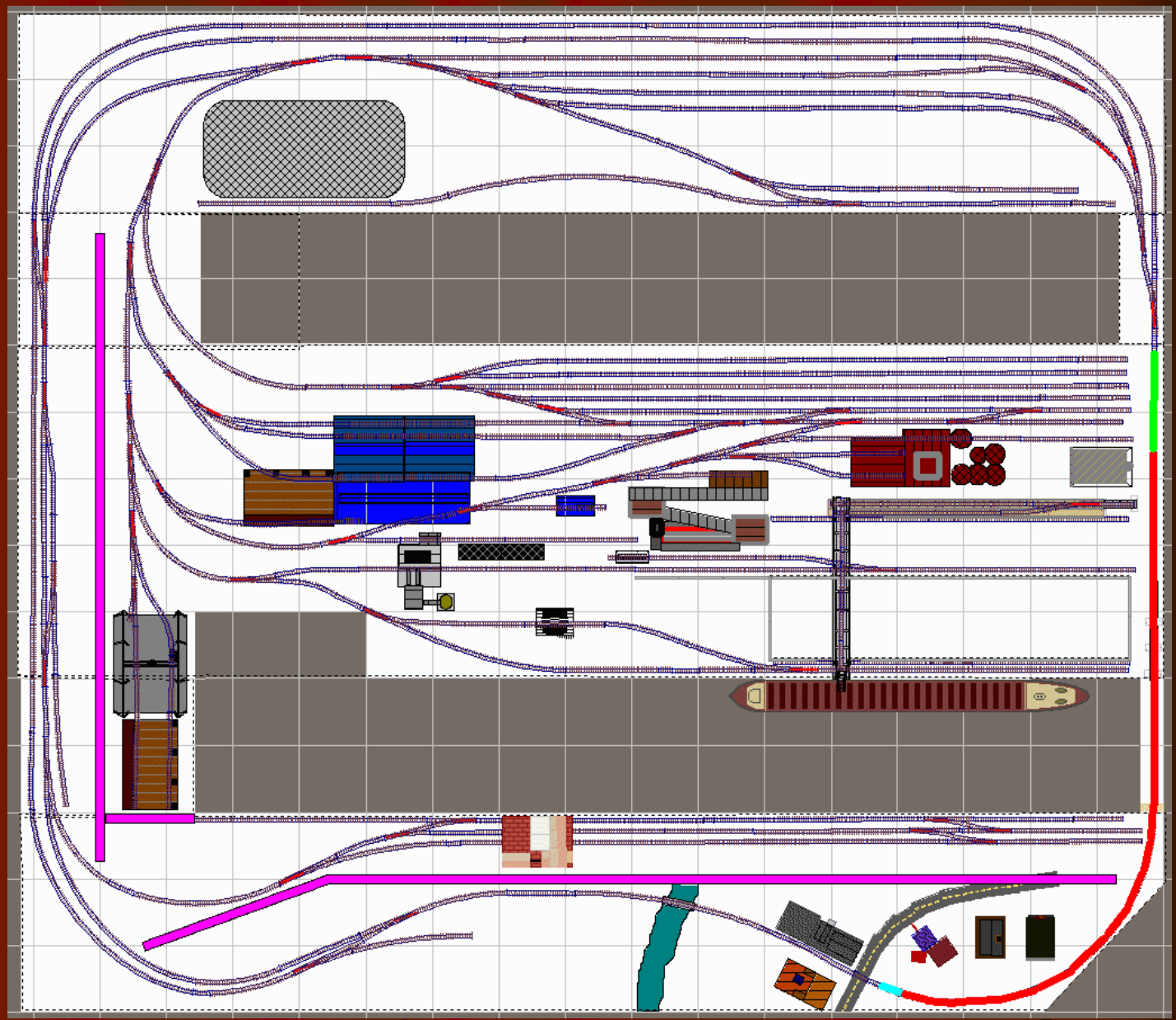


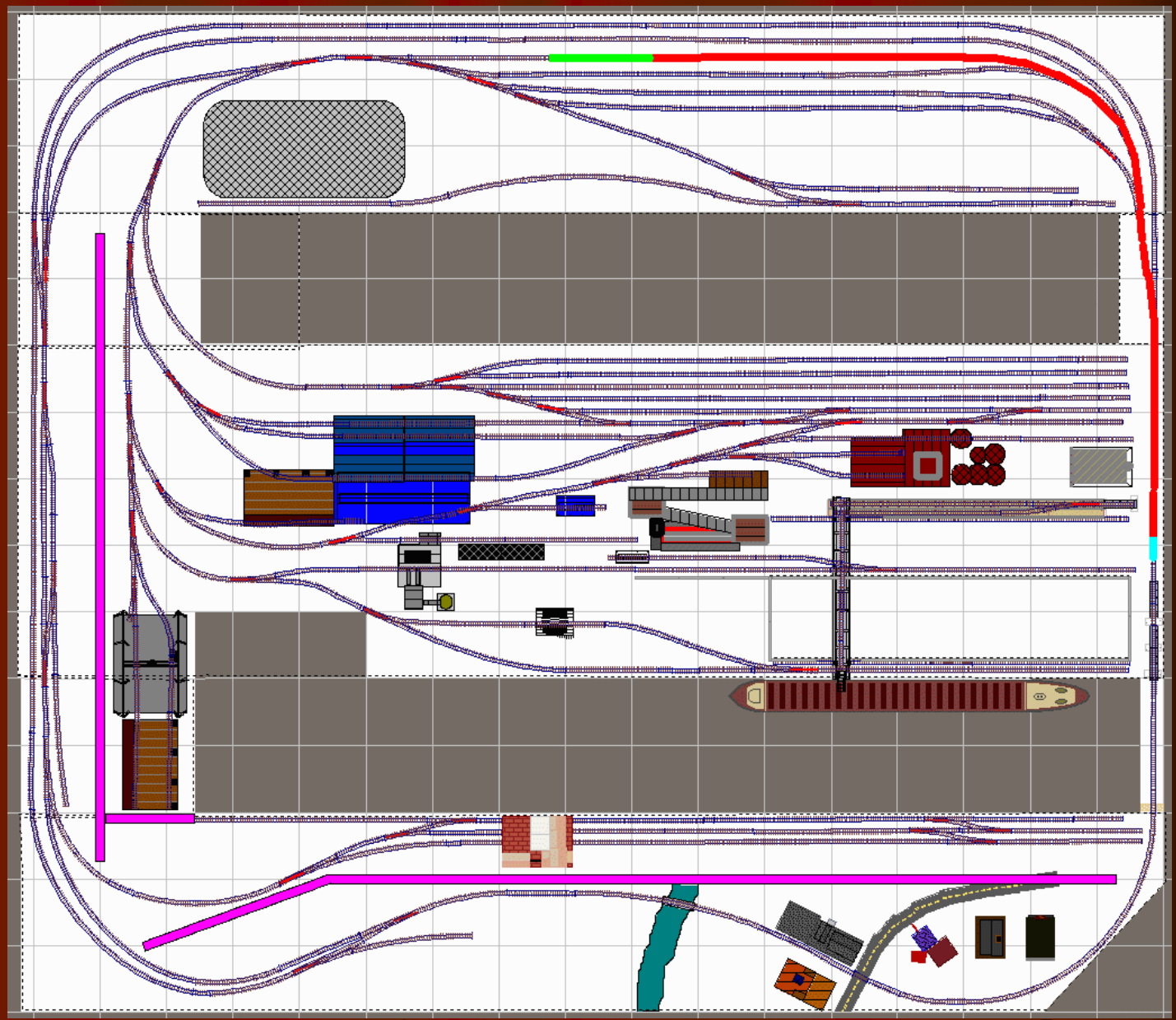


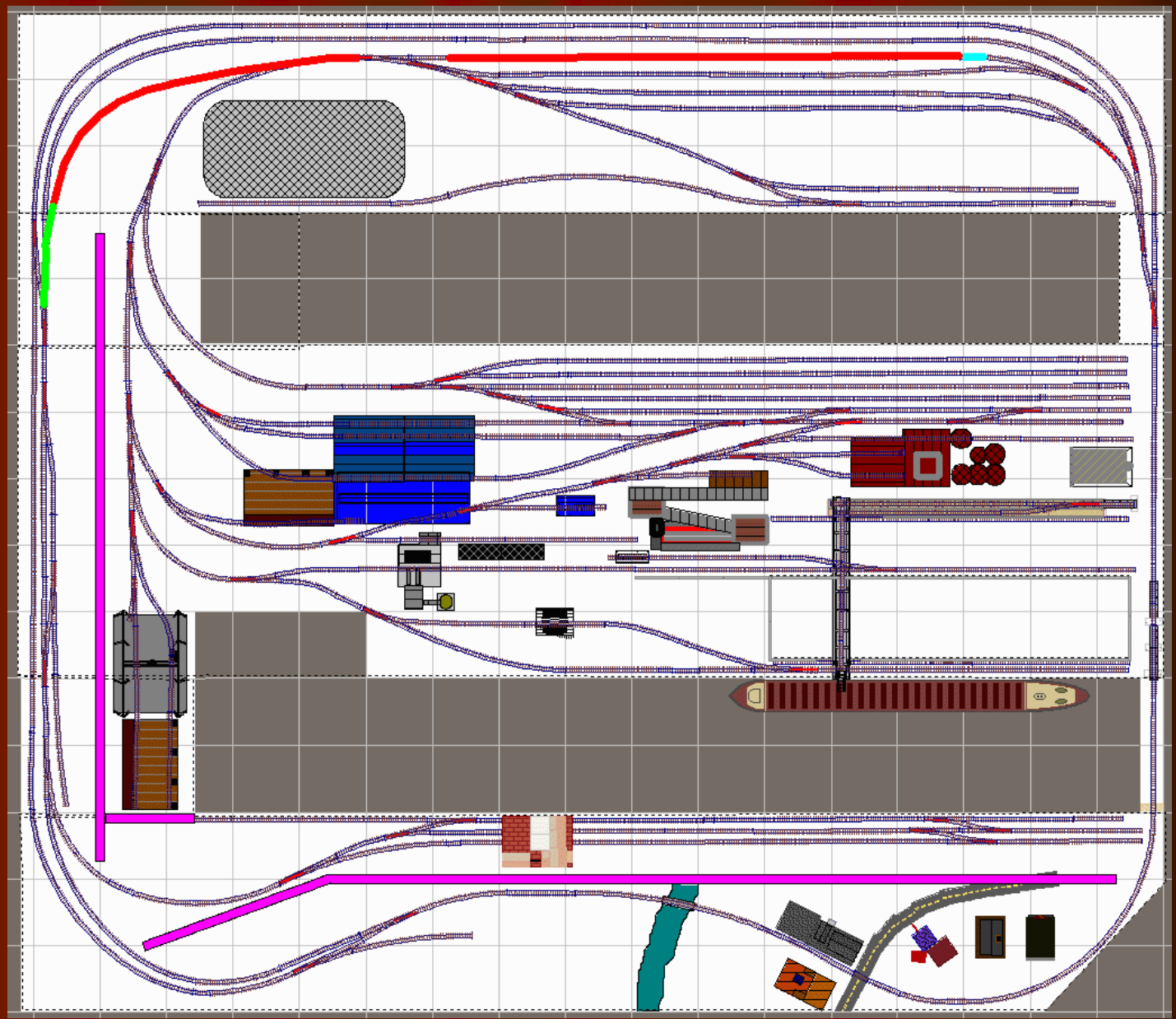


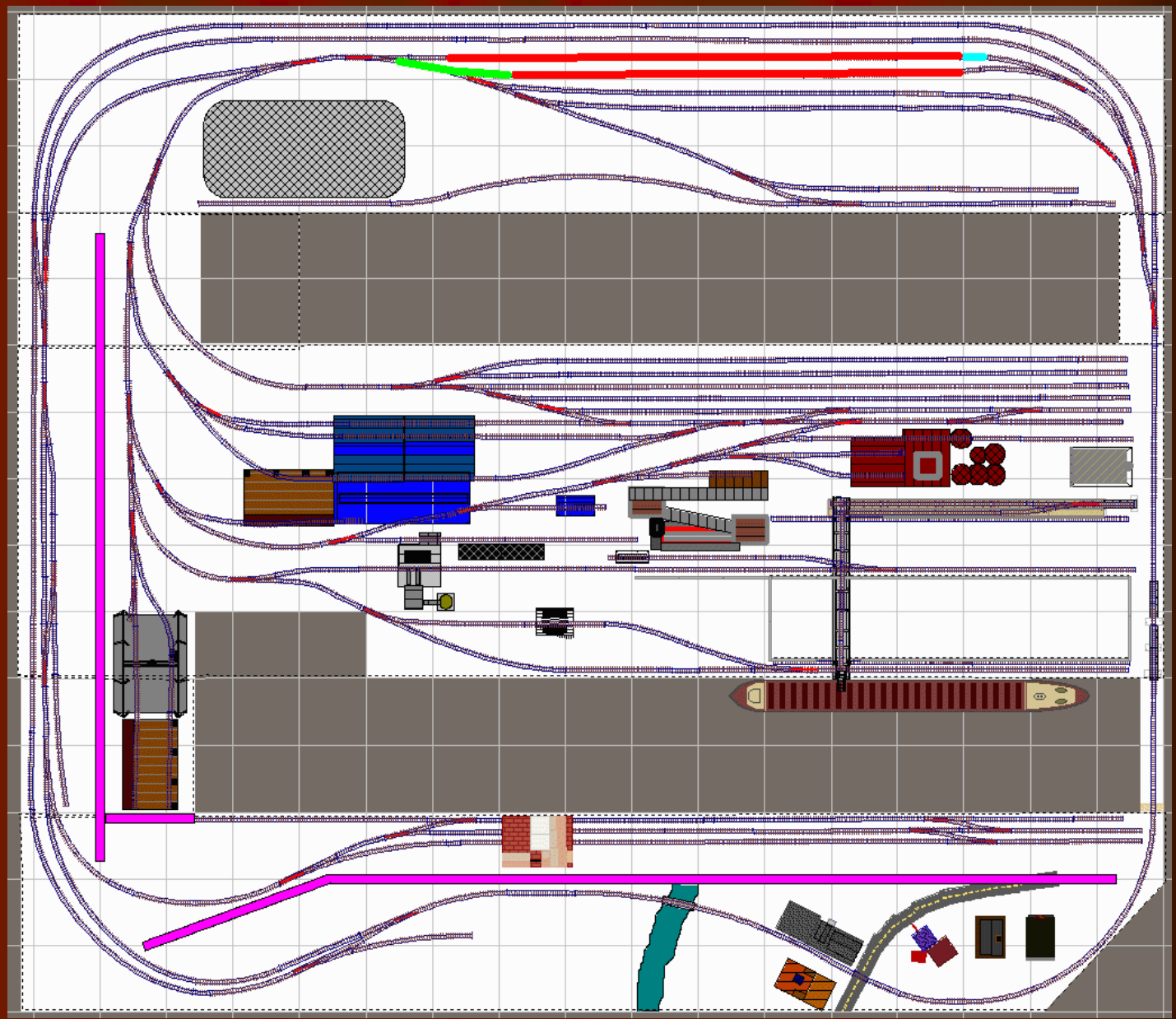


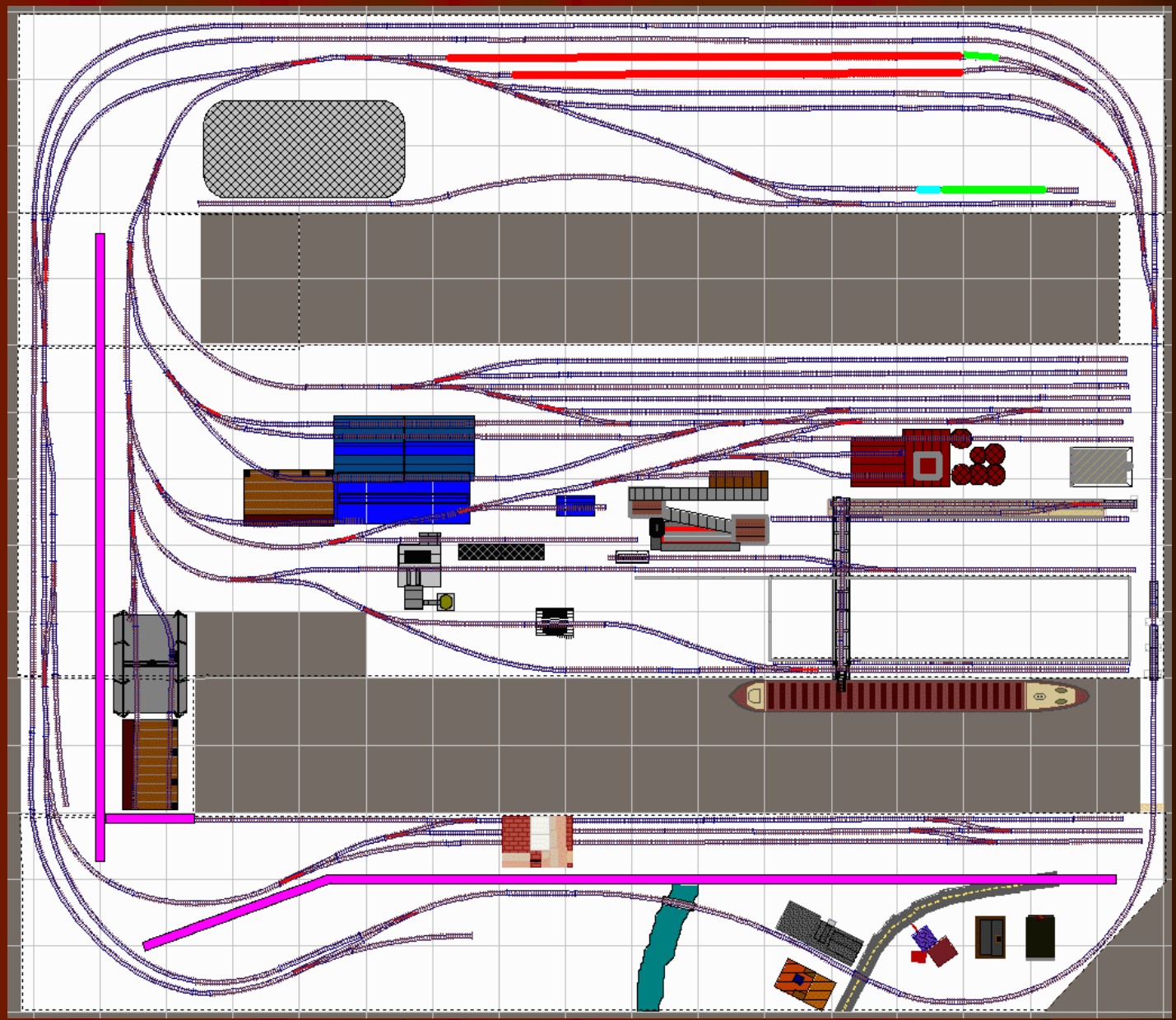


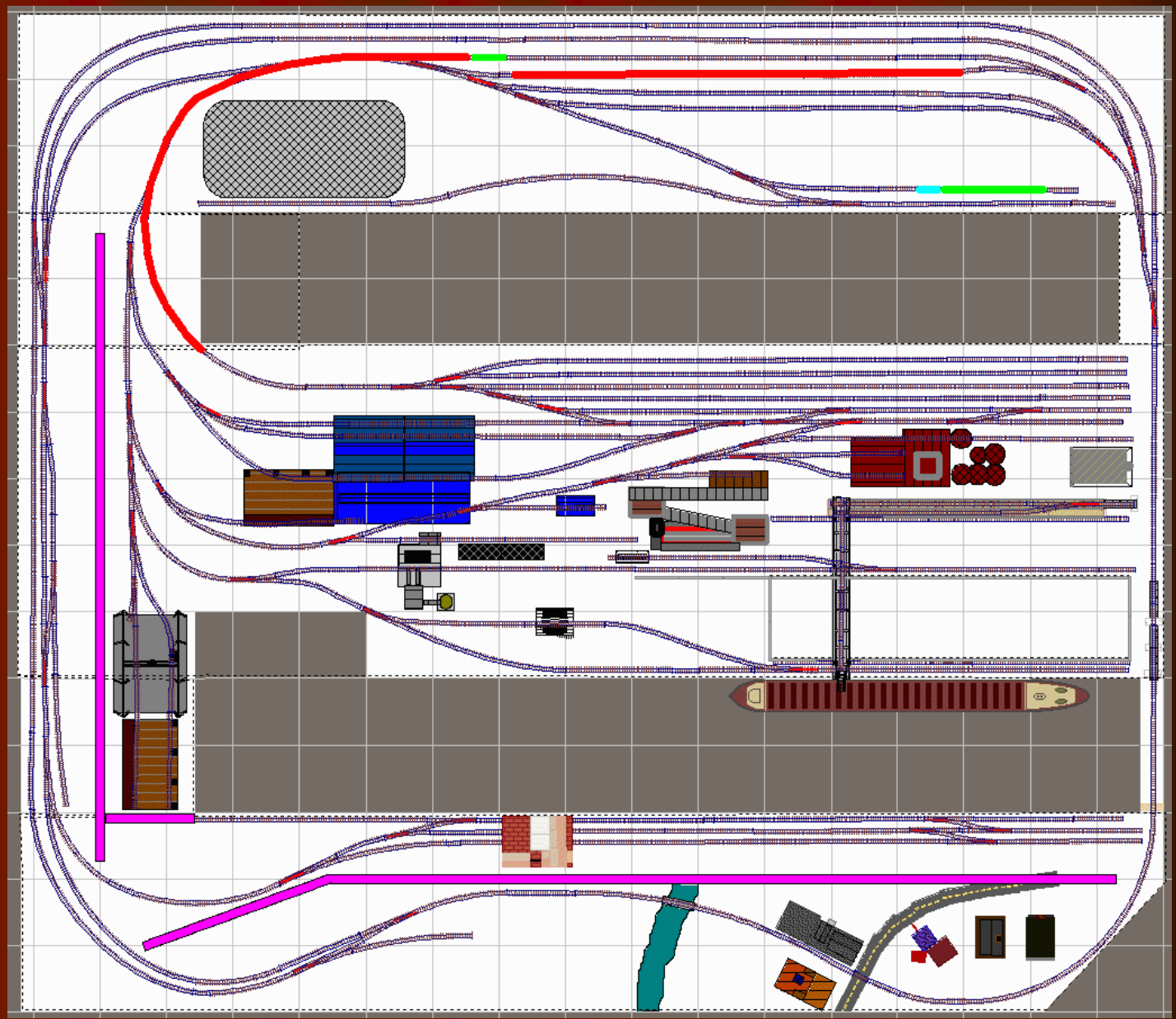


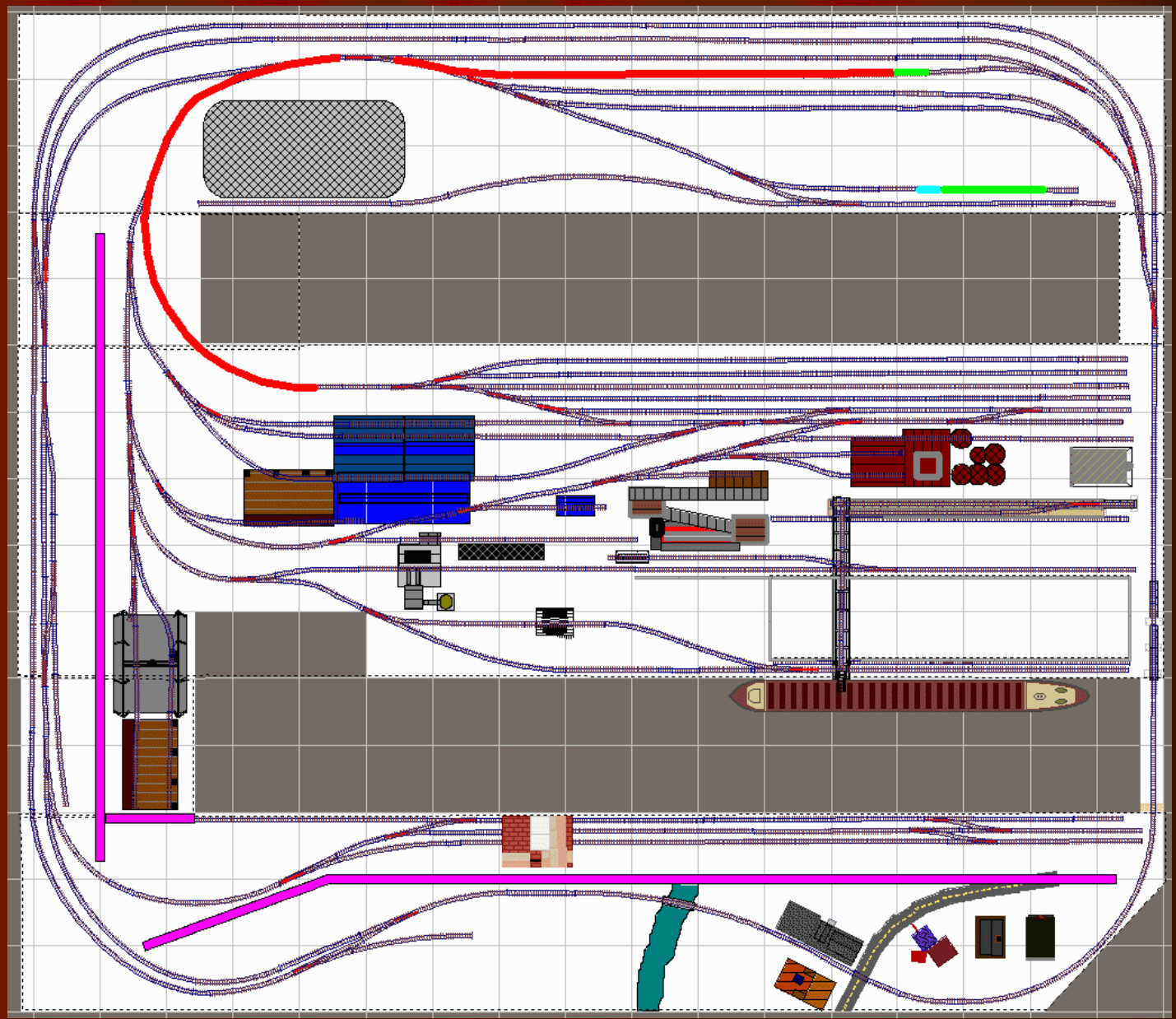


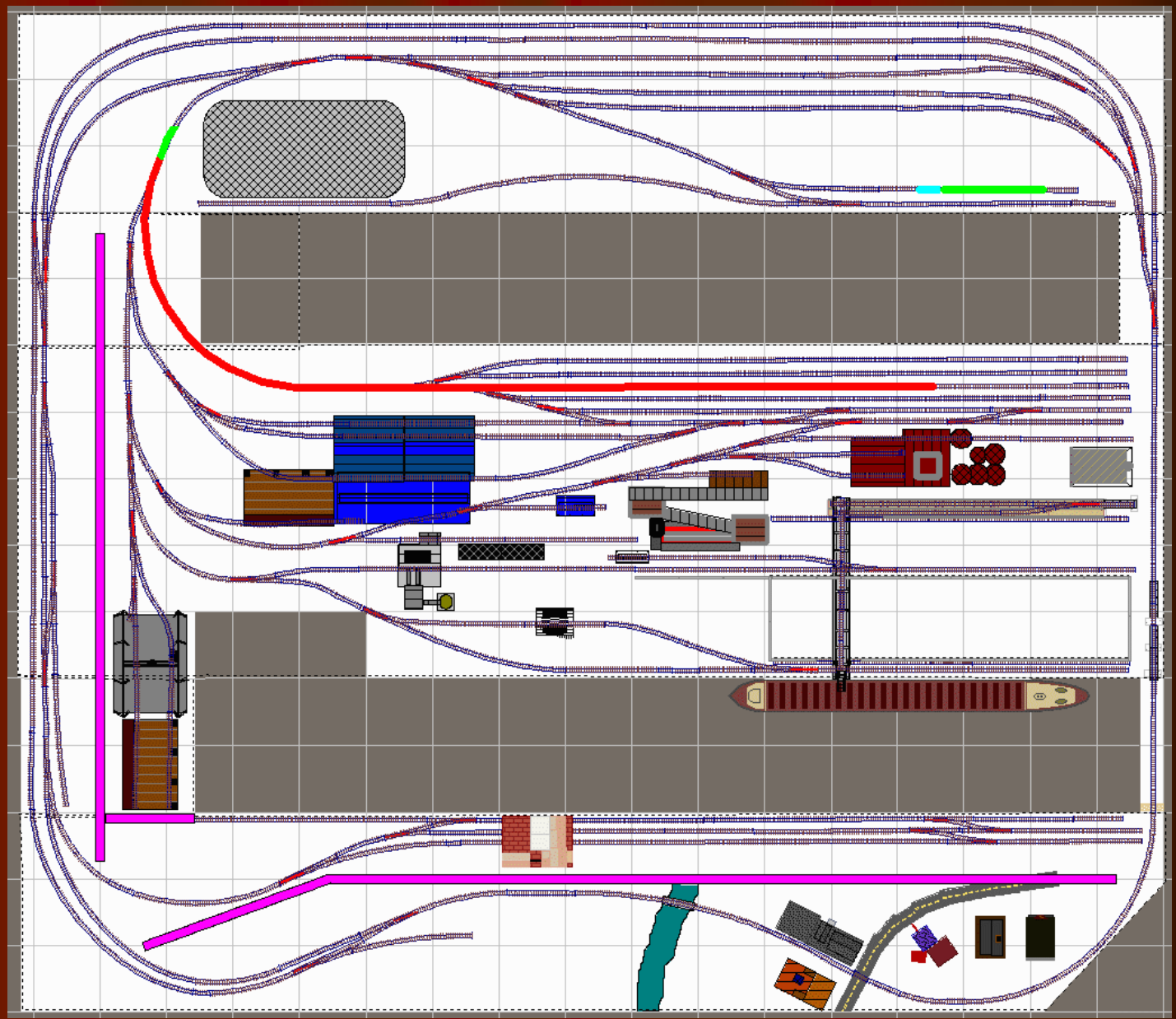


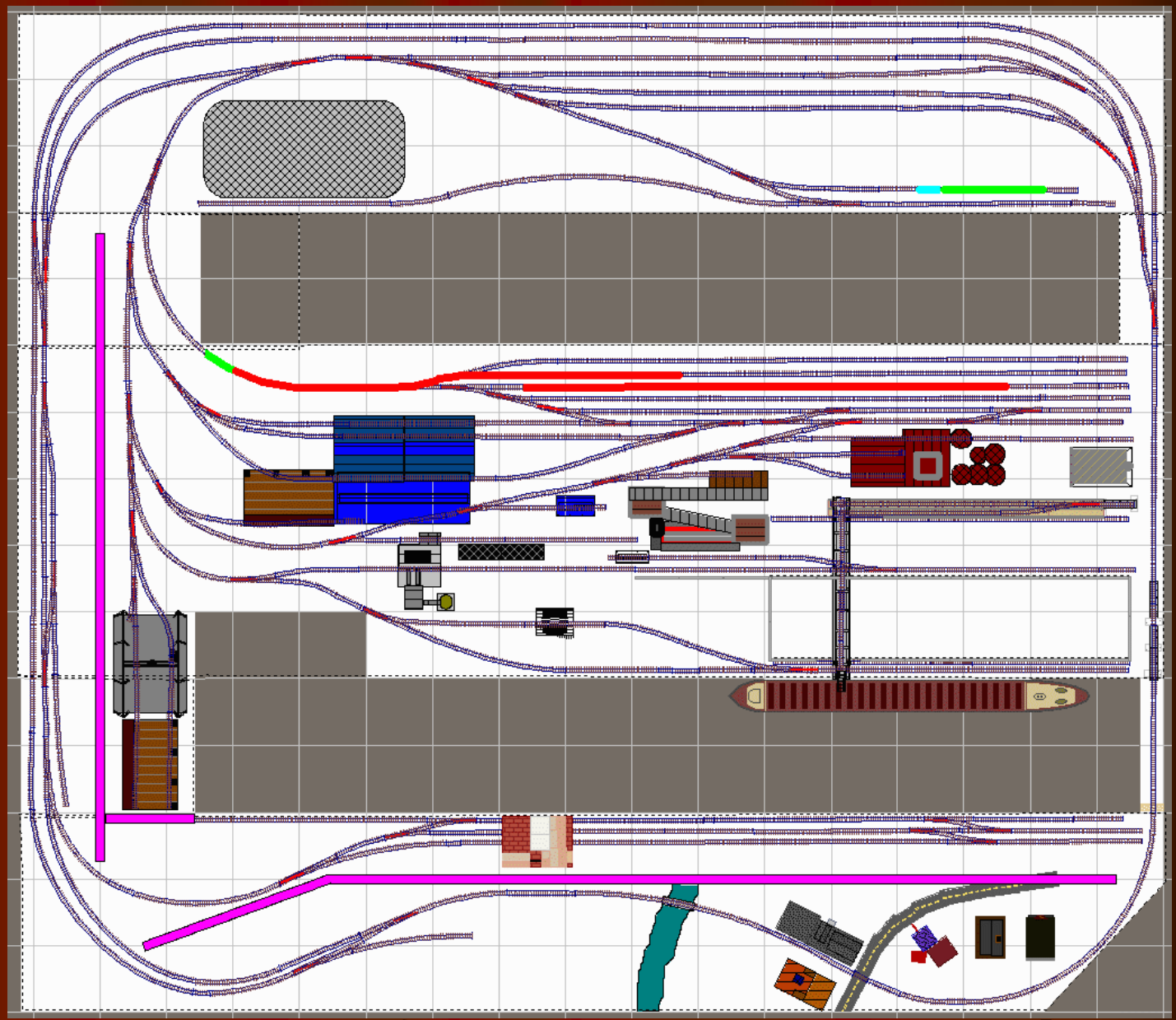


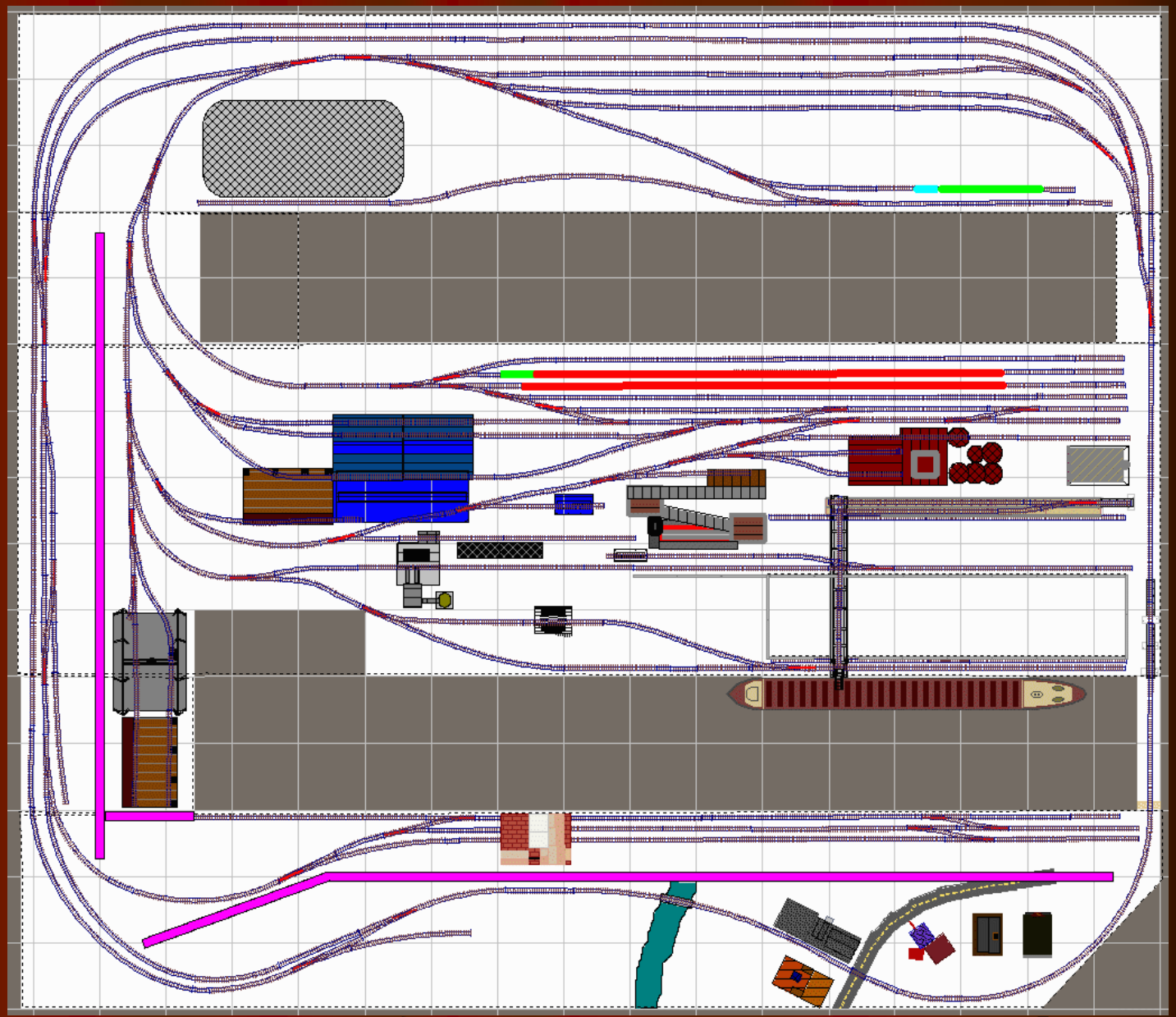




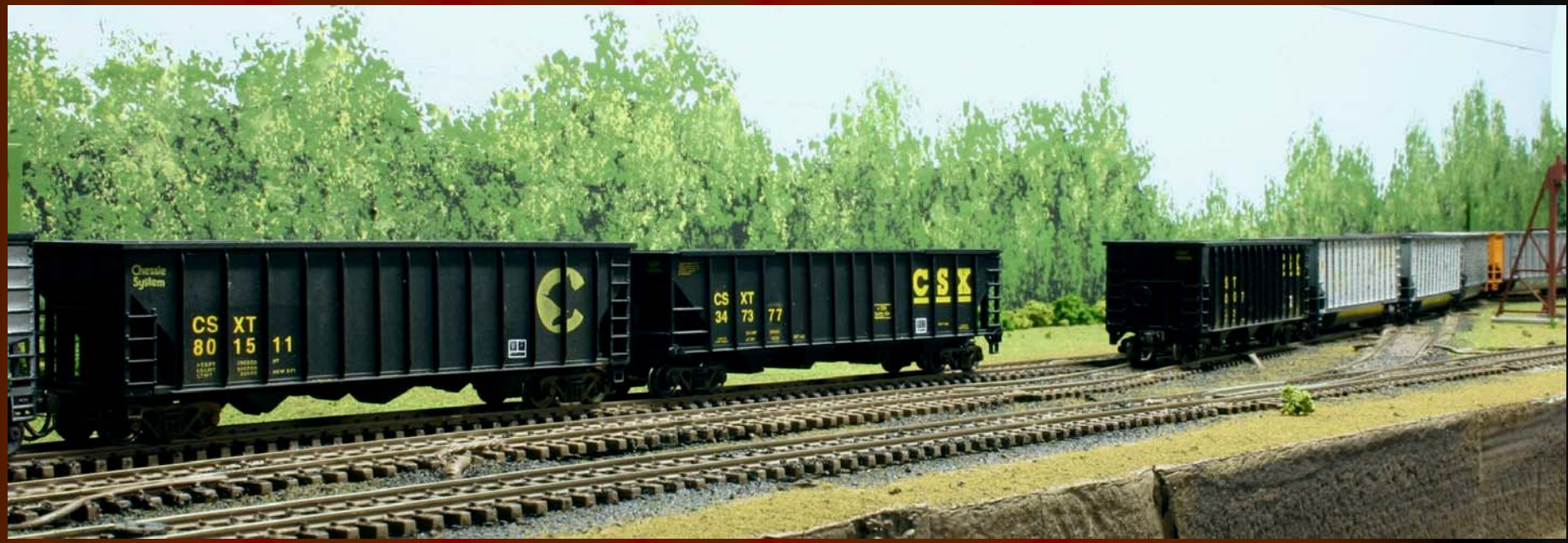








Coal cars arriving at Sabo Mining & Mineral



Iron Belt SD38-2's at Sabo Mining

Iron Belt SD38-2's at Sabo Mining

Pushing out a loaded train at Sabo

Passing through East Minister - Northbound

Arrival at staging yard

Plant switcher moving coal cars out of staging

Operating Scenario 1, Part B:

Yard to Coke Ovens

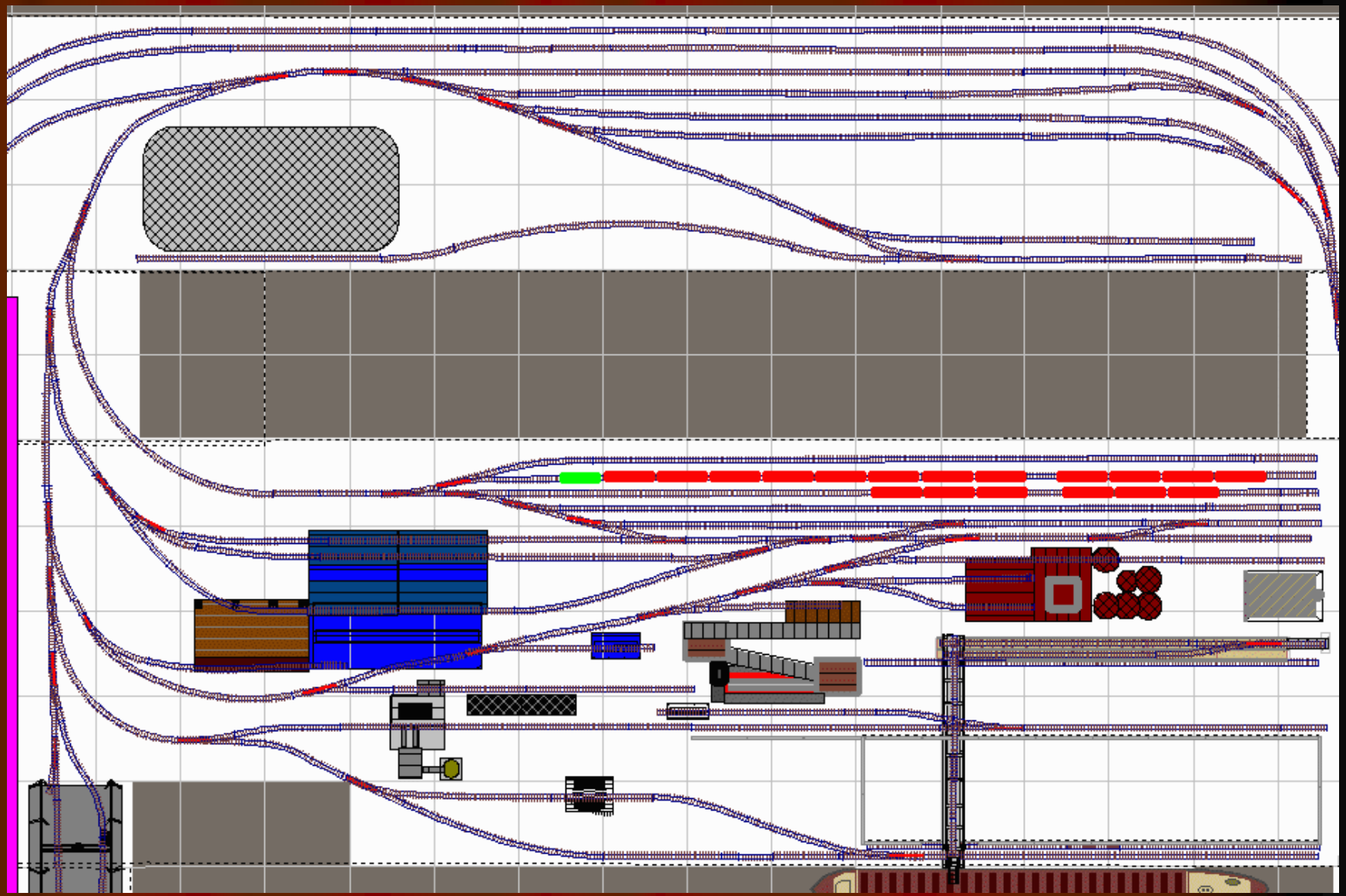
KEY:

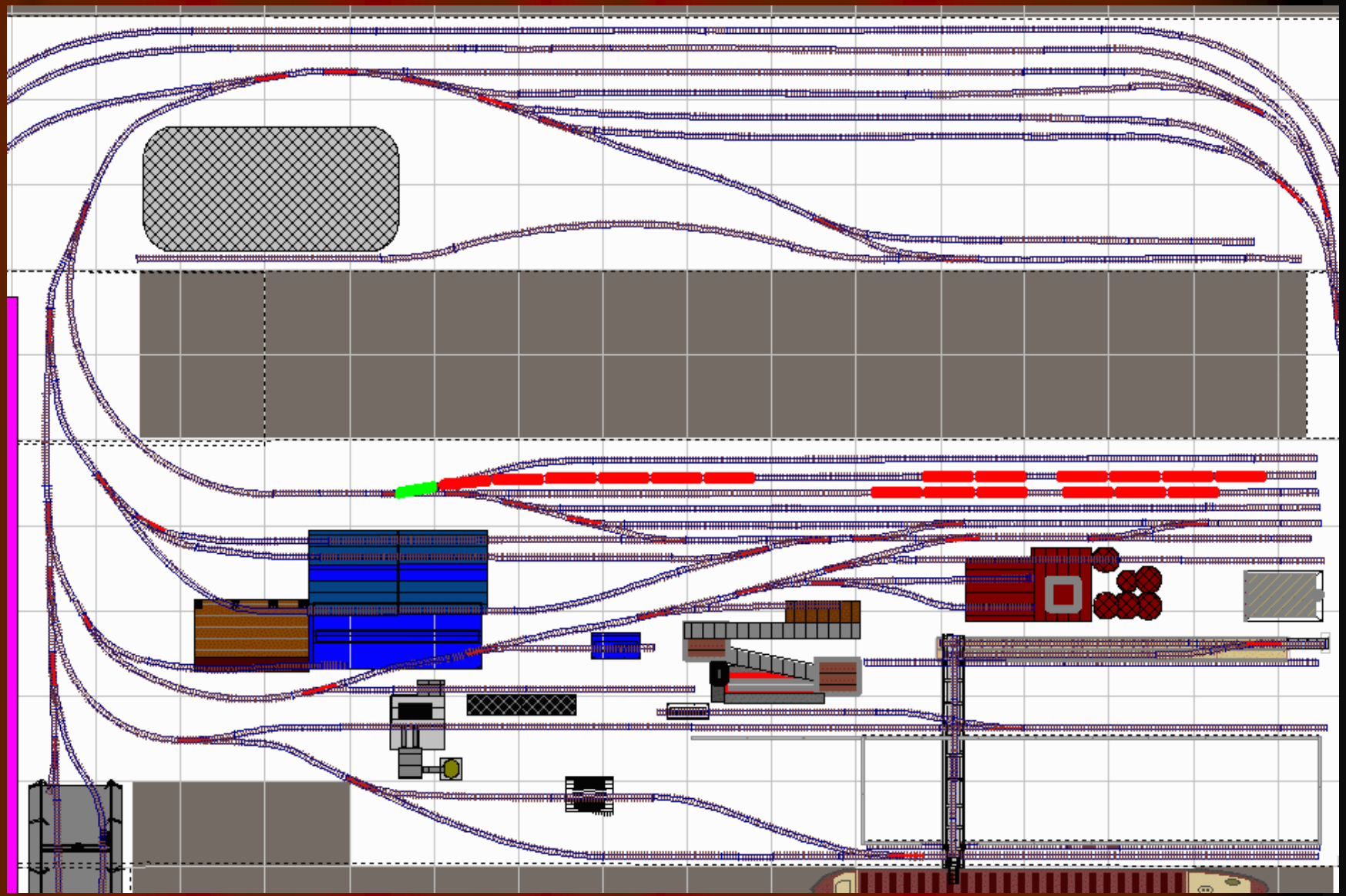
--- Locomotive

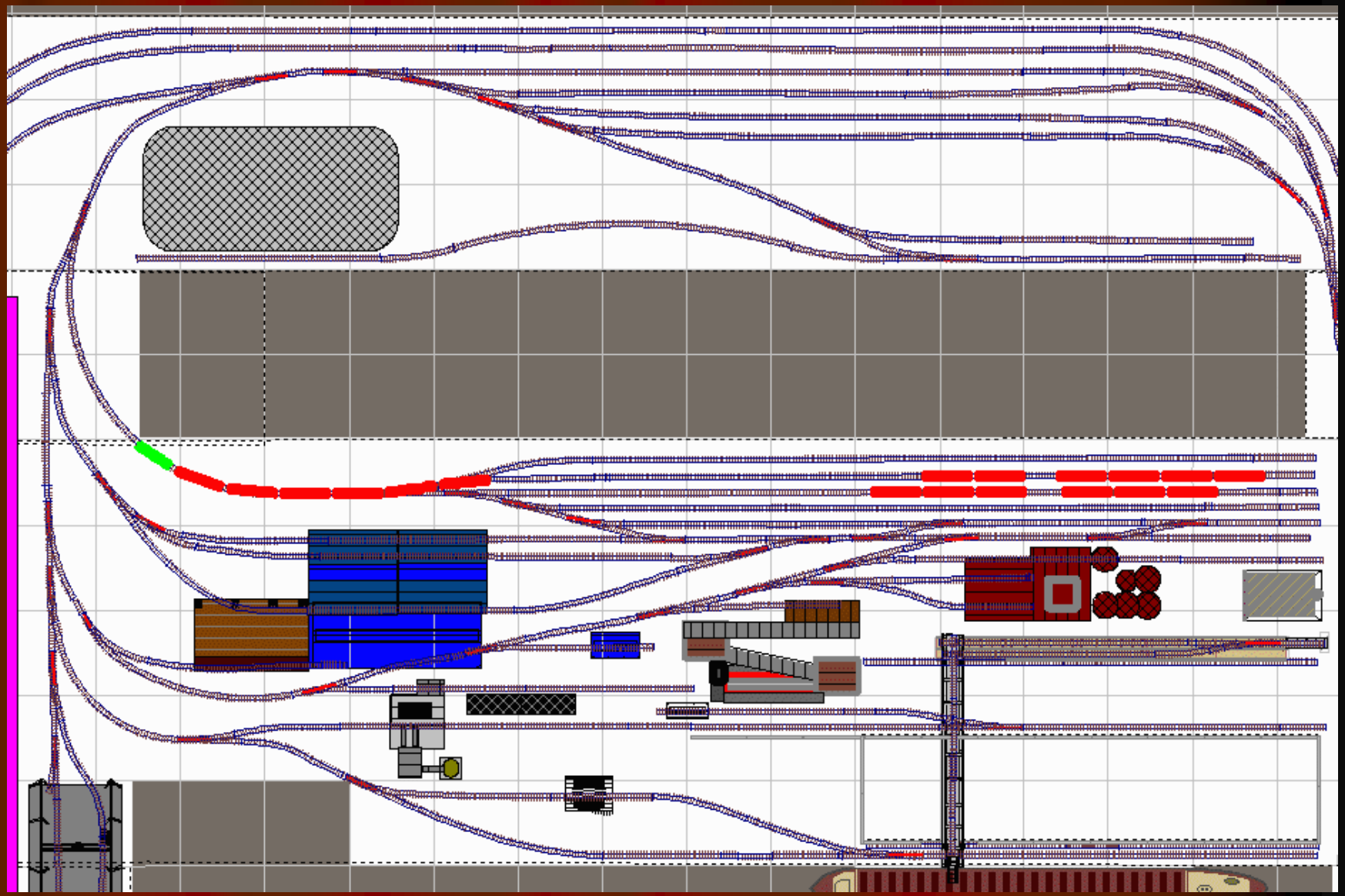
--- Coal Hopper or BethGon

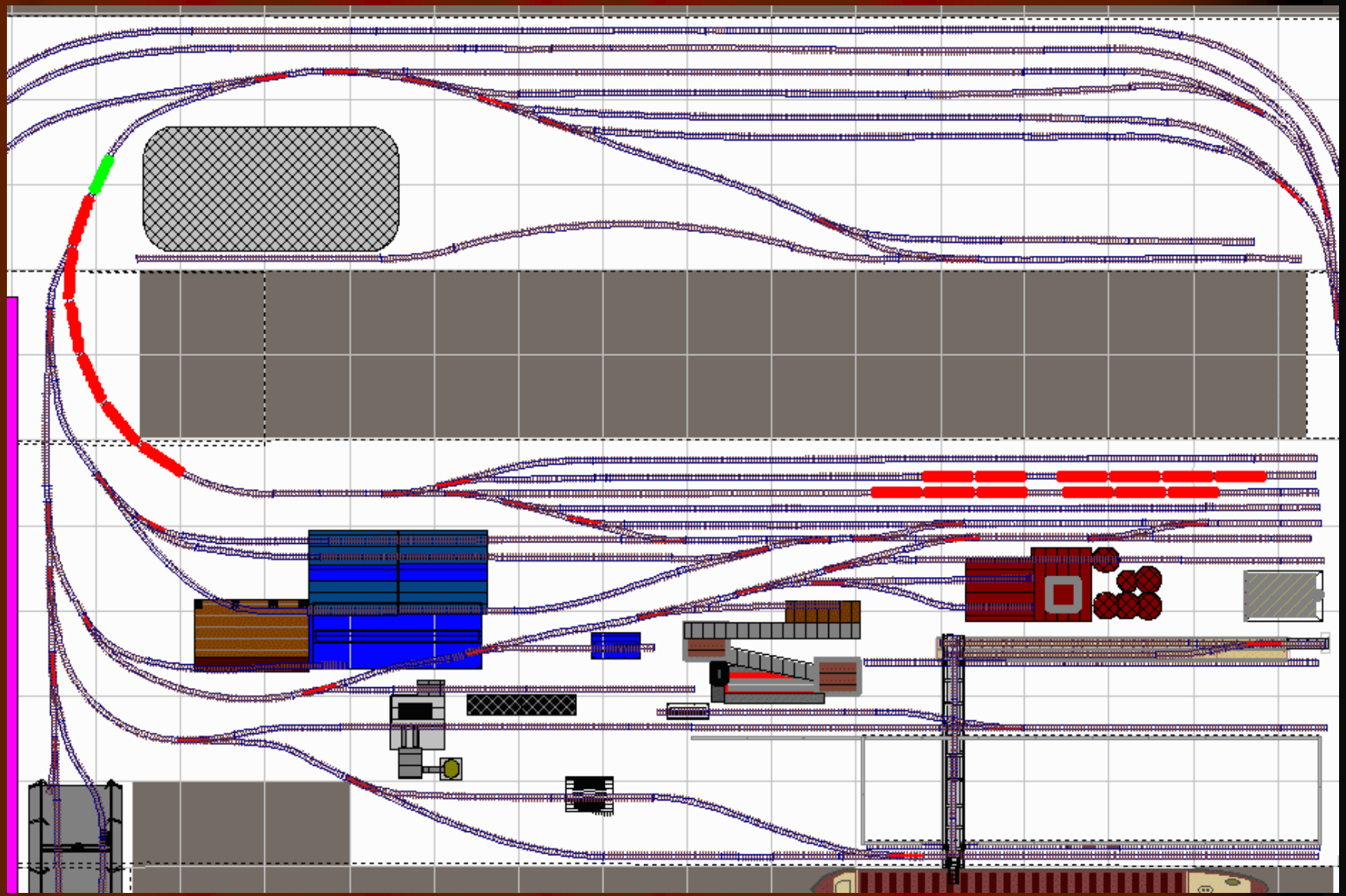
<u>NOTE</u>: For train movement diagrams to function smoothly, please shrink your display until the *entire slide* fits within 1 screen without the need for scroll bars.

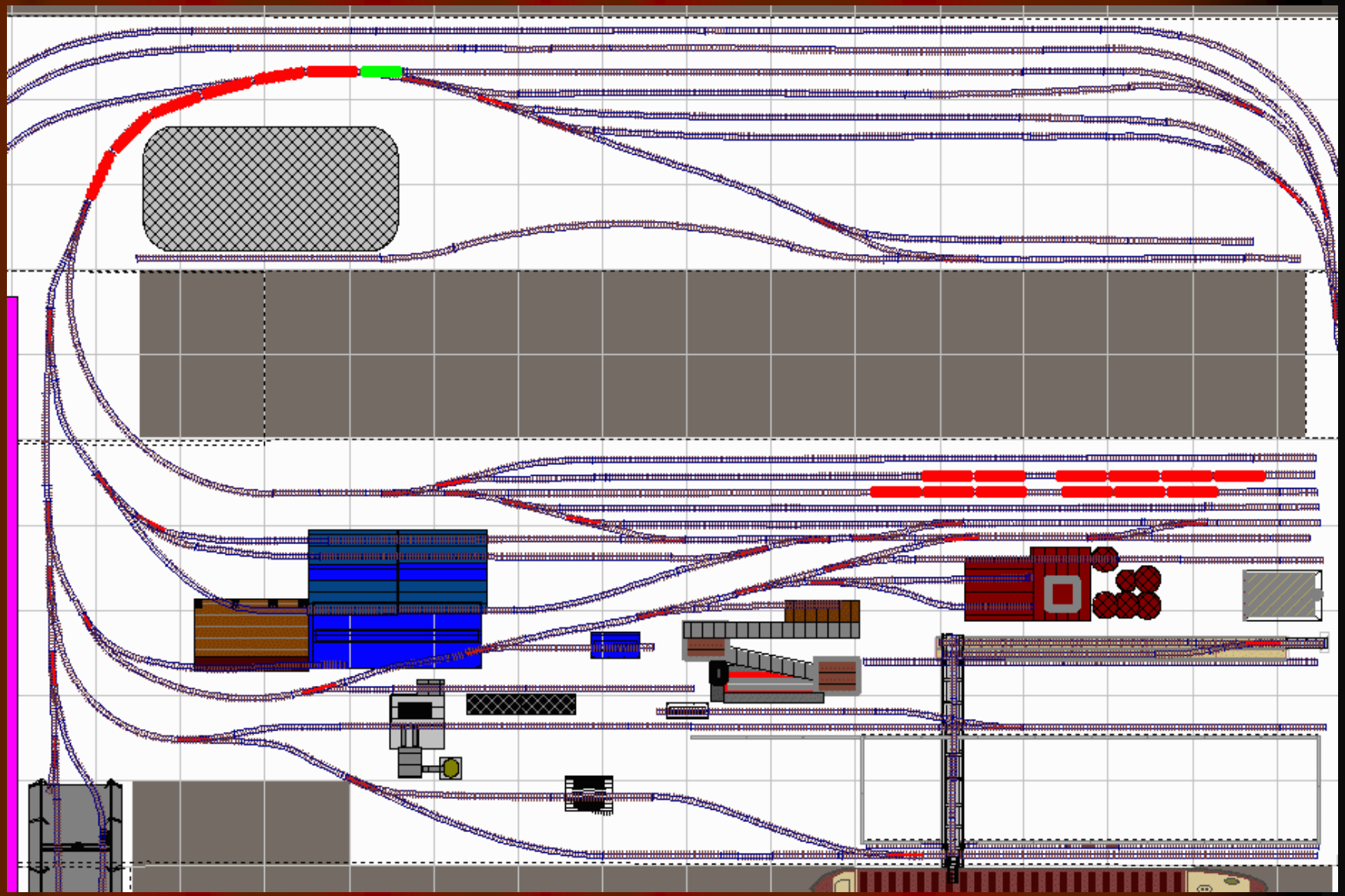
Use *Page-Dn* and *Page-Up* keys to navigate between slides.

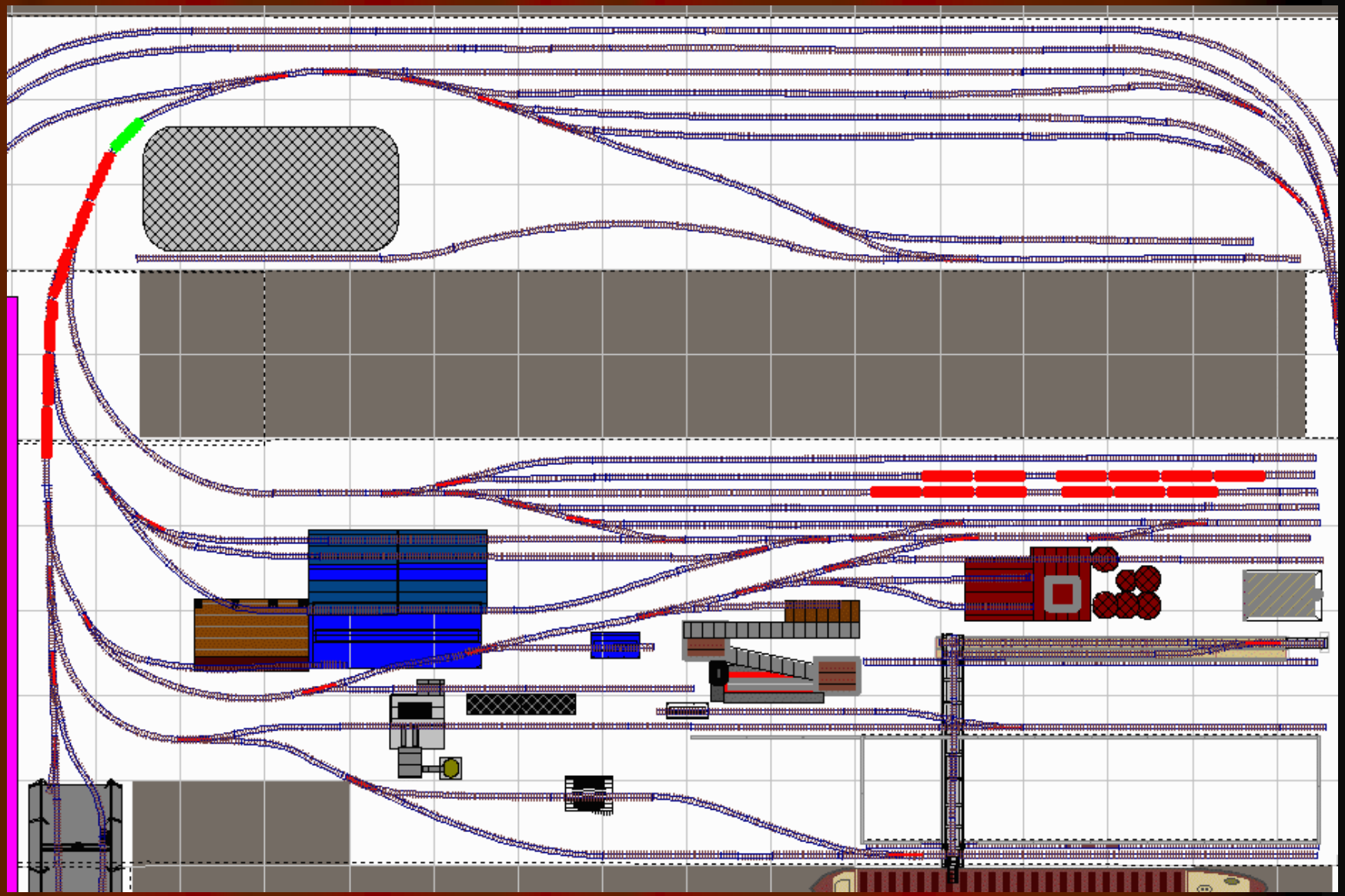


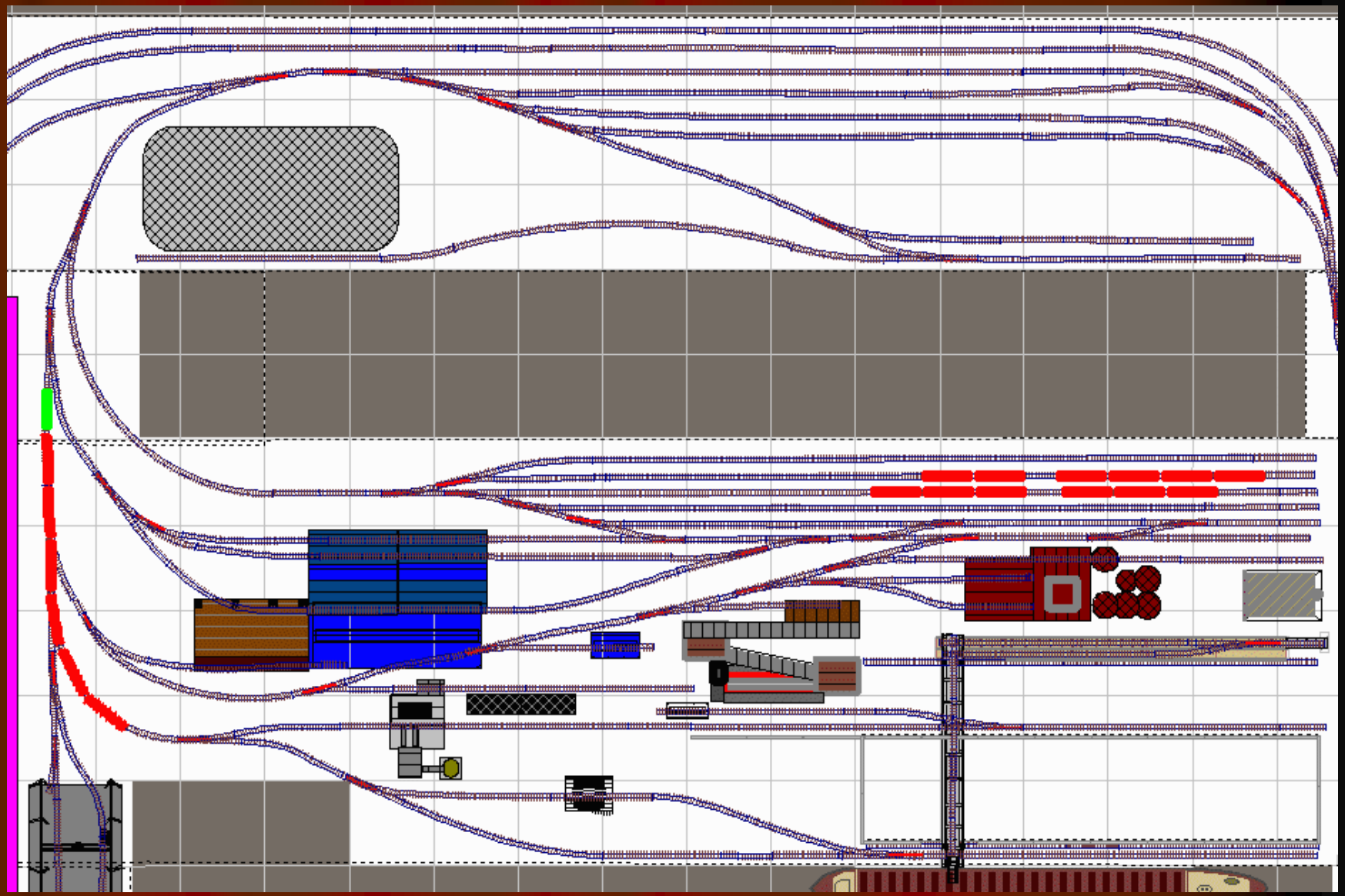


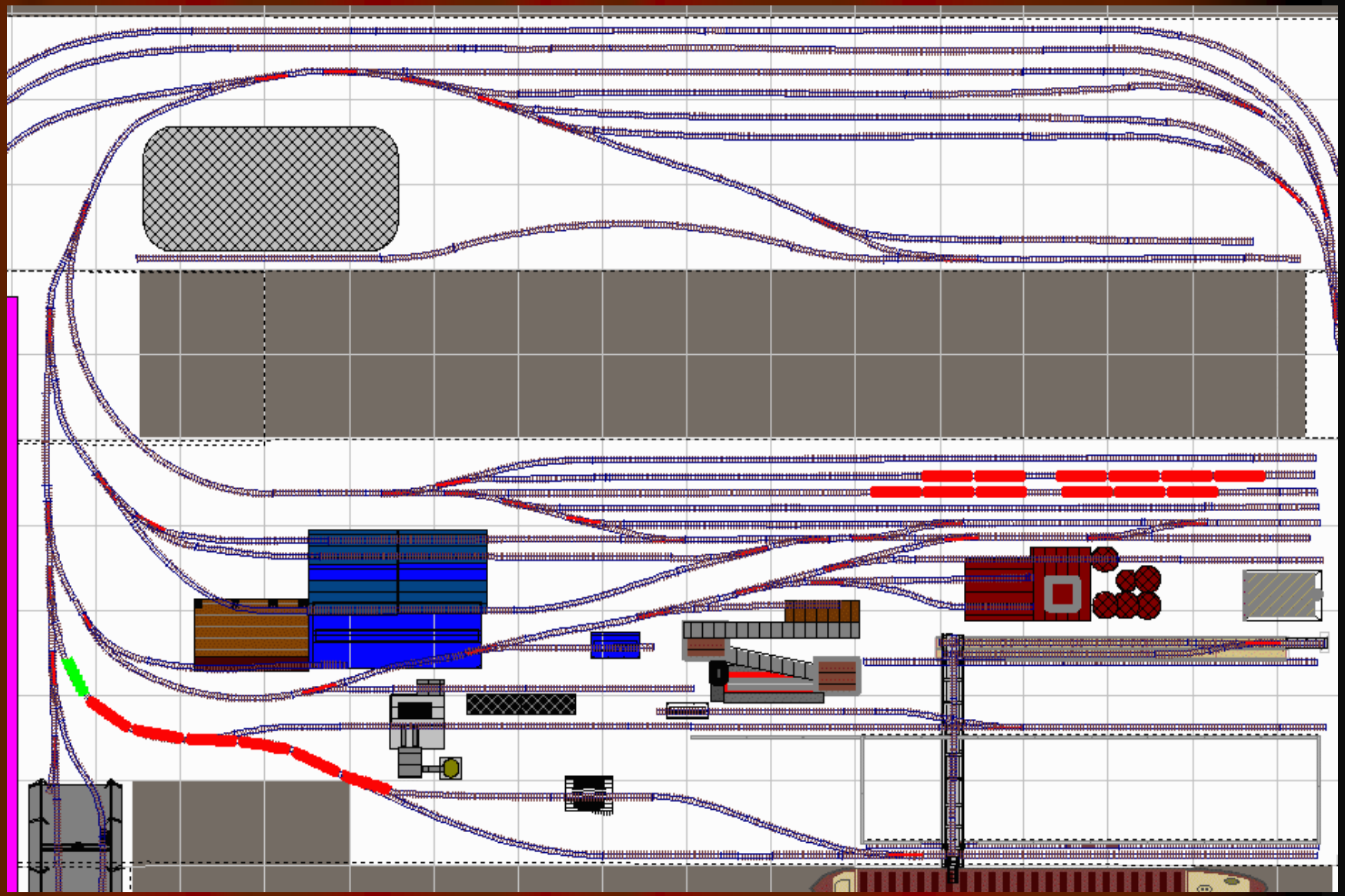


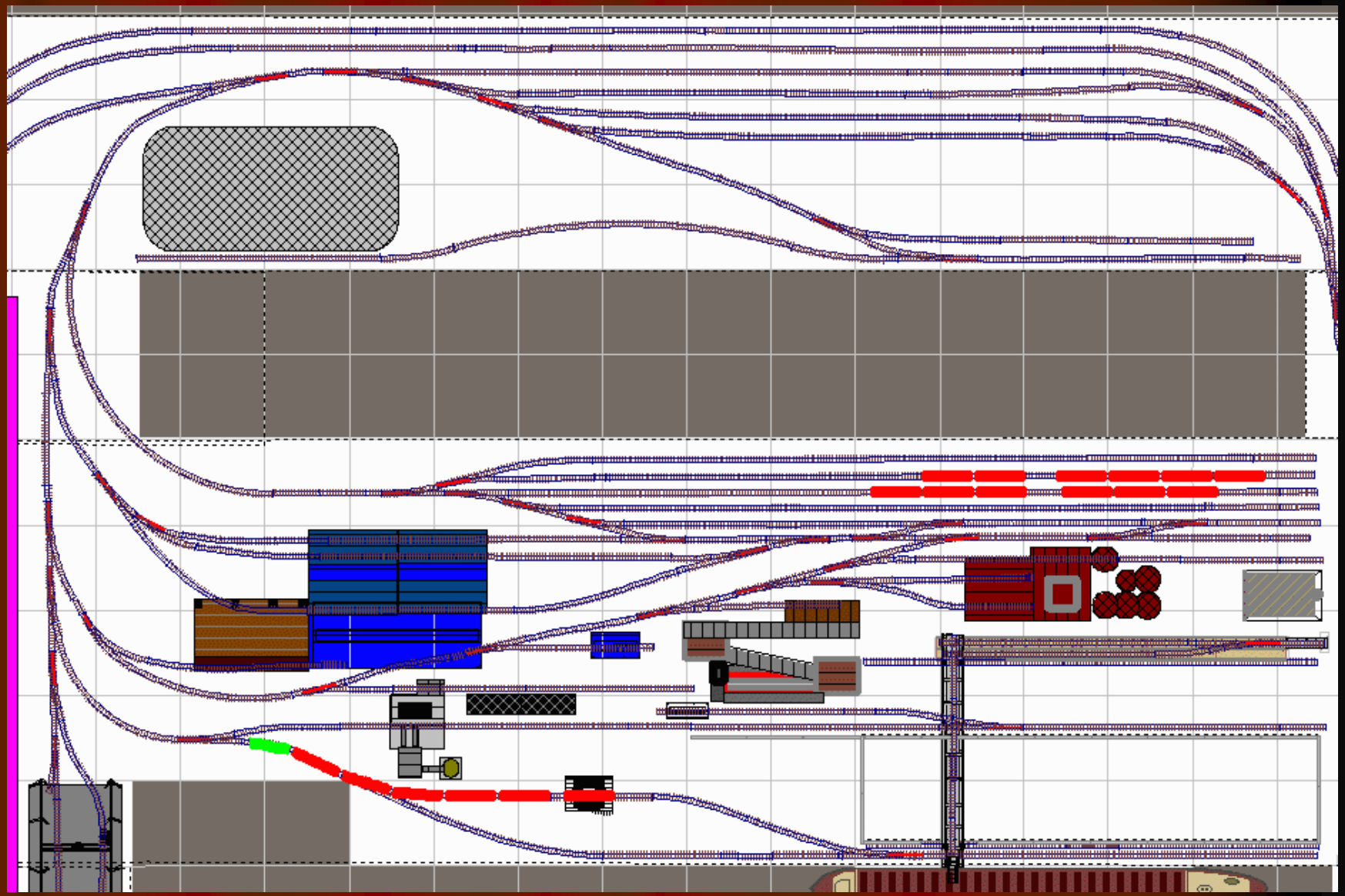


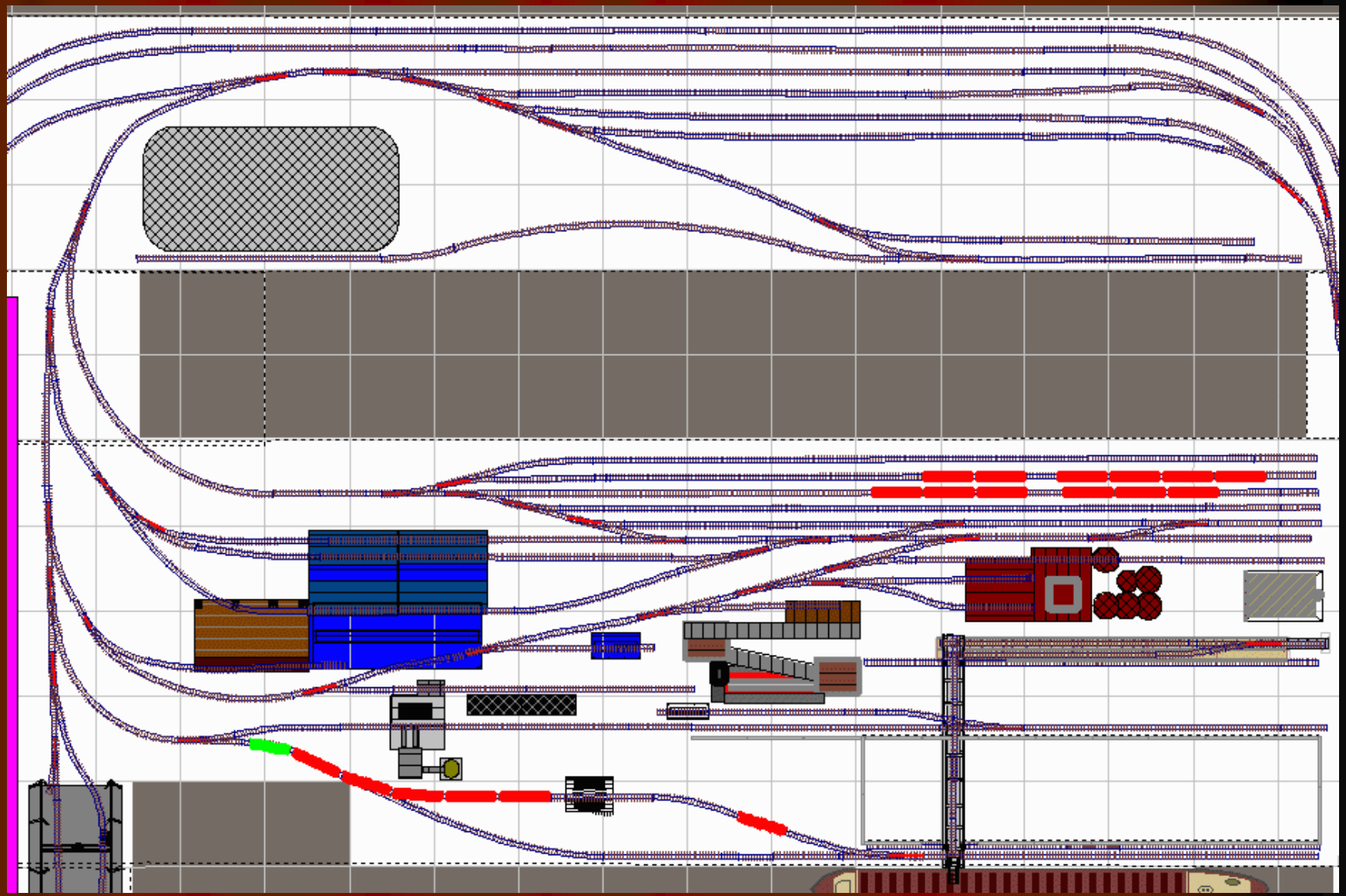


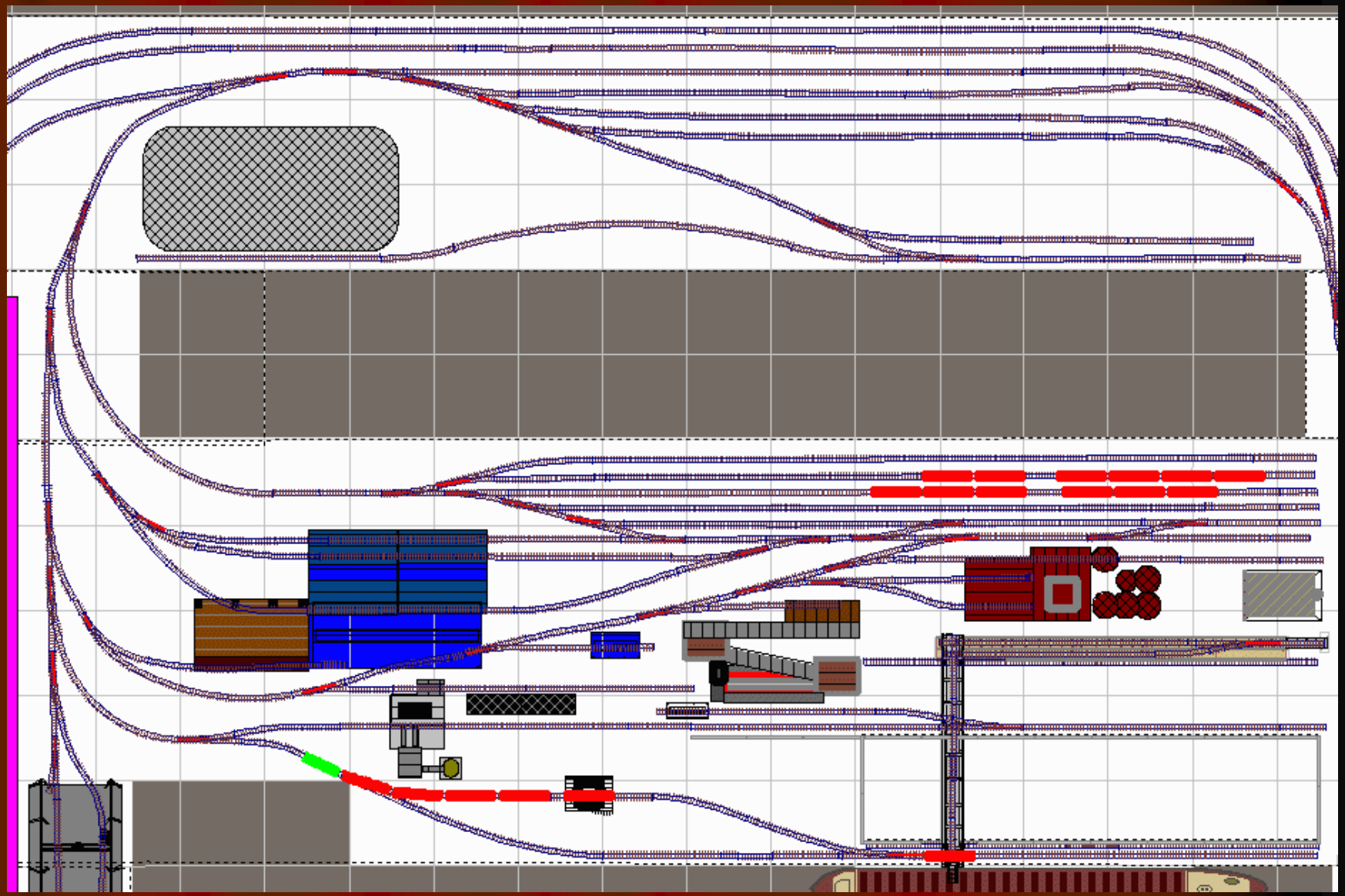


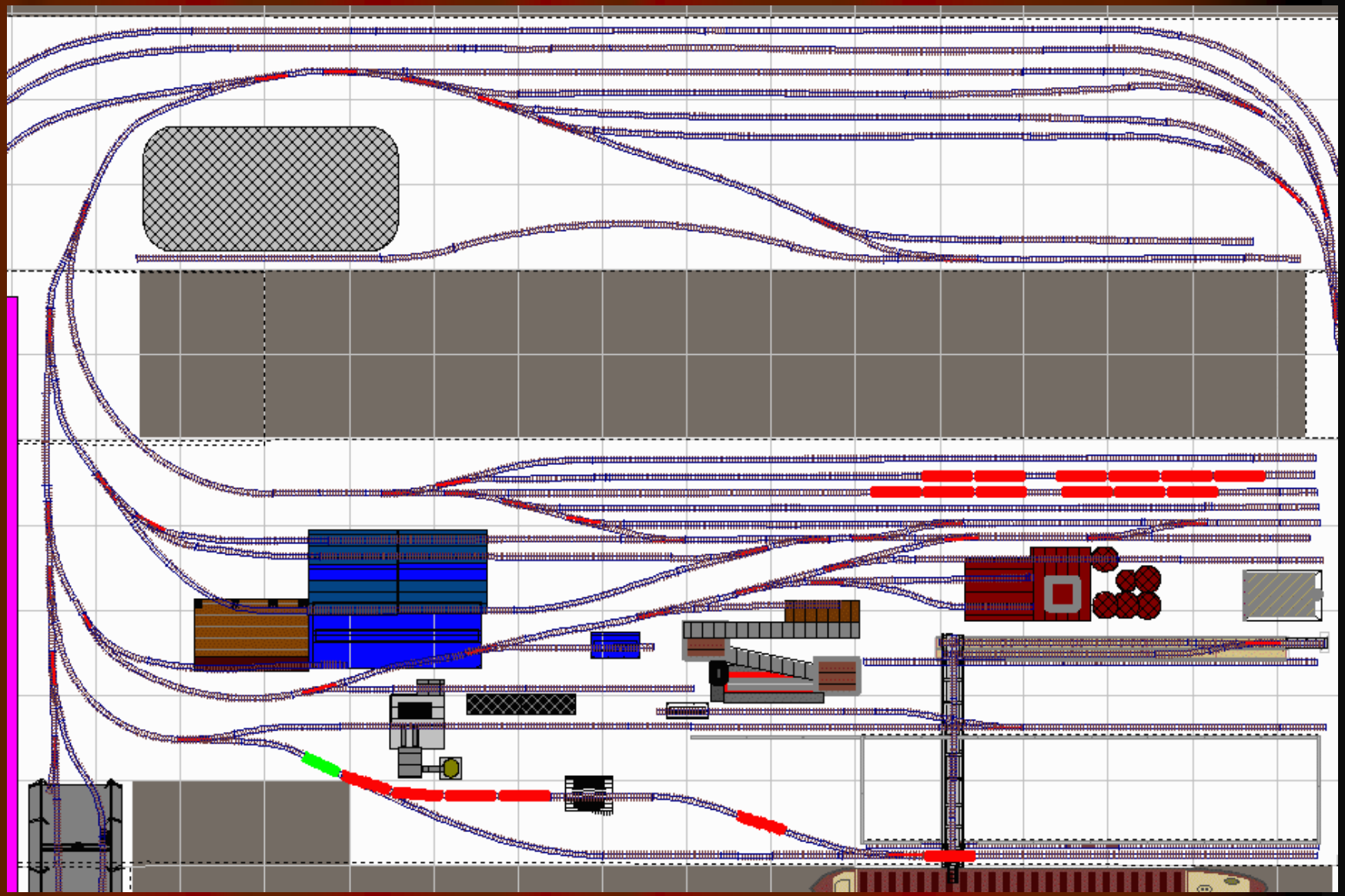


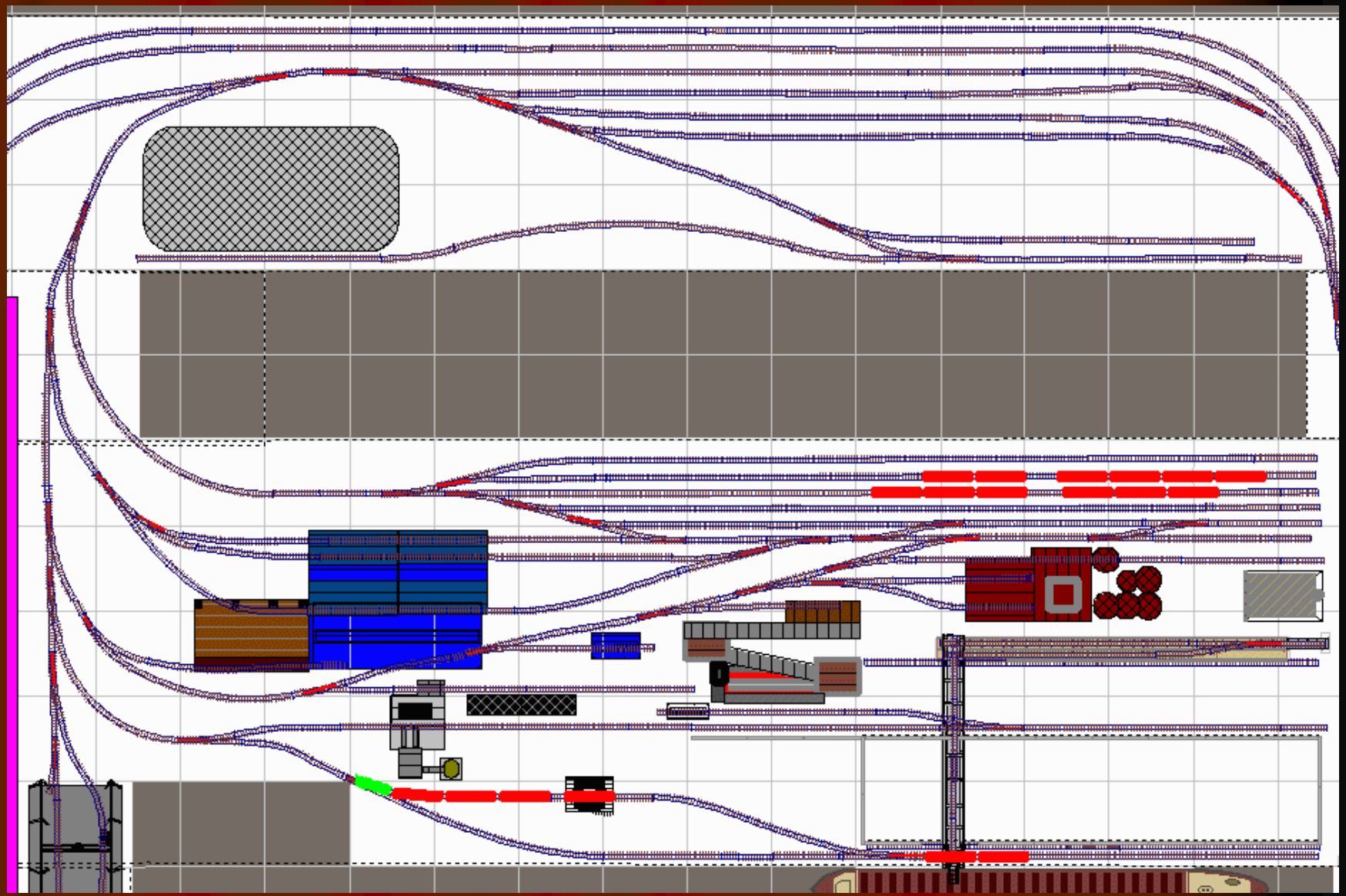


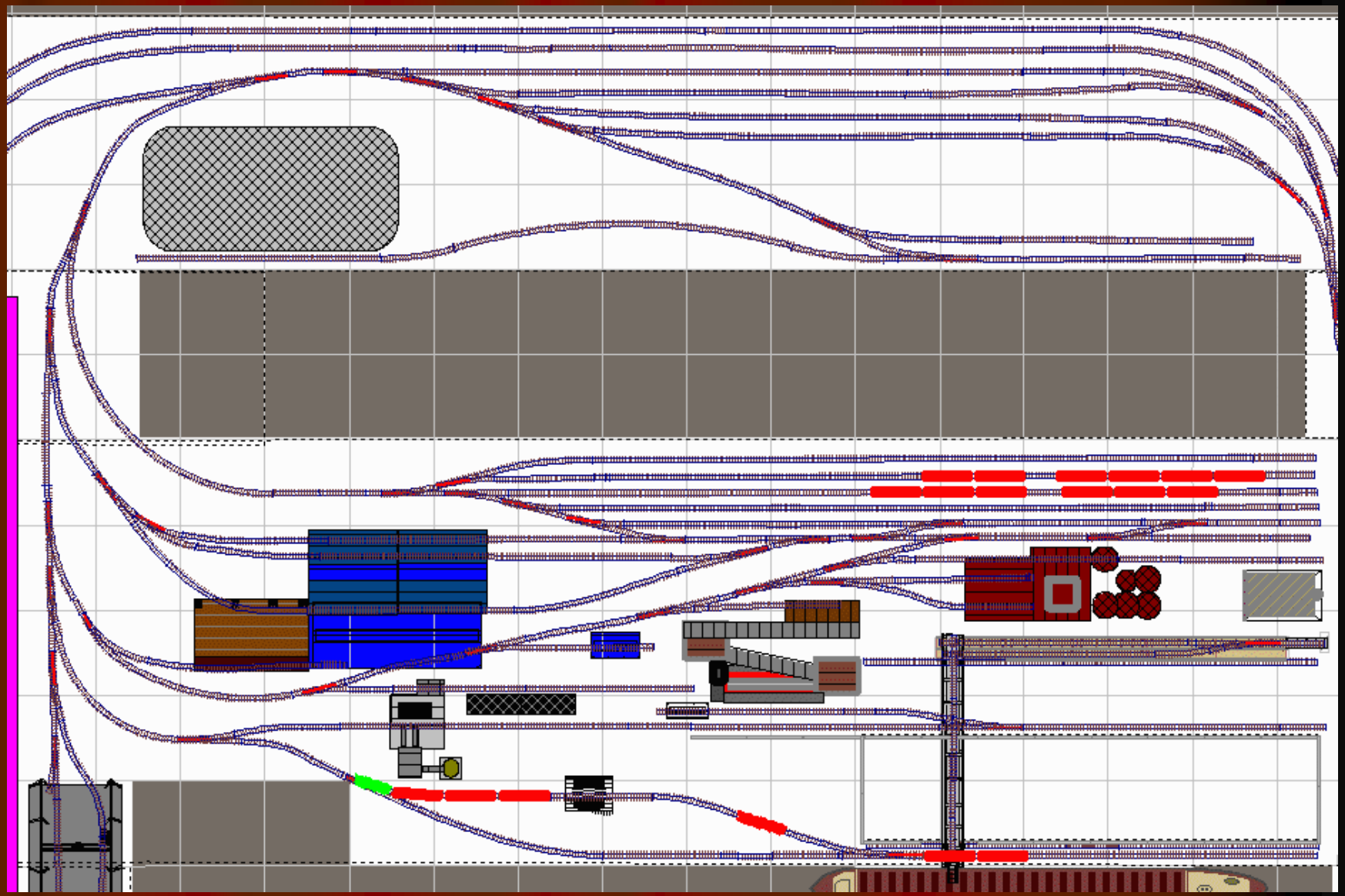


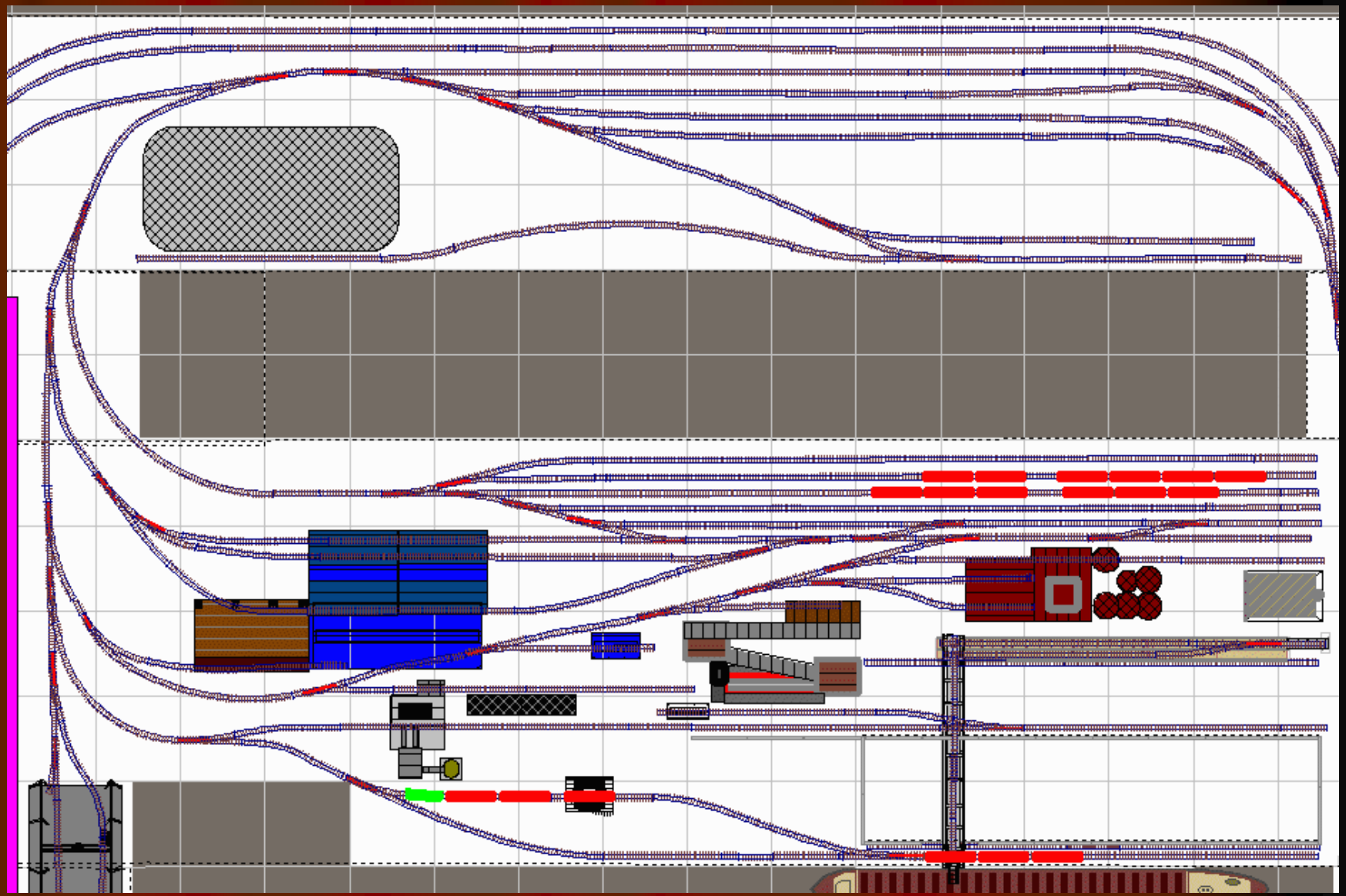


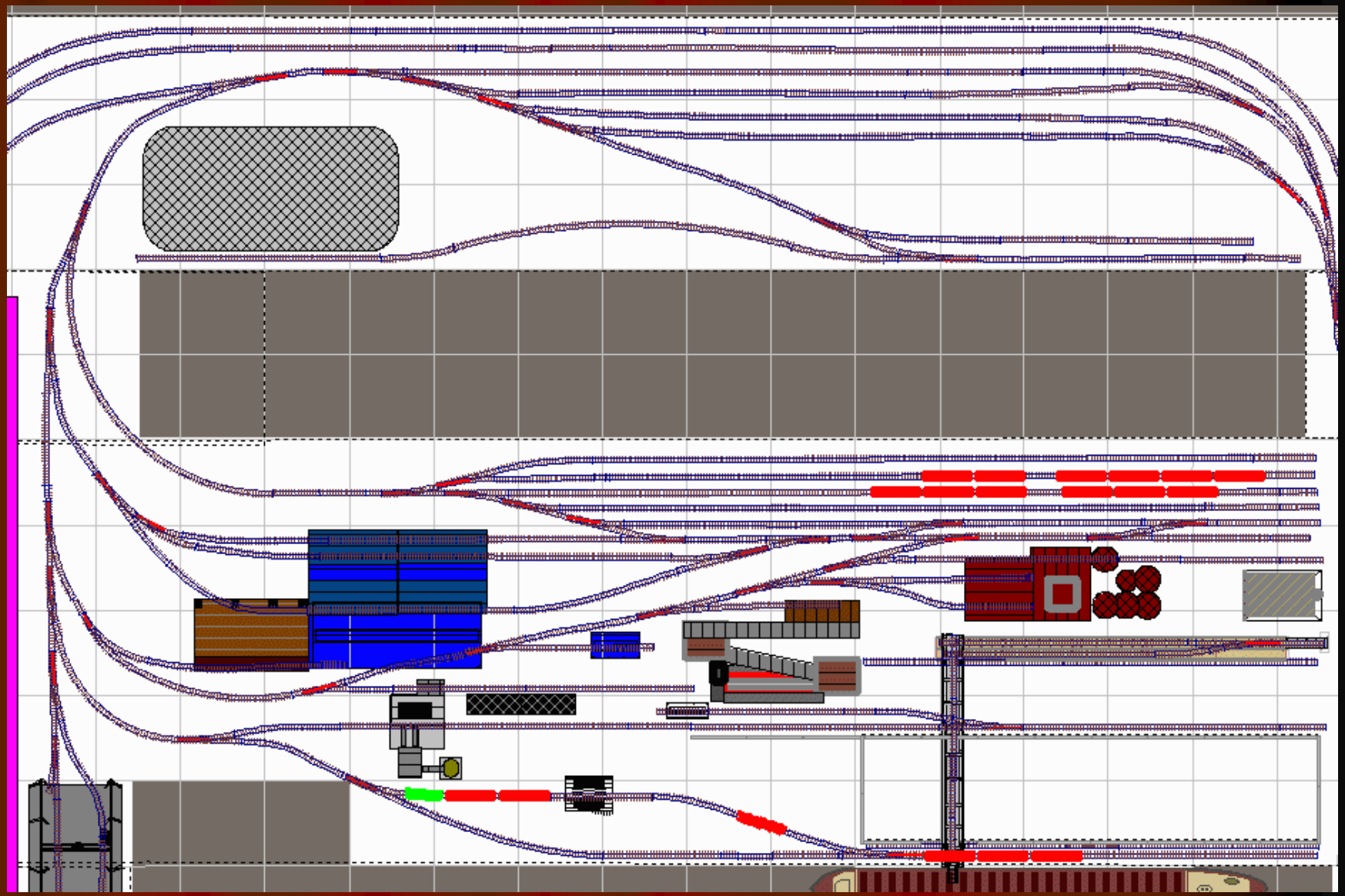


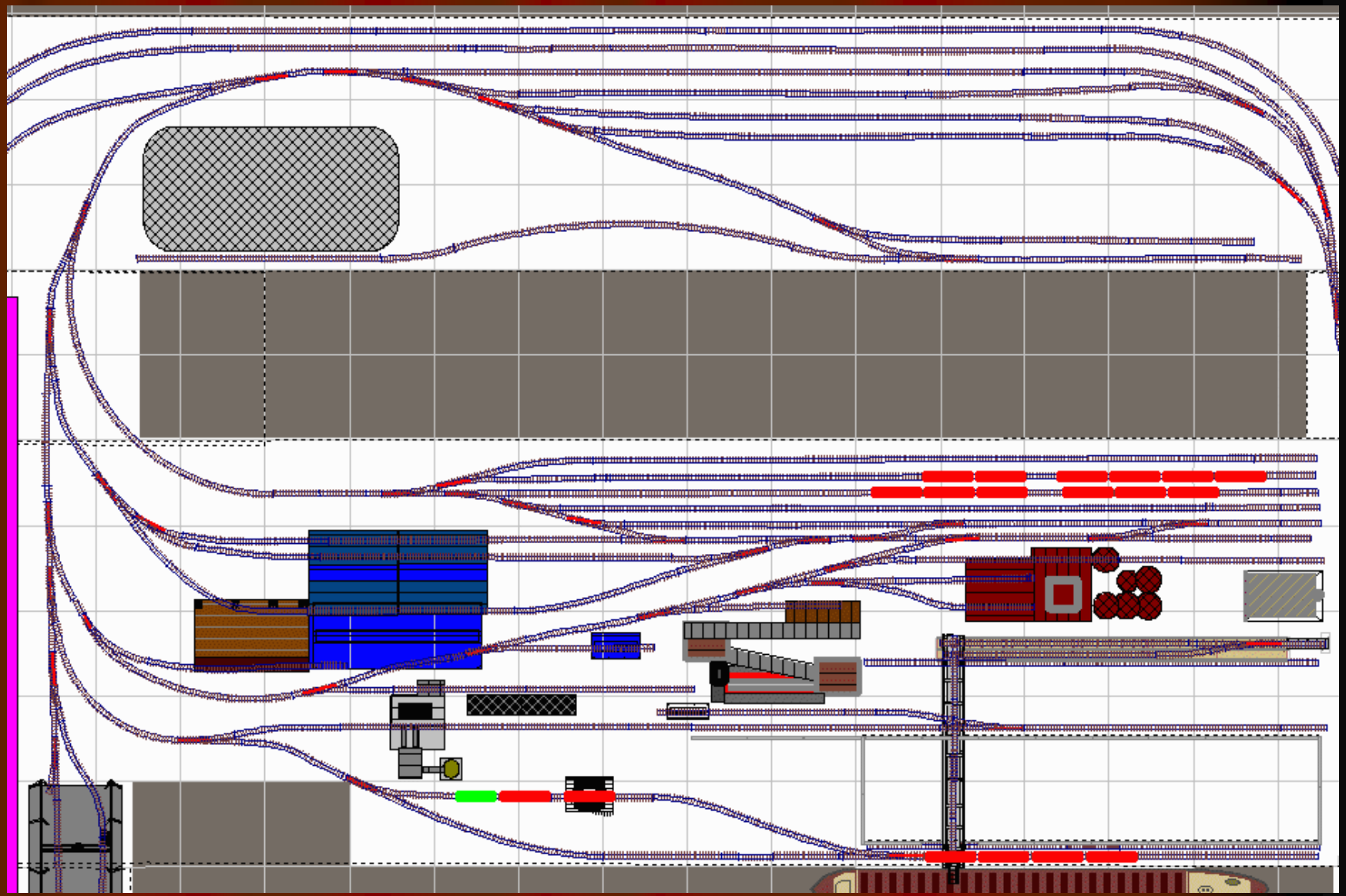


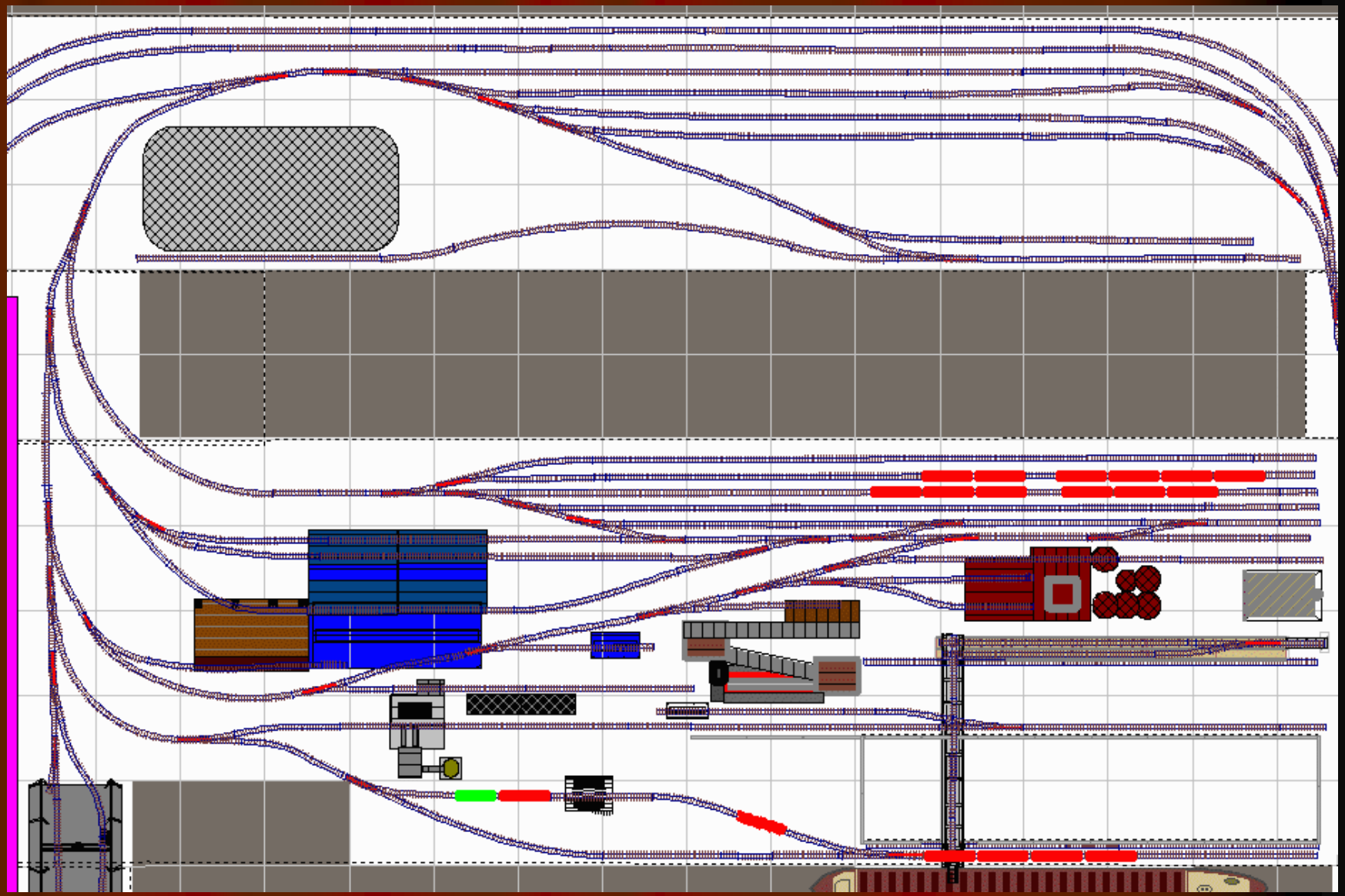


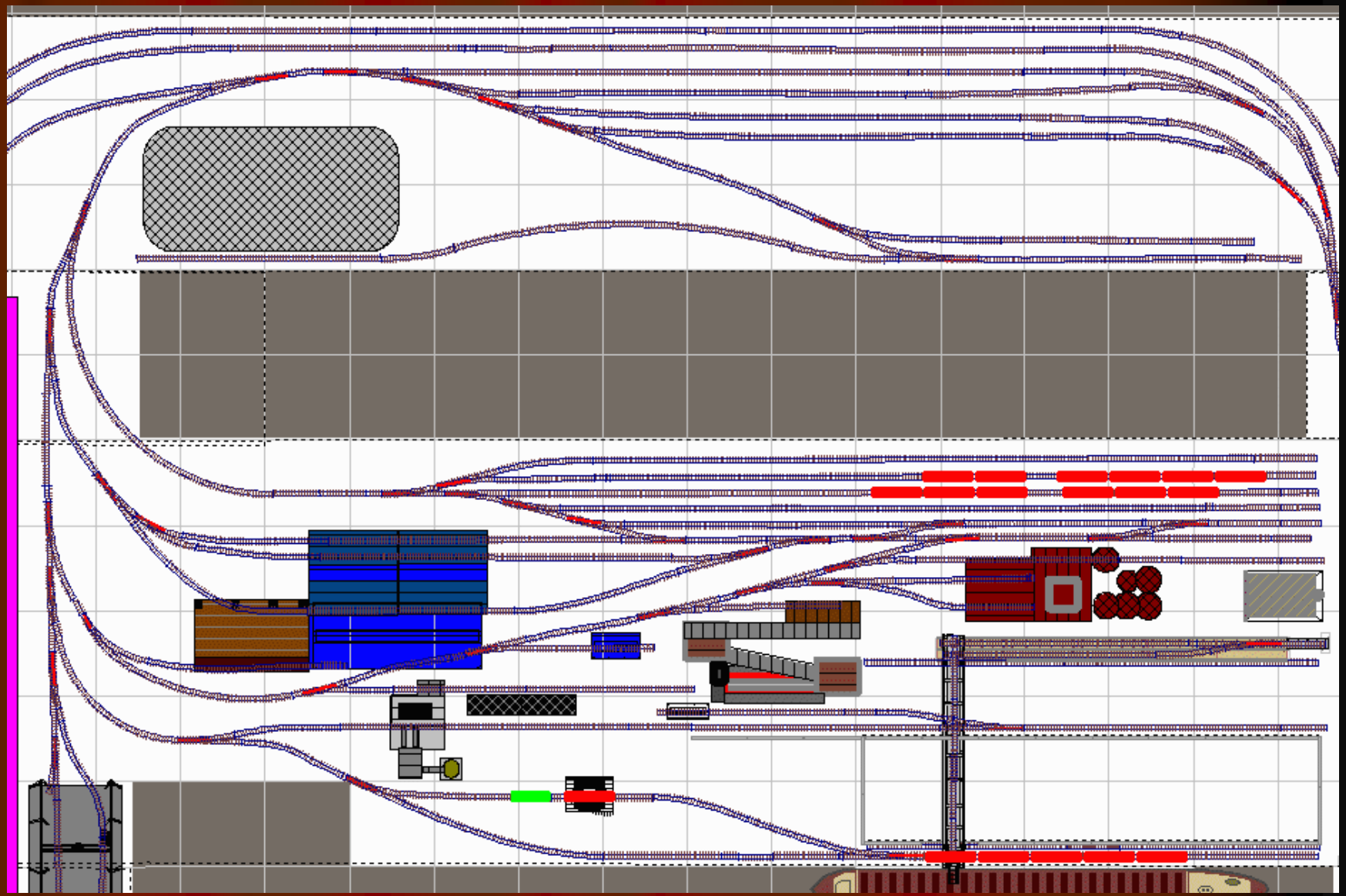


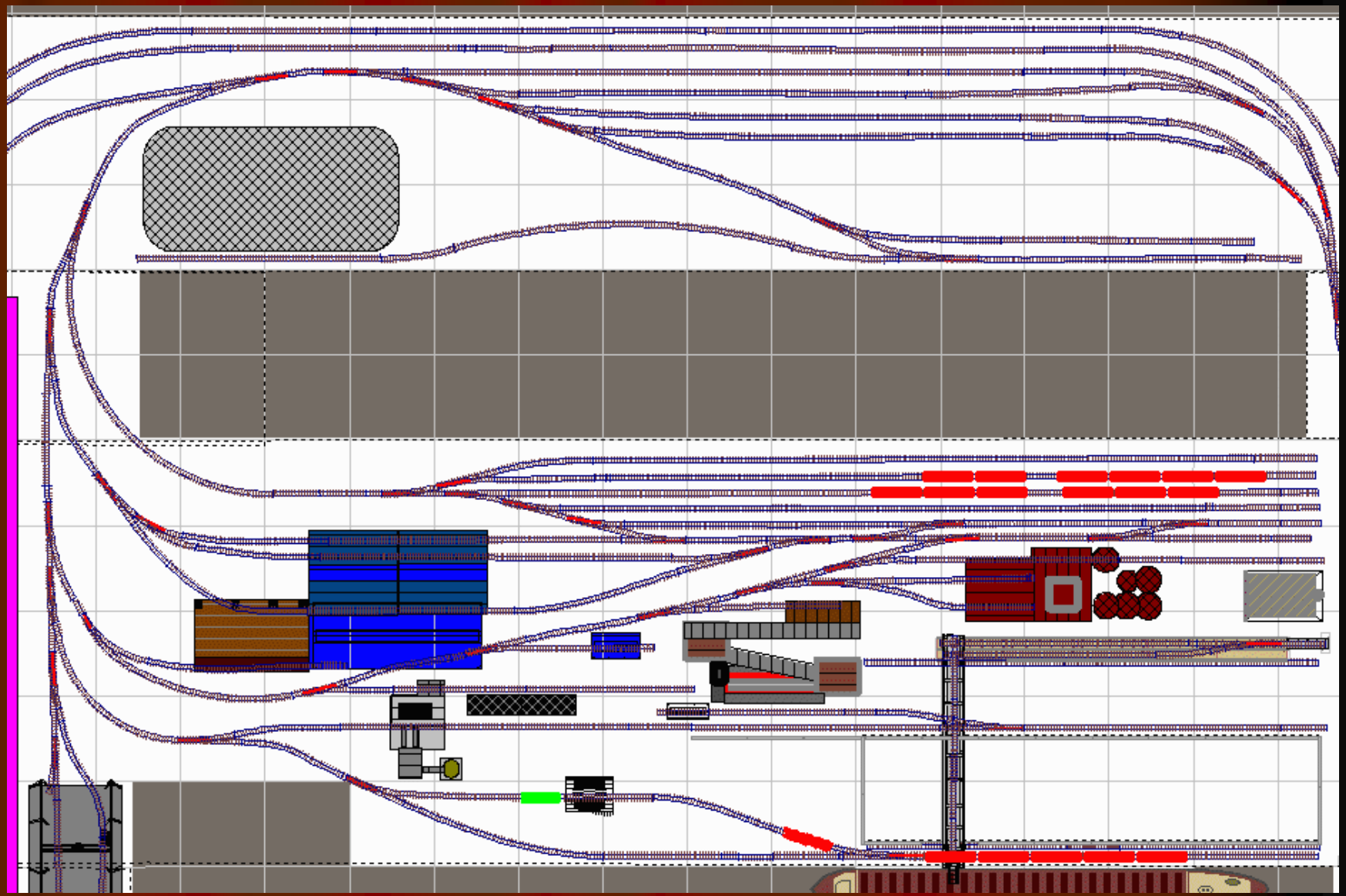


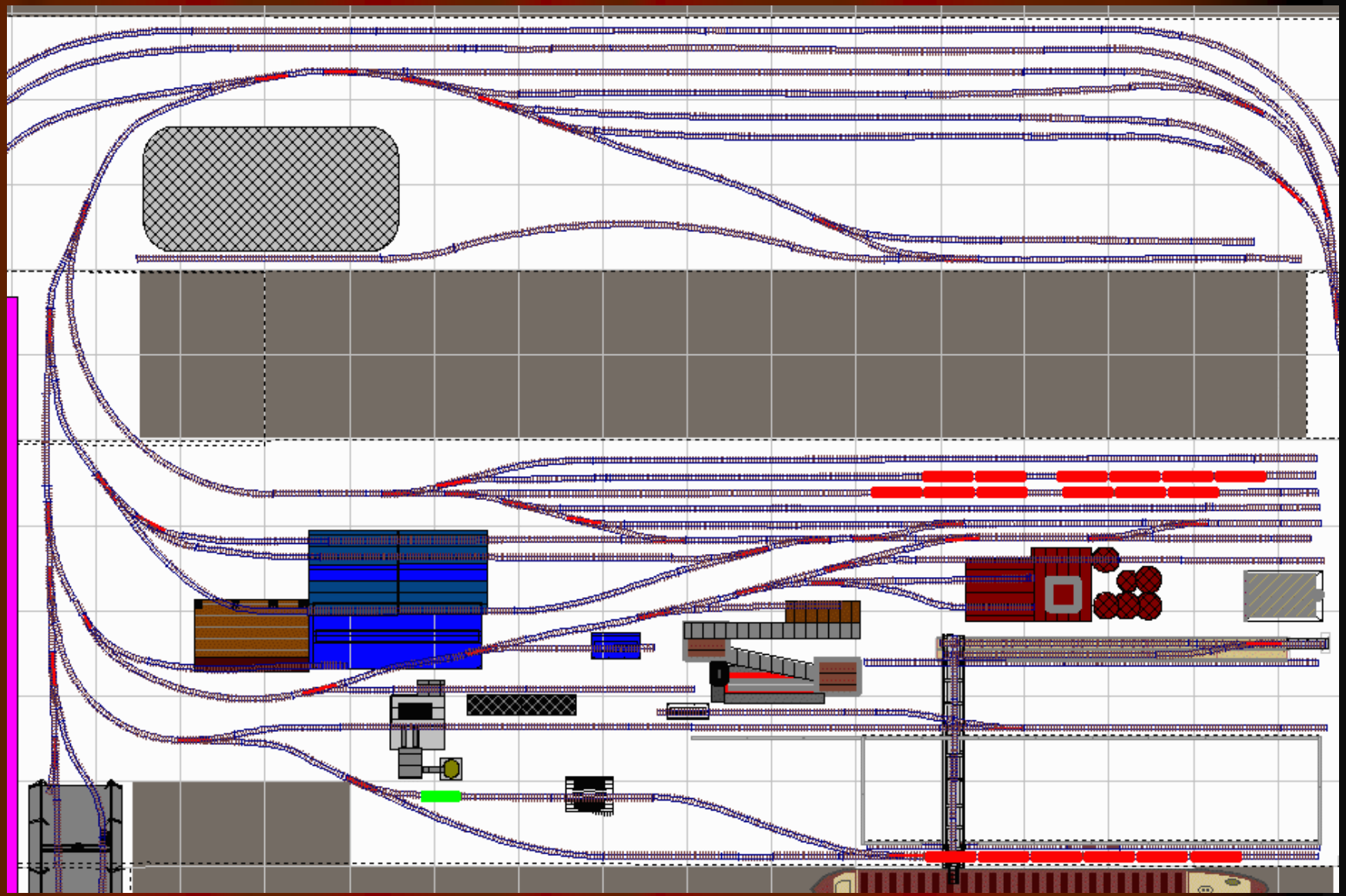


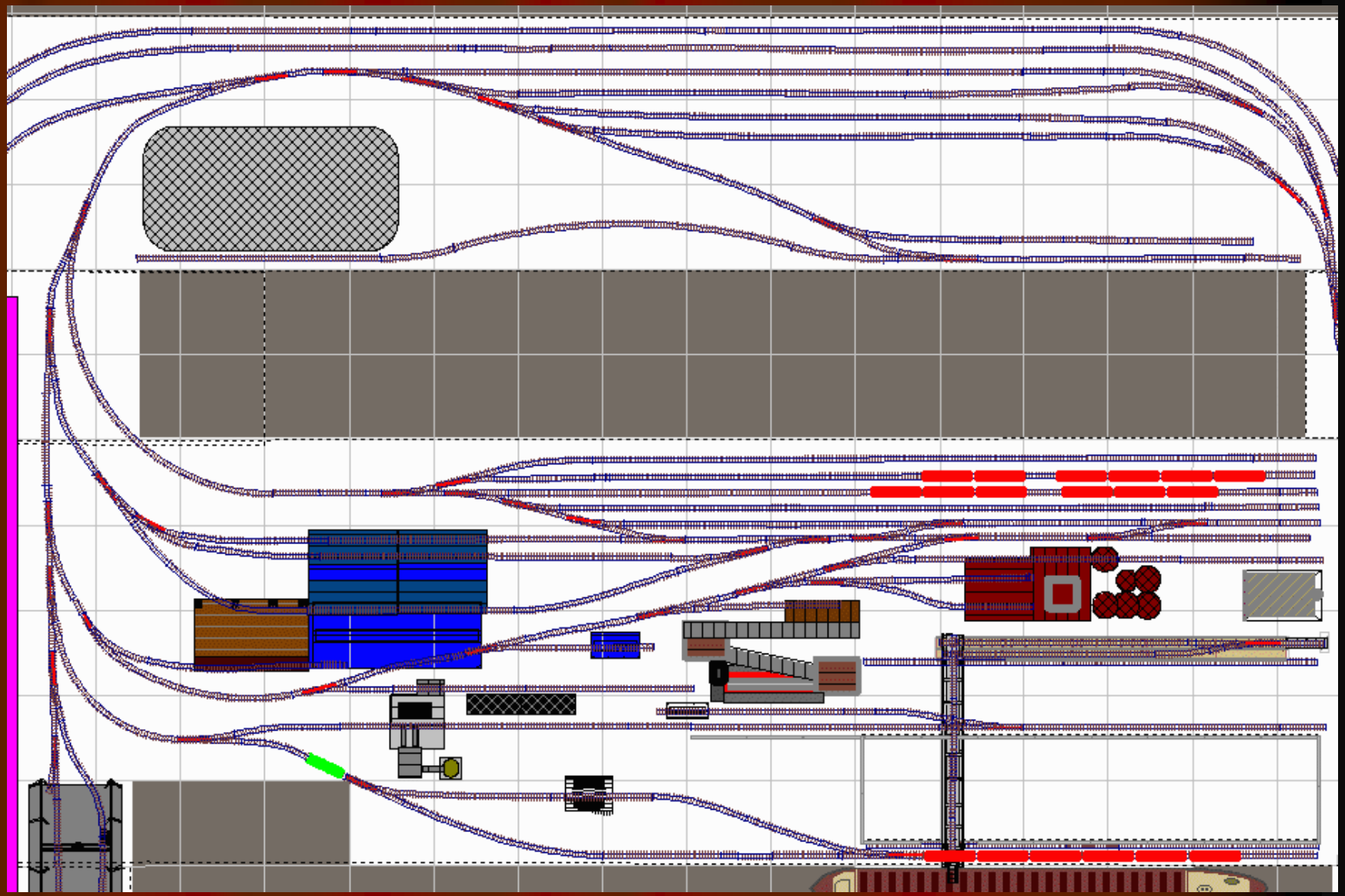


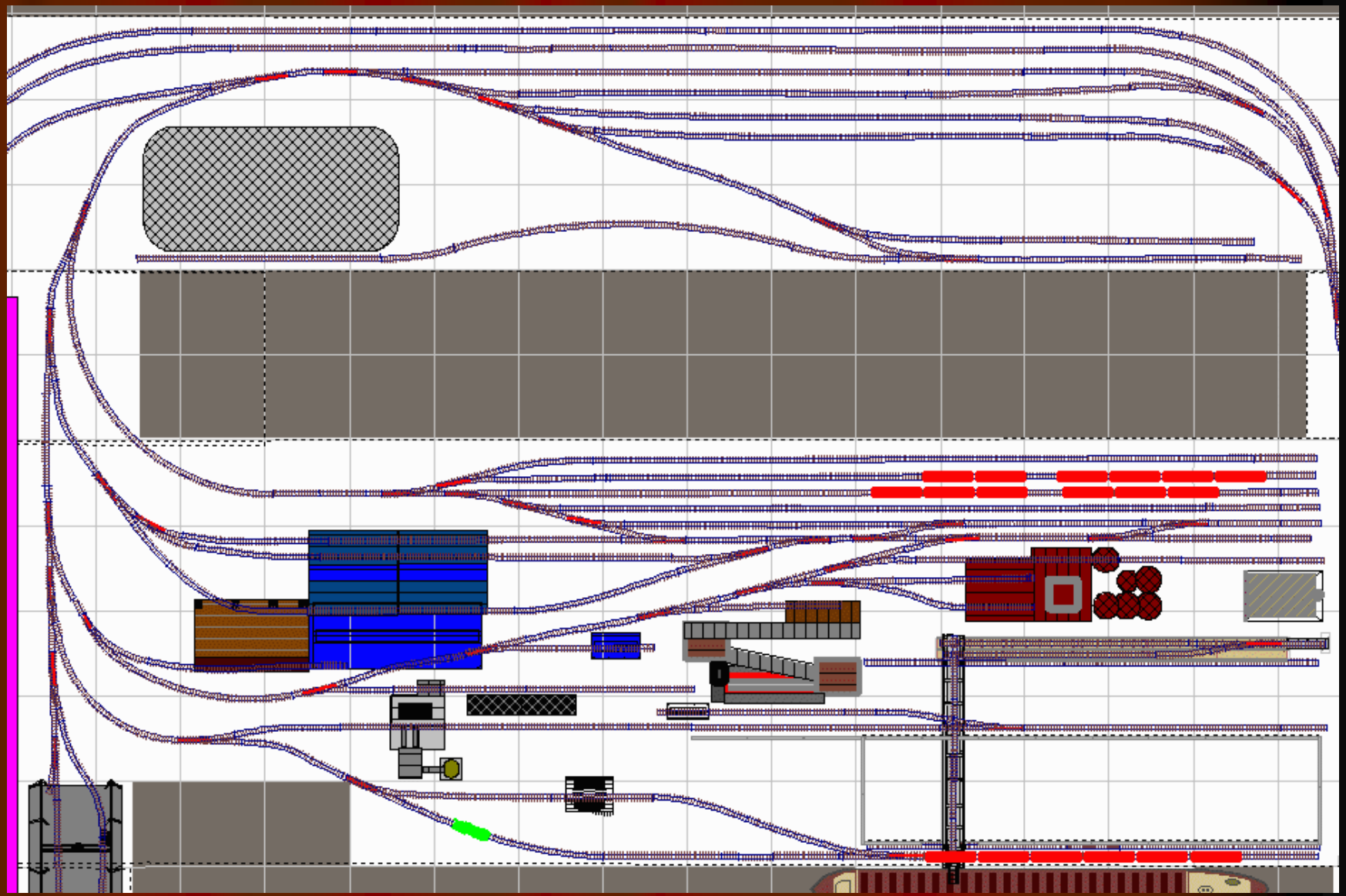


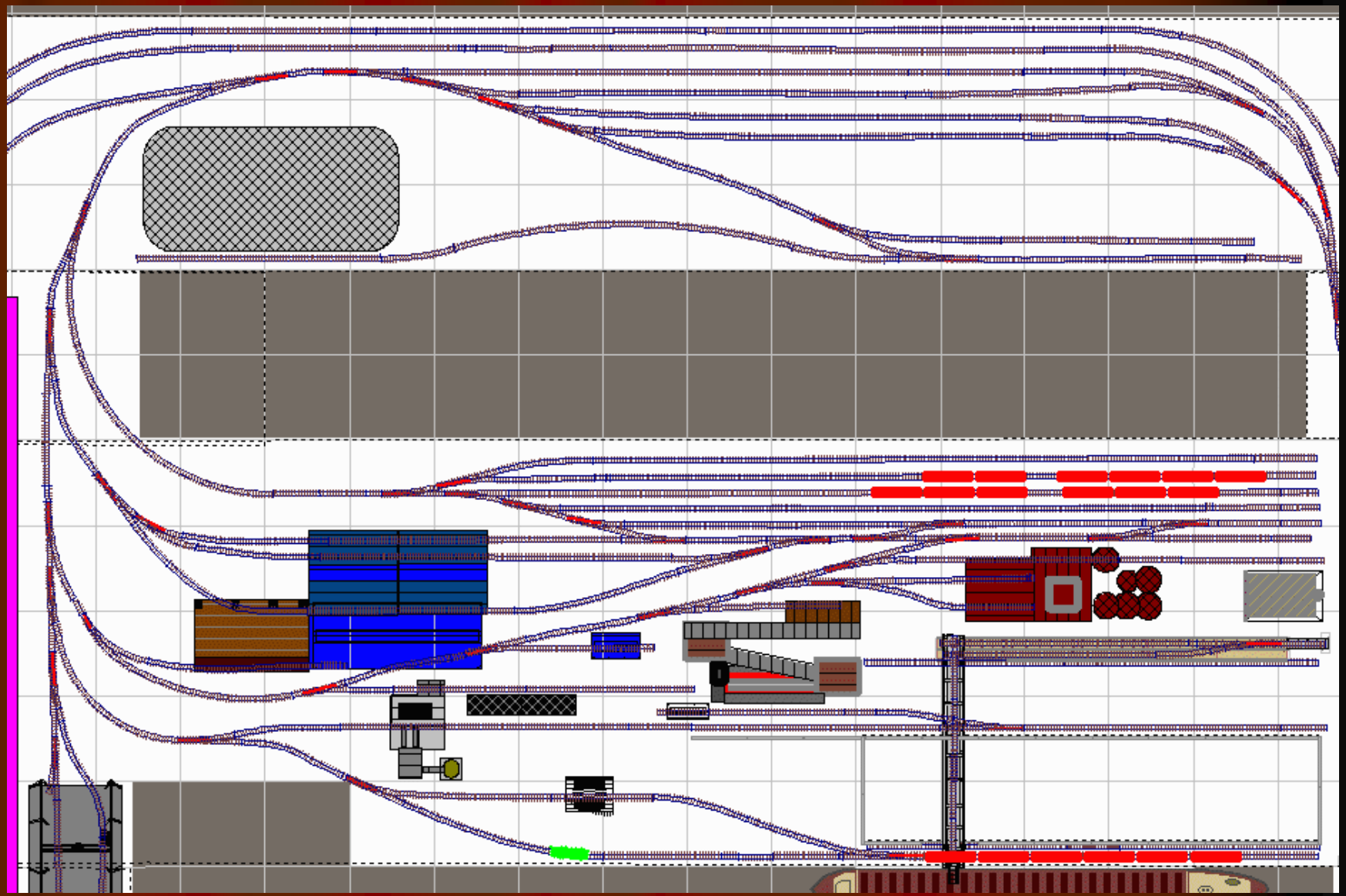


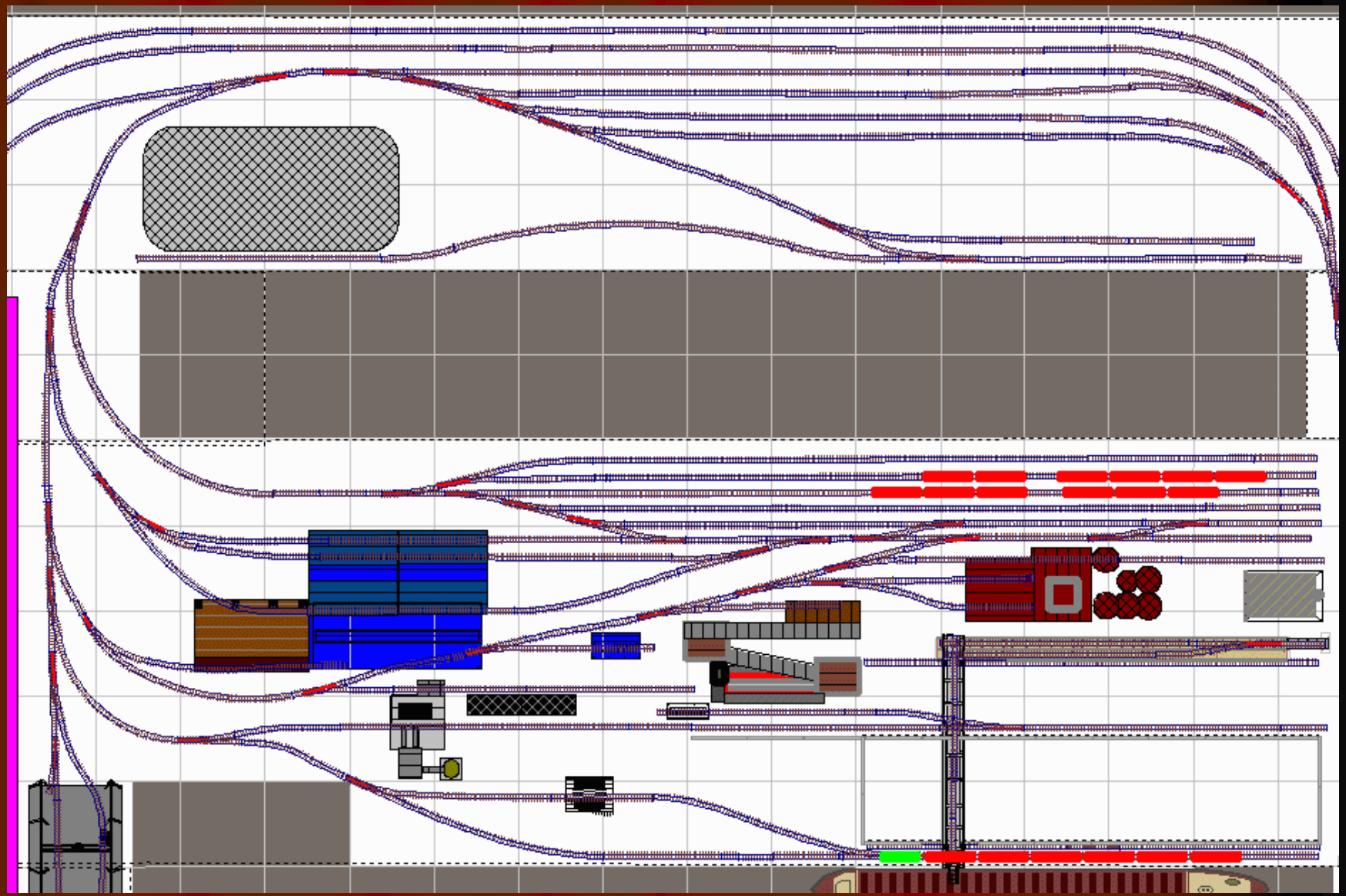


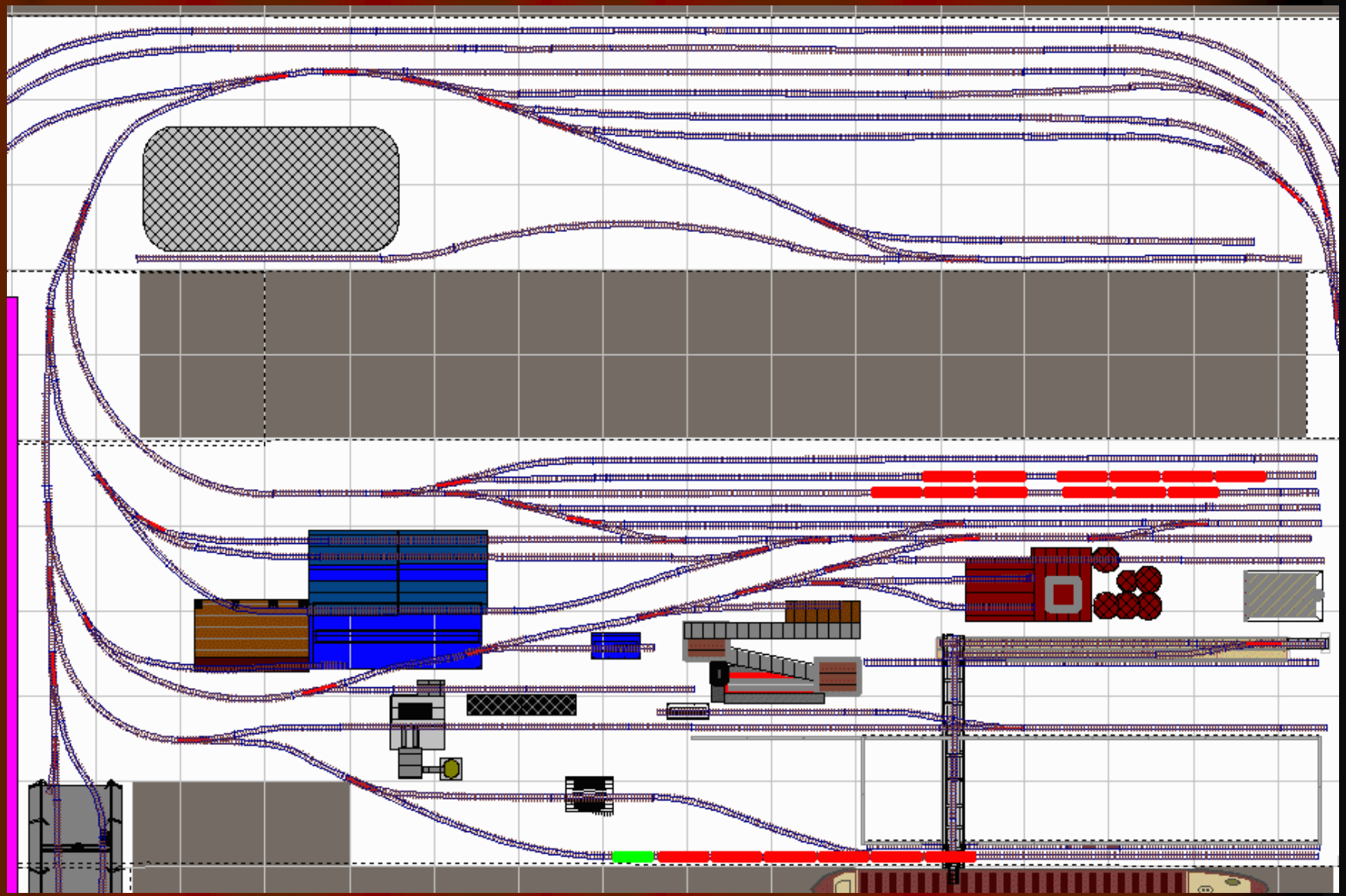


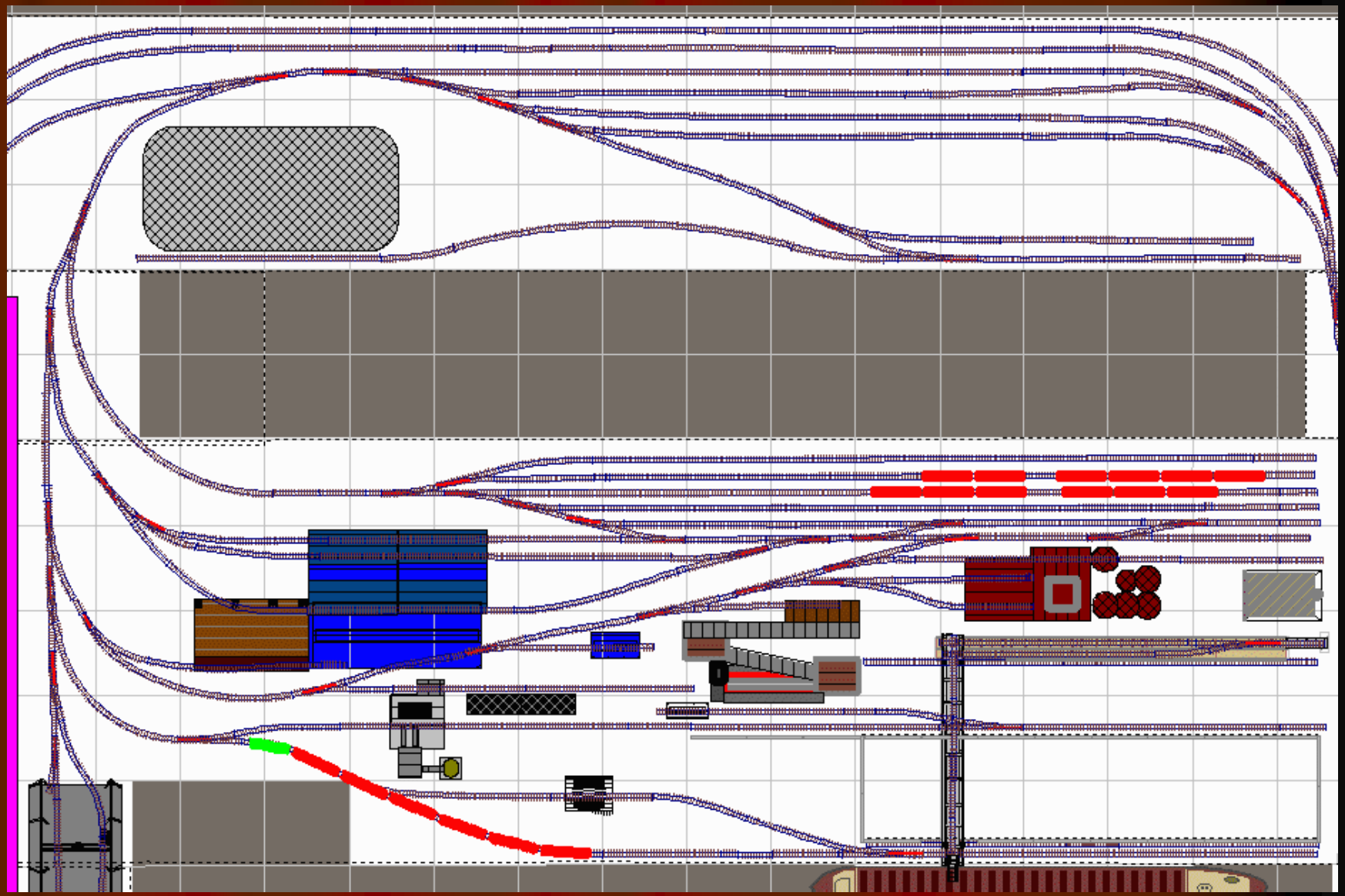


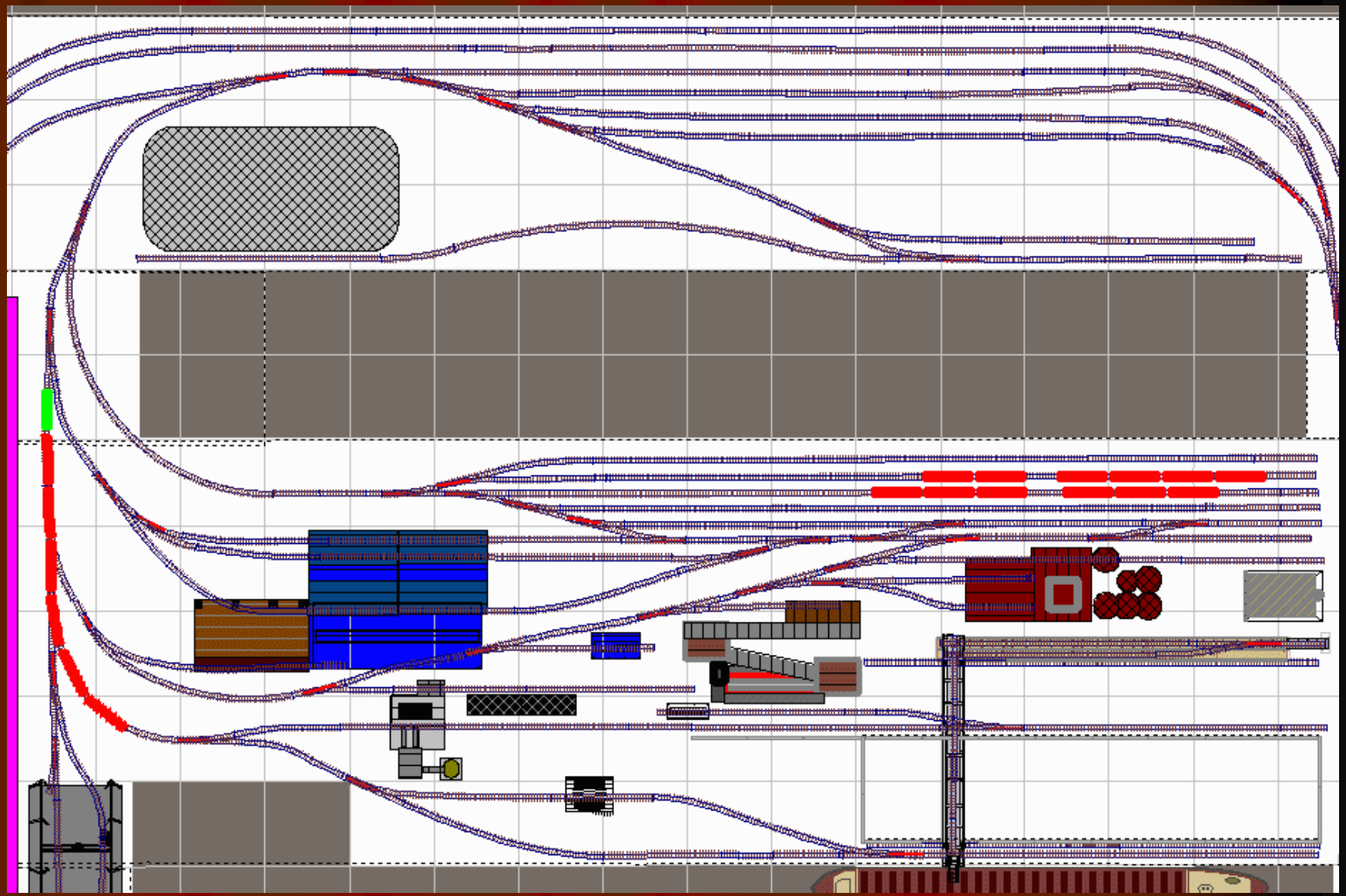


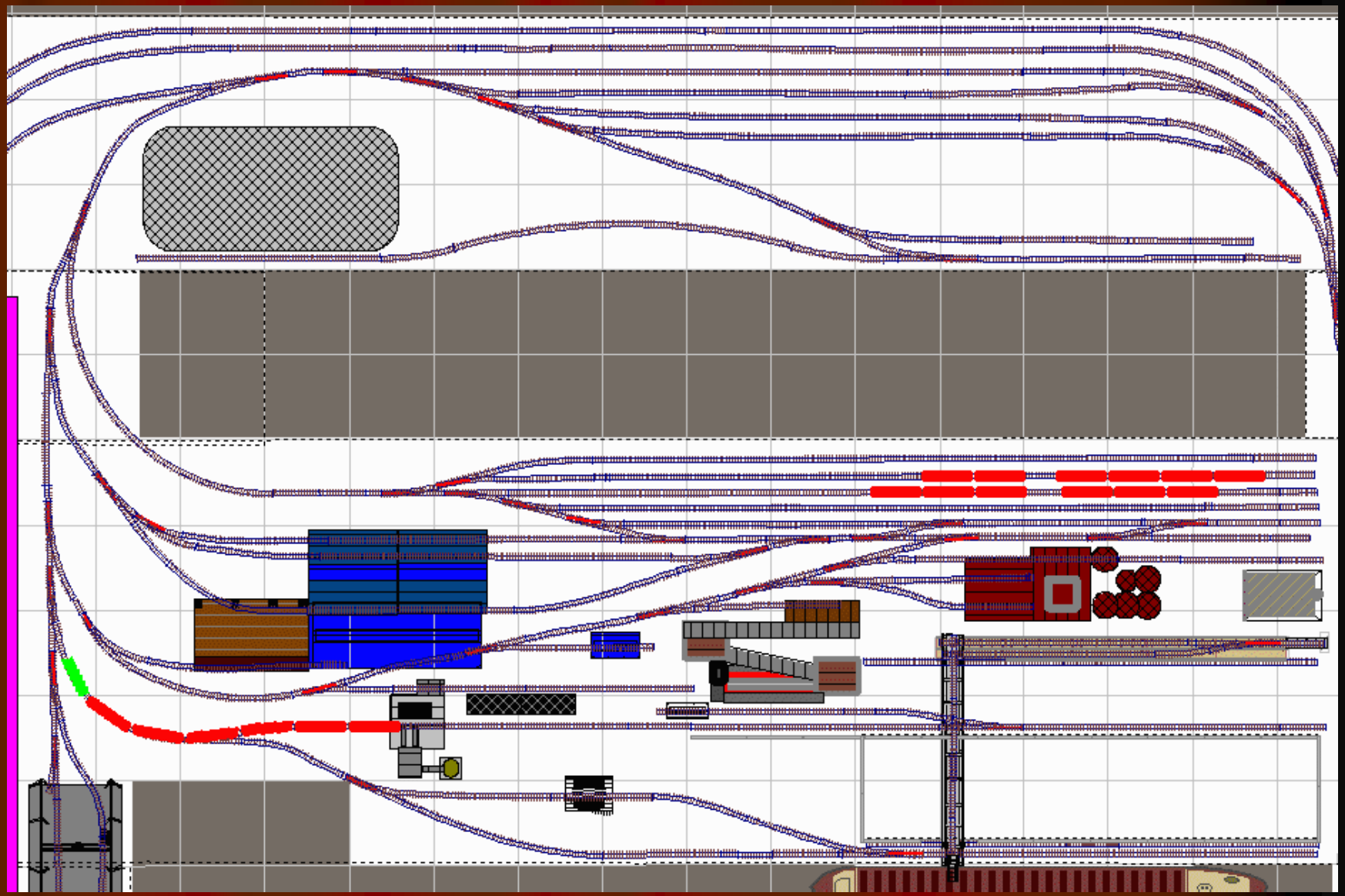


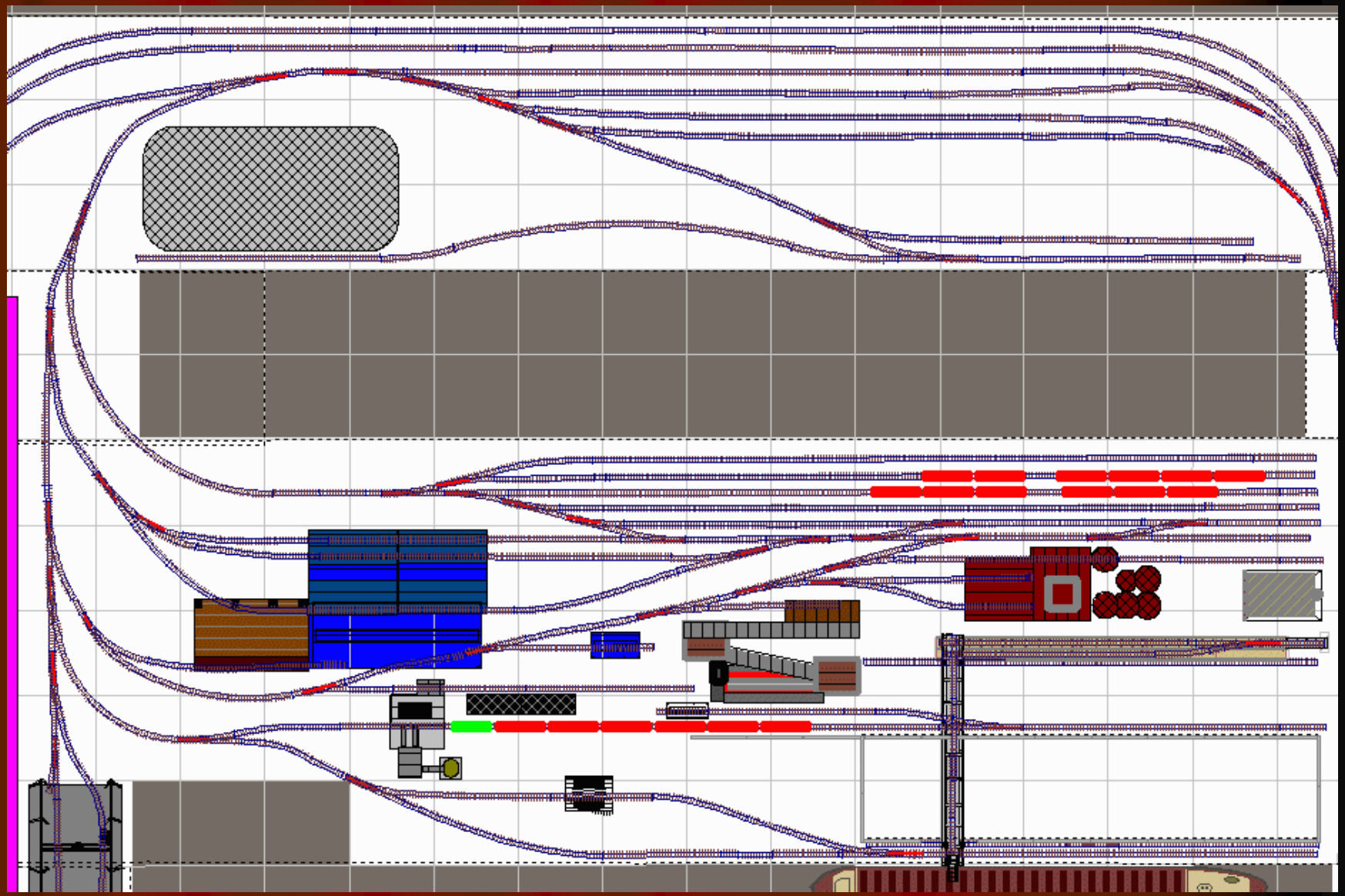


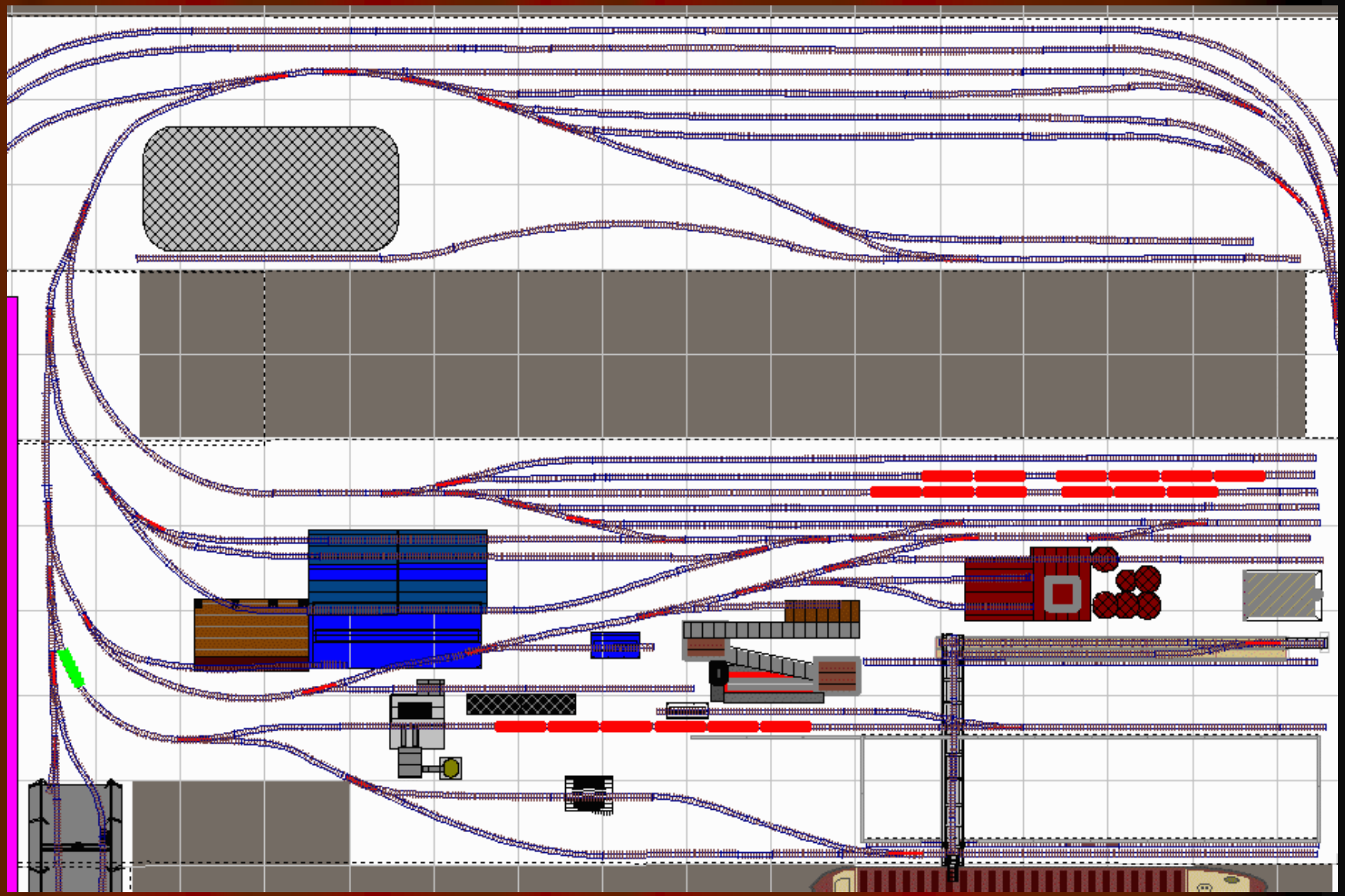












Coal cars approaching rotary dumper

Rotary dumper in action

Unloaded Bethgon drifts downhill from rotary dumper

Empty coal cars are cleared away from dock track

Empty coal cars await another mine run

Operating Scenario:

Turnaround Local

Turnaround Local cars on departure track

Motive power for departing Turnaround Local

First stop: Pickup loaded hoppers from East Minister interchange track

2nd stop: Fegan's Corner – Swap out propane tank cars

Panoramic view of Star Propane Co.

3rd stop for turnaround local: Allied Printing Co., boxcar swap-out

4th stop for turnaround local: Houghschnaegel Metal Recycling Co.

Loads out, empties in…

5th stop: R.T. Rifenbury Wholesale Produce Company - Loaded reefers in, empties out.

Warehouse doors spaced extra-far apart, to accommodate longer reefer cars

6th stop for turnaround local: Drop off tanker at Chandler bulk liquids team track

CSXT Extra 60 Northbound races thru Chandler…

...while turnaround local engines wait on the passing siding.

Turnaround local heads North for return trip.

Cars picked up by local turnaround arrive in staging yard

CSXT Extra 713 South thunders through East Minister…

...continuing over the Bethel Creek bridge.

The End