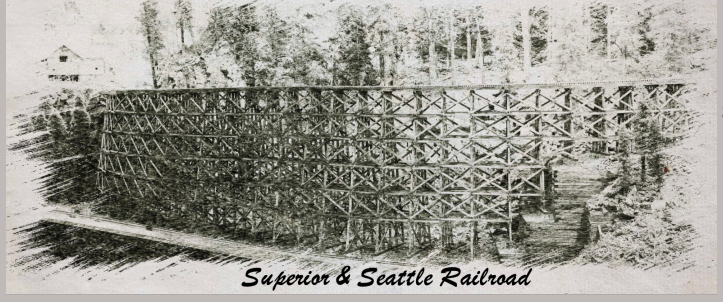
Volume 4 - 25 Number 9



September 1, 2025

The Superior & Seattle Railroad & Interchanges

Gazette



This month, we continue the focus stacked photographs of the structures that make up the Eagle's Nest Yard. Here we have two FSM kits Sewall's Foundry (renamed Schwarz's Foundry on the S&S RR) and Fox Run Milling. I modeled my versions of these kits so that they shared the same coal pit.

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In this photograph we have the Bonney Wrenches structure from the F&SM RR and another view of Schwarz's Foundry. A new rooftop detailing project is planned for the Eagle's Nest Warehouse behind these structures.

Below, are some zoomed in crops of this focus stacked photograph.

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The next structure in this industrial complex is Grandpa John's Welding, named for my dad who was a welder by trade. This structure started out as the FSM Swankhammer Welding Company kit. Below, I have zoomed in on the focus stacked photograph to see some of the details in this model.

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Grandpa John’s Welding is a busy place.

The Vehicle in this photograph was modeled by Dan Raymond.

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What's new on the Superior & Seattle Railroad

Where did the summer go? I started this spring with 139 projects/tasks on my 1:1 to-do-list. I was a program manger for car programs in my past life so prioritized task lists are the way I roll. These lists are also very helpful in managing the CFO of the Superior & Seattle RR who wants me to work on all 139 of the projects, today. I have 24 more projects to do before winter sets in, or the CFO adds to the list. These are the things that keep me from working on the layout so it is real easy to put them off. I think all of us are looking forward to modeling season.

In this part of the world this summer, we have also had a big problem with the smoke from the Canadian wildfires. It has really hindered outdoor activities. My sinuses really give me issues with smoke, especially, the smoke that smells like a week old campfire. It makes me look forward to the snow that will finally put an end to the fires.

The time that I have been able to spend on the layout, this month, has been spent making some track changes for operations and building structures for Isaacstown. I had planned on building a number of vehicles in the Gazebo this summer but the smoke really cut into my enjoyment of the Gazebo, this year. I will probably do the vehicle builds inside before I start my next big structure build. I will continue documenting the progress on the layout in detail in my ongoing build article here in the S&S Gazette.

I made the decision at the last minute to skip the Narrow Gauge Convention this year. The main reason is that my daughter is running in a marathon that weekend and I want to be here to cheer her on. I have also attended two conventions in St Louis so I have visited the layouts that are going to be open. I plan to go to the Narrow Gauge convention next year. I think this makes the fourth miss in 25 years.

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In this issue of the S&S RR & I Gazette - Vol 4, Number 9 - September 25

1) The Superior & Seattle Railroad - Eagle's Nest Yard 1 - 9
John Siekirk
2) What's New on the S&S RR 10
John Siekirk
3) In this Issue 11
4) Comments on our Last Issue 12 - 13
5) What's on my Workbench - Isaacstown - Part 32 - FSM Butcher's Way 14 - 52
John Siekirk
6) The Franklin & South Manchester Railroad - Part 41 53 - 88
John Siekirk for George Sellios
7) Karl Osolinski's Workbench - Part 12 89 - 92
John Siekirk for Karl Osolinski
8) A photo essay BEST table top castings with legs 93 - 96
David Emery
9) Progress on the Shadowlands and Tellynott Railroad 97 - 145
Mark Dalrymple
10) Building Bar Mills Kit - Klinger's Pharmacy 146 - 165
Bob Courneya
11) LED Lighting 166 - 187
Bill Sartore
12) Structures that need to be modeled:
Tom Boyd
Iain Collingwood
Jerry Beach 188 - 211

13) Superior & Seattle RR & Interchanges Gazette Statistics 212 - 217

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Comments on our last Issue

Thank-you once again for an enlightening and entertaining publication. Please be assured its receipt brightens my day.

Frank

Thanks for another excellent issue.
Mark Wellhausen

Hi John

Newsletter is great as usual, really enjoying the structure builds lately and learning a lot of new techniques from them.

Regards iain

Once again a great August issue of the Gazette. Page 2 shows an abandoned geared locomotive I found interesting. I have a kit by BTS of a non functional geared loco. Seeing that photo reminds me that I might need to modeling on it soon.

John, great SBS on the Tannery landscaping. Especially the change in elevation.

Great group of photos of Karl O's Boathouse. Well done Karl.

Thanks to Bob C for explaining his method of painting and glazing windows.

I noticed in Jerry's article it appears he's using Caboose Industries ground throws on his turnouts. These are what I'm planning on using for turnout operation.

Already looking forward to the September issue

Terry

Comments on our last Issue

Hi John.

What's on my workbench - The Dick Elwell Co. Tannery is looking great, John. The overall scene on page 68 shows it blending in very well with the other buildings of Isaactown.
The F&SM - There are always new gems to find on this wonderful layout. The two coal companies on either side of the tracks just past the turnout leading to the outermost siding is a perfect example. The shot with the signal box at right and Gorre in the background is also fabuluos.
Karl Osolinski's workbench - A wonderful rendition of the F&SM's boathouse. The multiple wharf heights and decks really pack this structure with interest. The photos with the pile driver in the foreground make for a very complex scene and demands further study.

Cheers, Mark.

What's on my Workbench - The Building of Isaacstown - Part 32

John Siekirk

Structure Builds covered in this issue: Butcher's Way (FSM Kit JS-11)

You will recall that about three issues ago I decided to concentrate on one structure build at a time for this article. In our last issue I completed the Tannery complex and now I'm going to go back to the structures on this baseboard for the lower level of Isaacstown. We left off withJim McGee's Fine Furniture about 90 percent completed, and the main structures for Butcher's Way about to be glued down on the baseboard. This article will get us caught up so all future builds will be complete from start to finish.



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Peel and stick LED's were added inside the structures before they were glued down. I also added a goose neck lamp on the outside of this structure and ran the wires inside before glueing.

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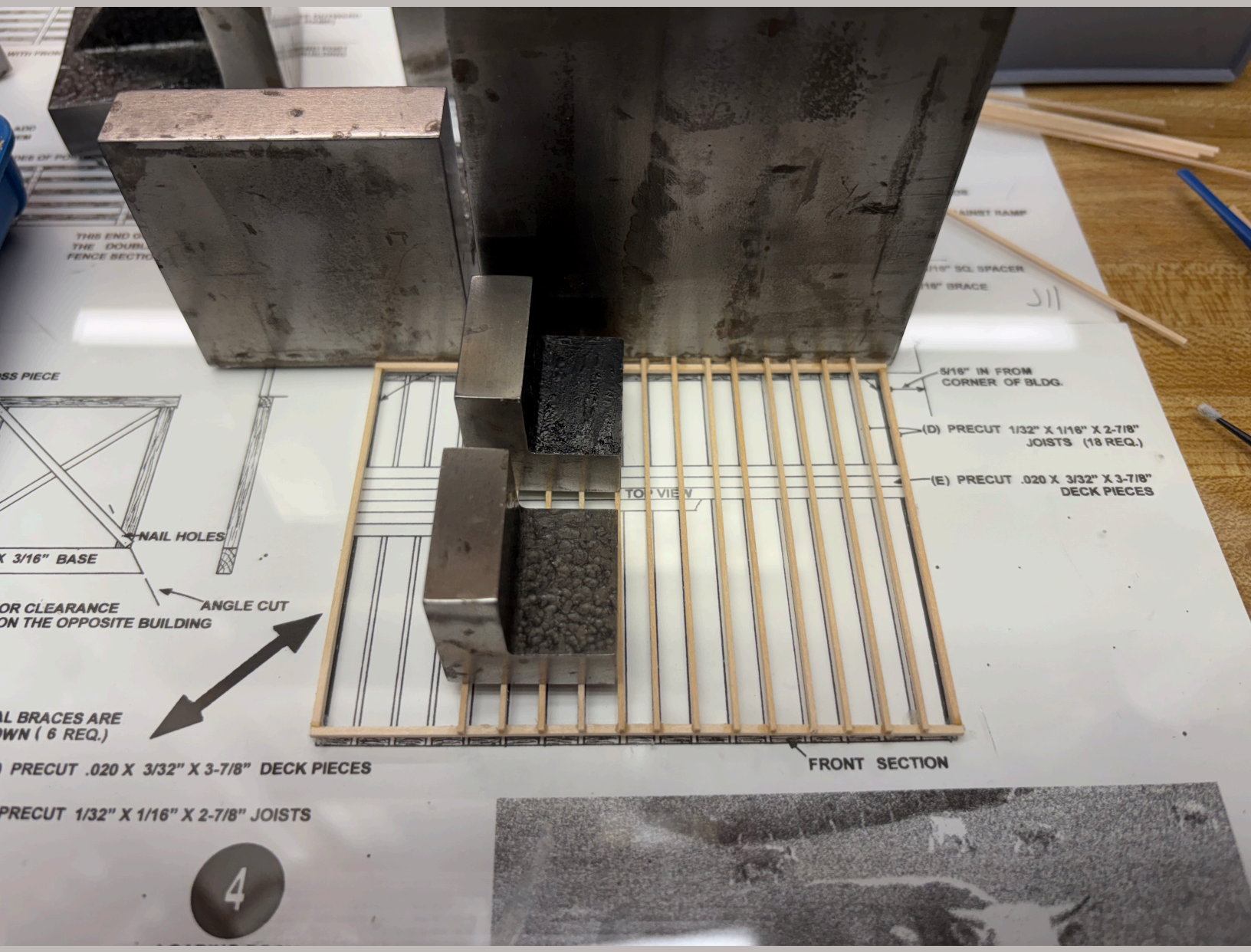

Once the location was determined for the main structures and they were glued down to the baseboard, it was time to build the loading docks. I built them over the construction cards from the kit when possible. Because of the shape of my lot for this complex on my layout, a few of them had to be modified.

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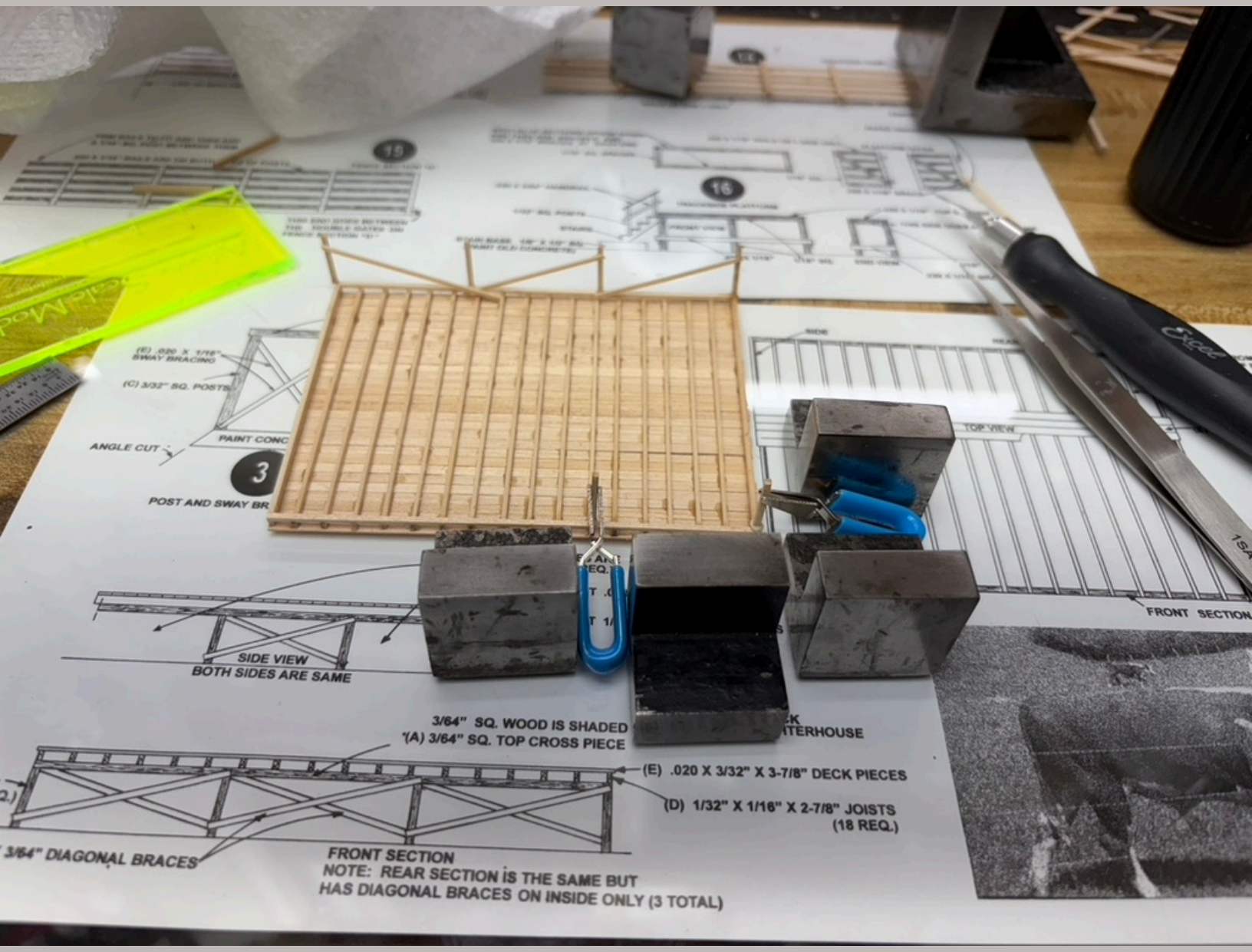

Adding the legs for the loading dock after completing the deck on top of the rafters and frame. The dock has been flipped over after completing the construction over the template.

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All of the strip-wood used to construct the loading docks was weathered with one of my rasps to create wood grain. As I mentioned in our last issue I have a number of rasps with different teeth configurations and try to have a number of different grain patterns in the wood.

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This is a photograph of the baseboard when the third and final main Butcher's Way Structure was in place.

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After installing the butcher house loading dock, the next step was to create the holding corral. I built the fence sections over the templates provided in the kit but made many modifications to match the configuration on my baseboard.

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The loading ramp and the start of the fencing. I drilled holes for the fence posts right into the plywood base. The first coat of AK black mud has been applied to the plywood for the corral ground cover. I also added another goose neck light above the entrance to the butcher house.

I have added just a hint of required repairs to the roofing with a couple of raised metal panels. I'm modeling this as a running business that is just behind on the required maintenance. The metal roofing is rusty but still in good shape.

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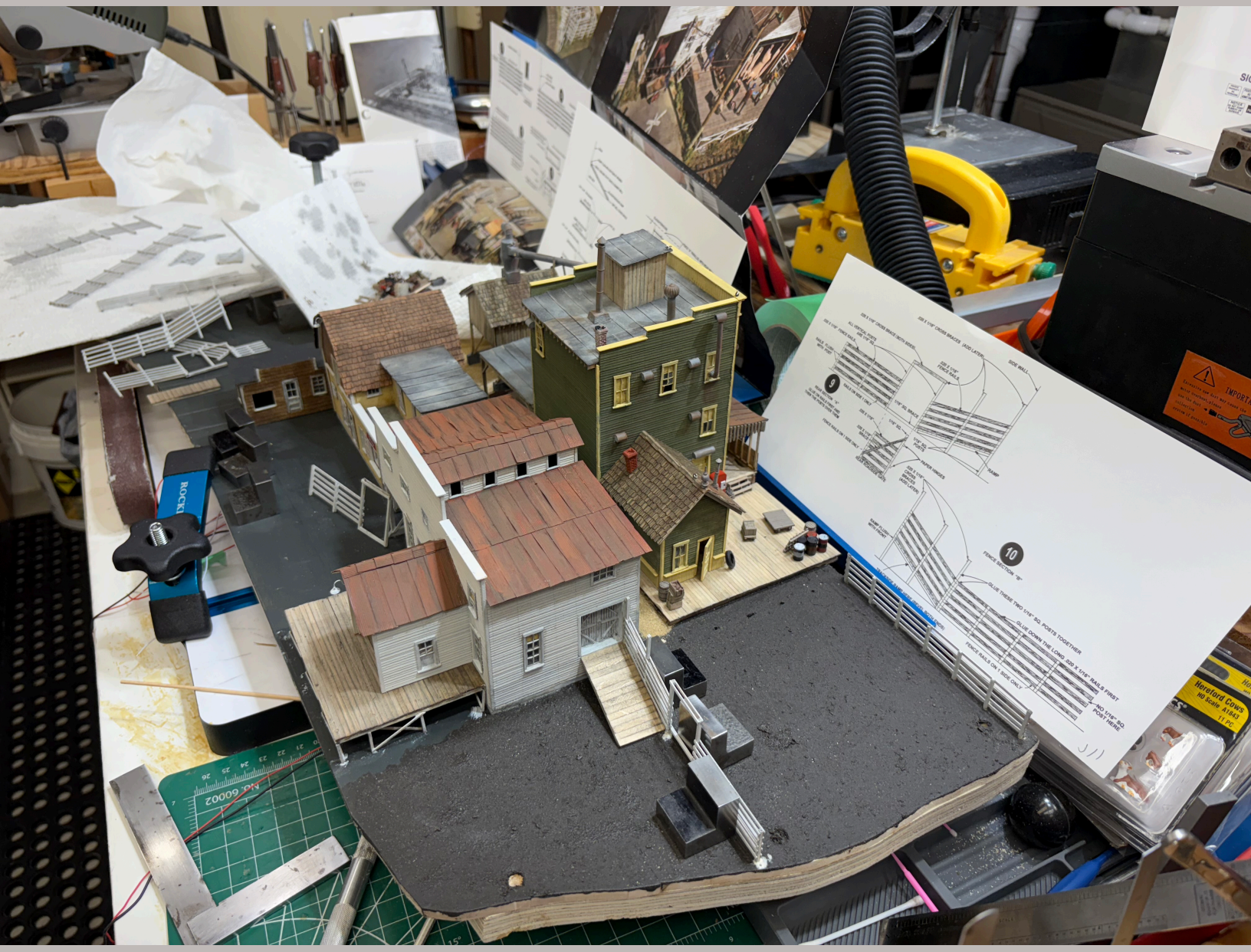

Here is another view of the fence going in.

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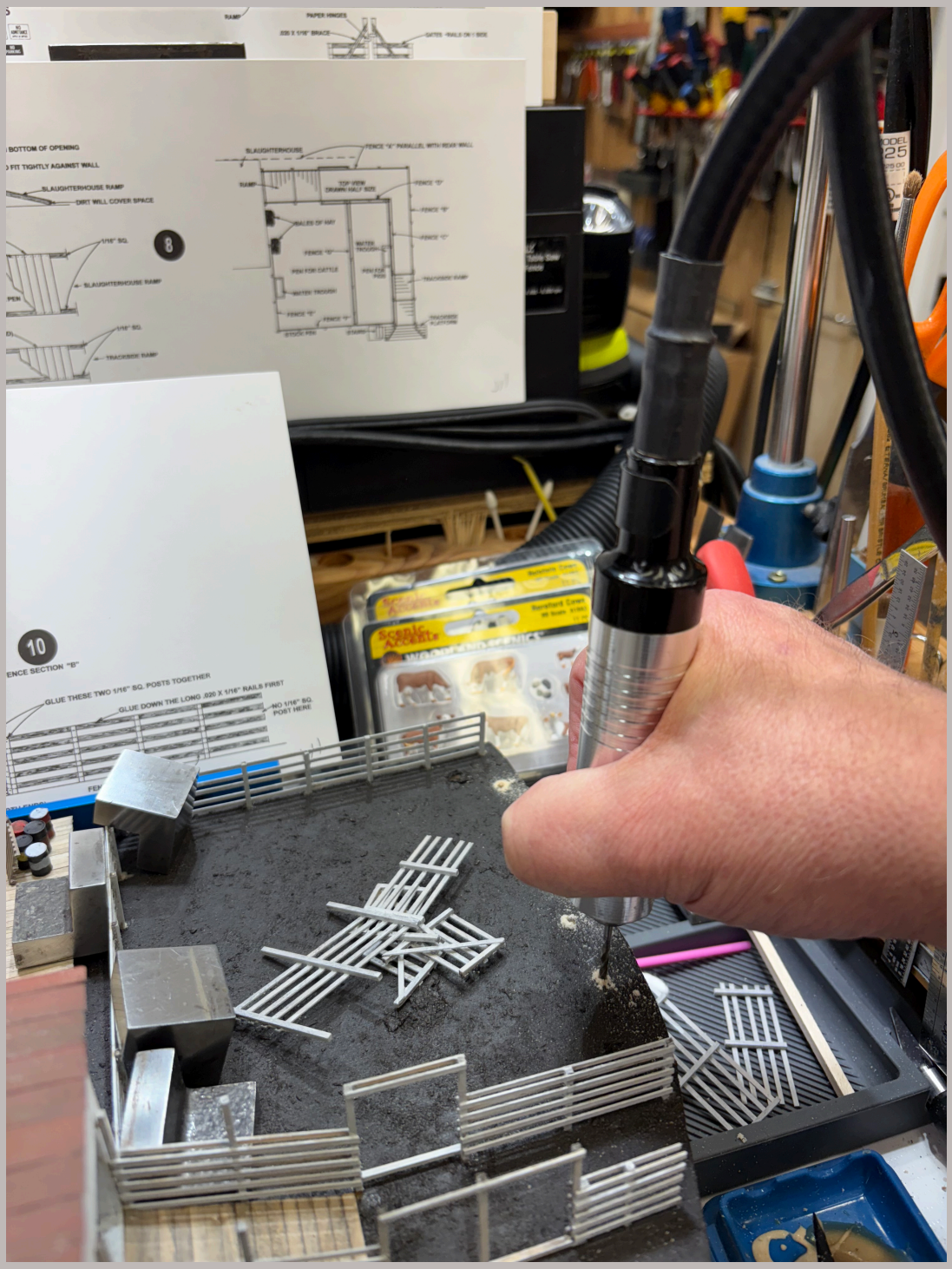

Digging fence posts in HO scale. Much easier than doing it 1:1 scale - I learned that spending summers working on my Grandparent's farm.

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Adding the legs to the observation deck - this was custom made using a cardboard template that was cut to size with the baseboard on the layout. It all started from the rough sketch shown below.

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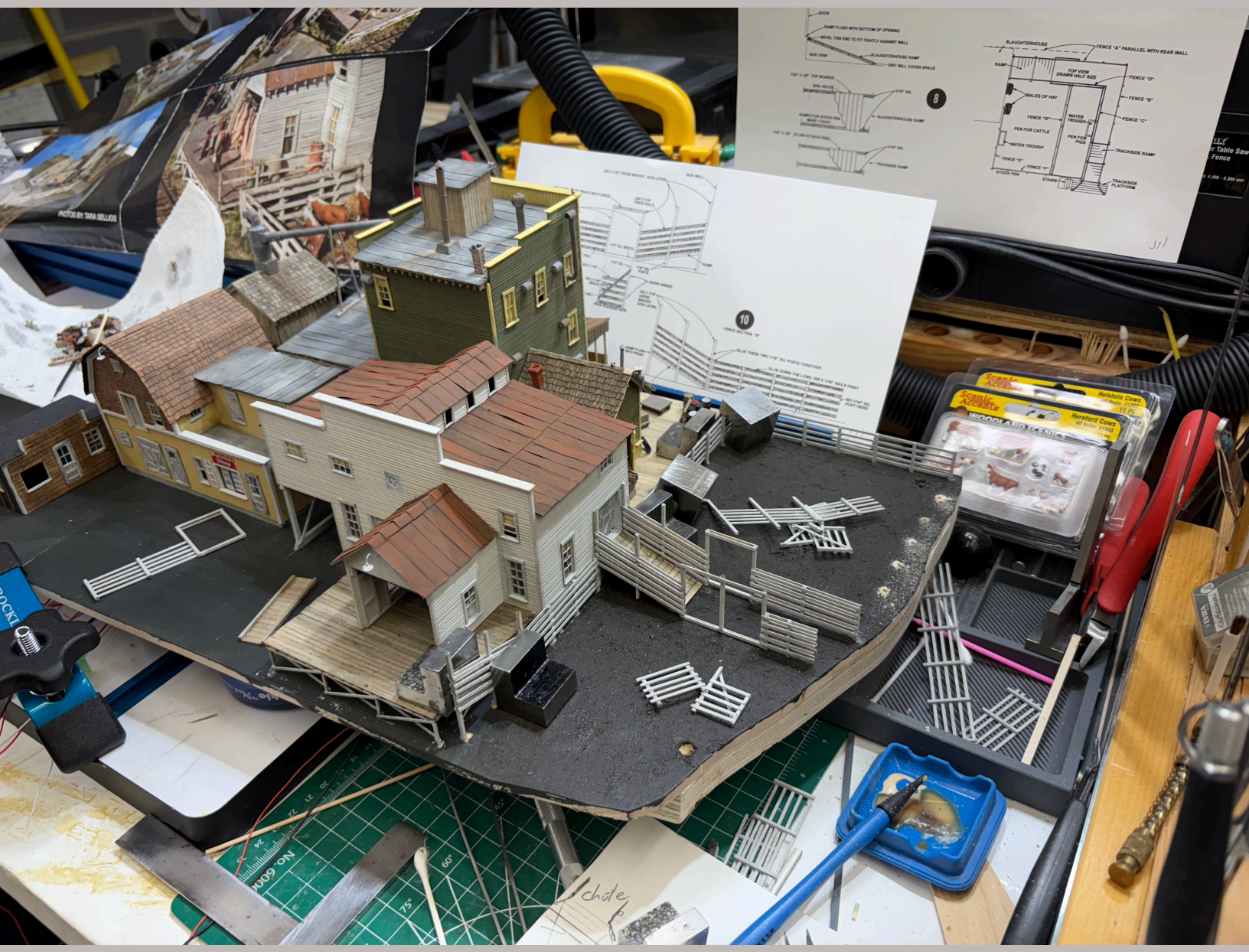

Corral installation progress photograph.

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The baseboard was placed on the layout for a test fit before designing the observation platform.



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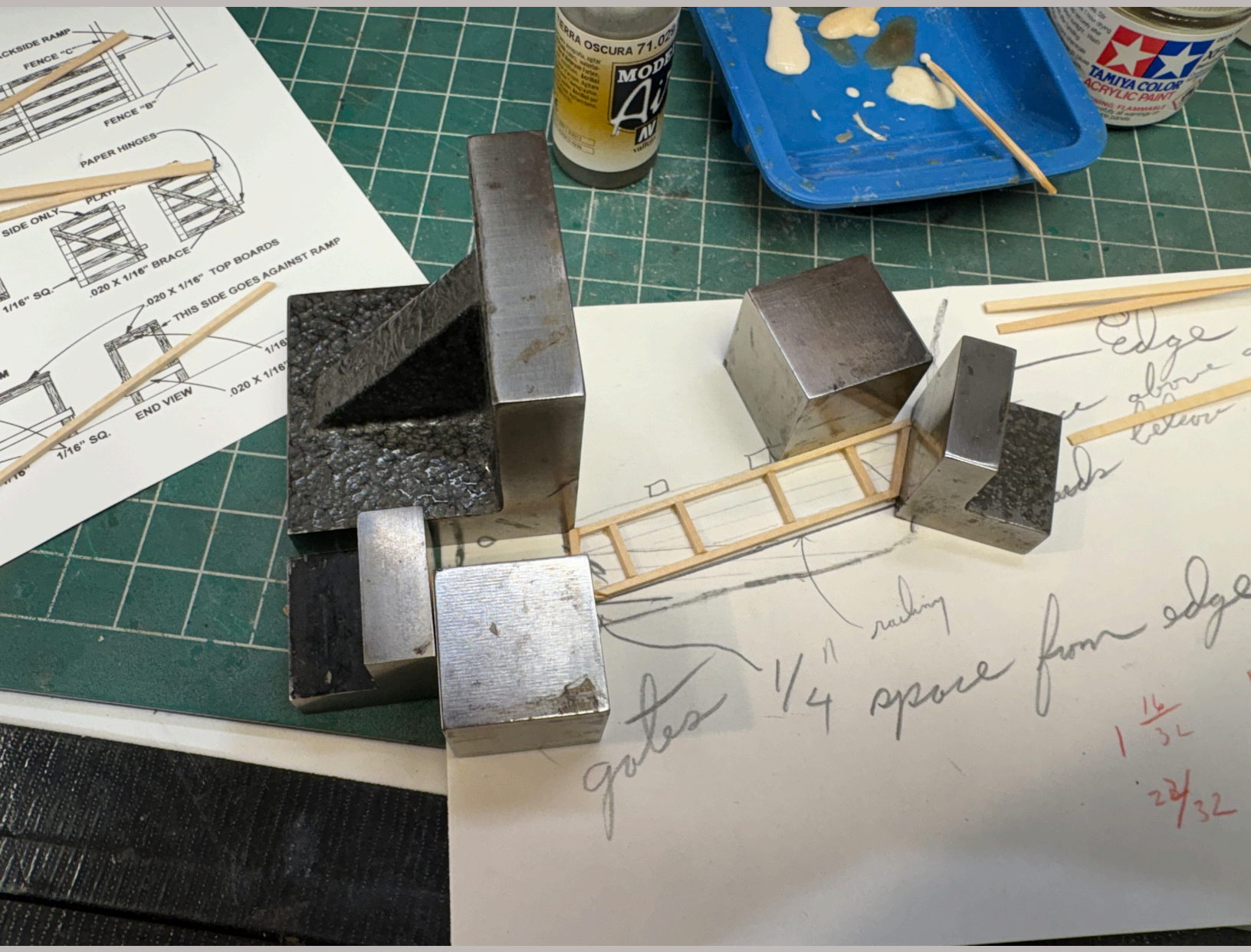

Building the frame of the observation deck over my sketch.

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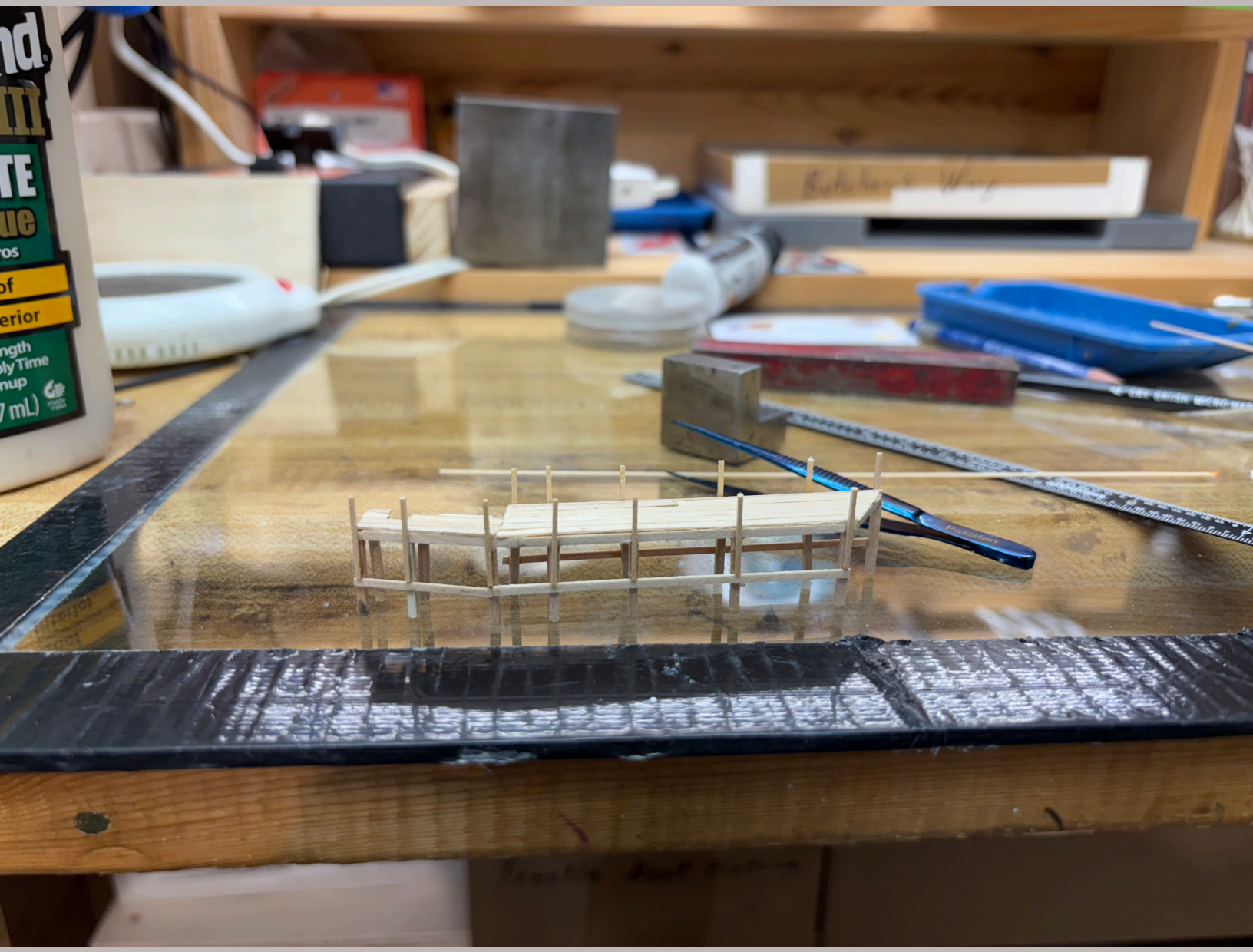

In this photograph the legs have been completed and the deck has been flipped over so I can add the hand railings.

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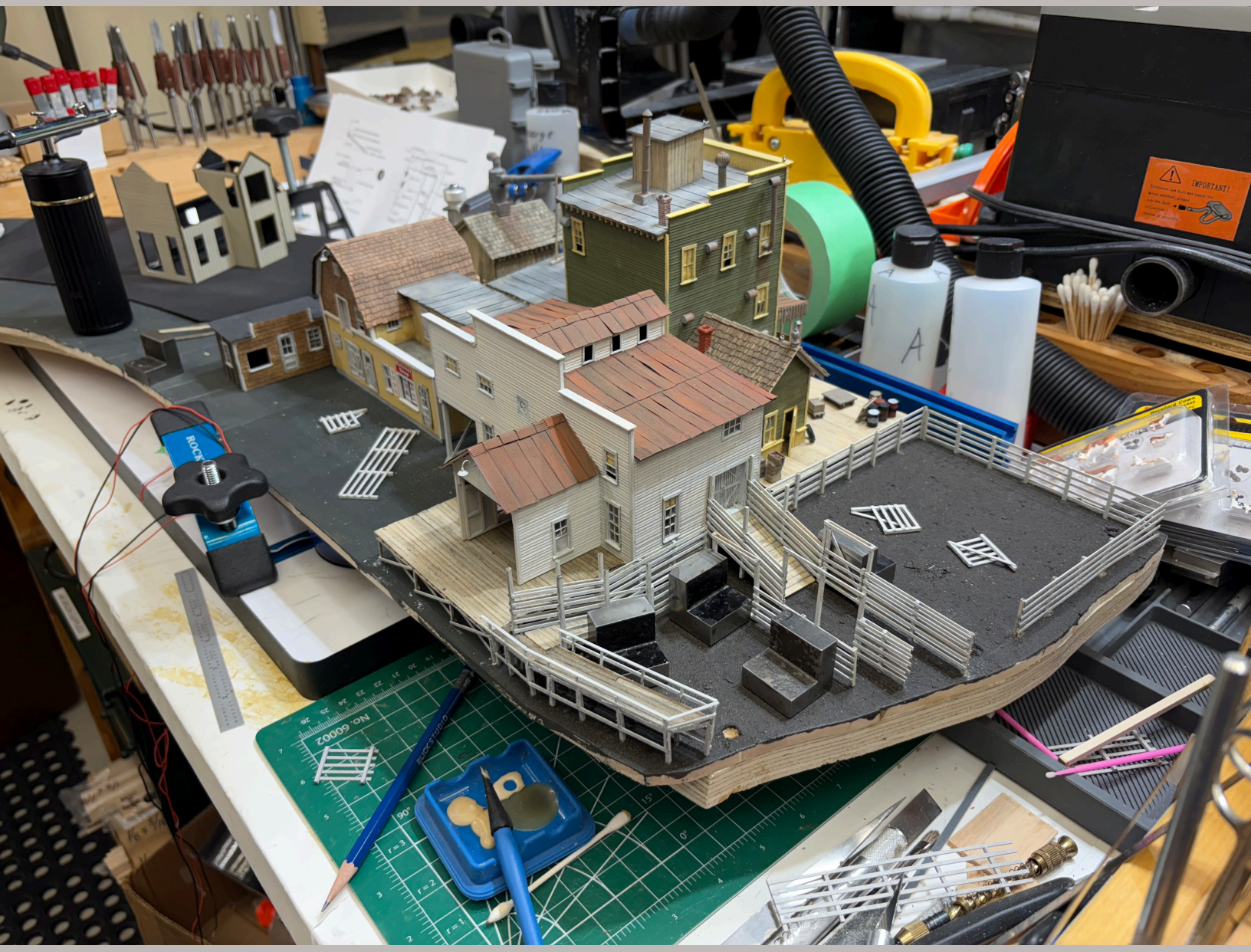

The observation dock in place in the corral.

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Scenic Accents
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Adding the final sections of corral fencing.



Finished corral fence with a start on the scenery materials.



Before moving on with the Butcher's Way Build, I wanted to get the concrete roadway in place. I used 1/16 inch thick task board for the road. This would set the lot size for the rest of the structures on this baseboard. The task board was cut to fit the pavement space and then painted.

Note: I purchased my task board from Dick Blick.

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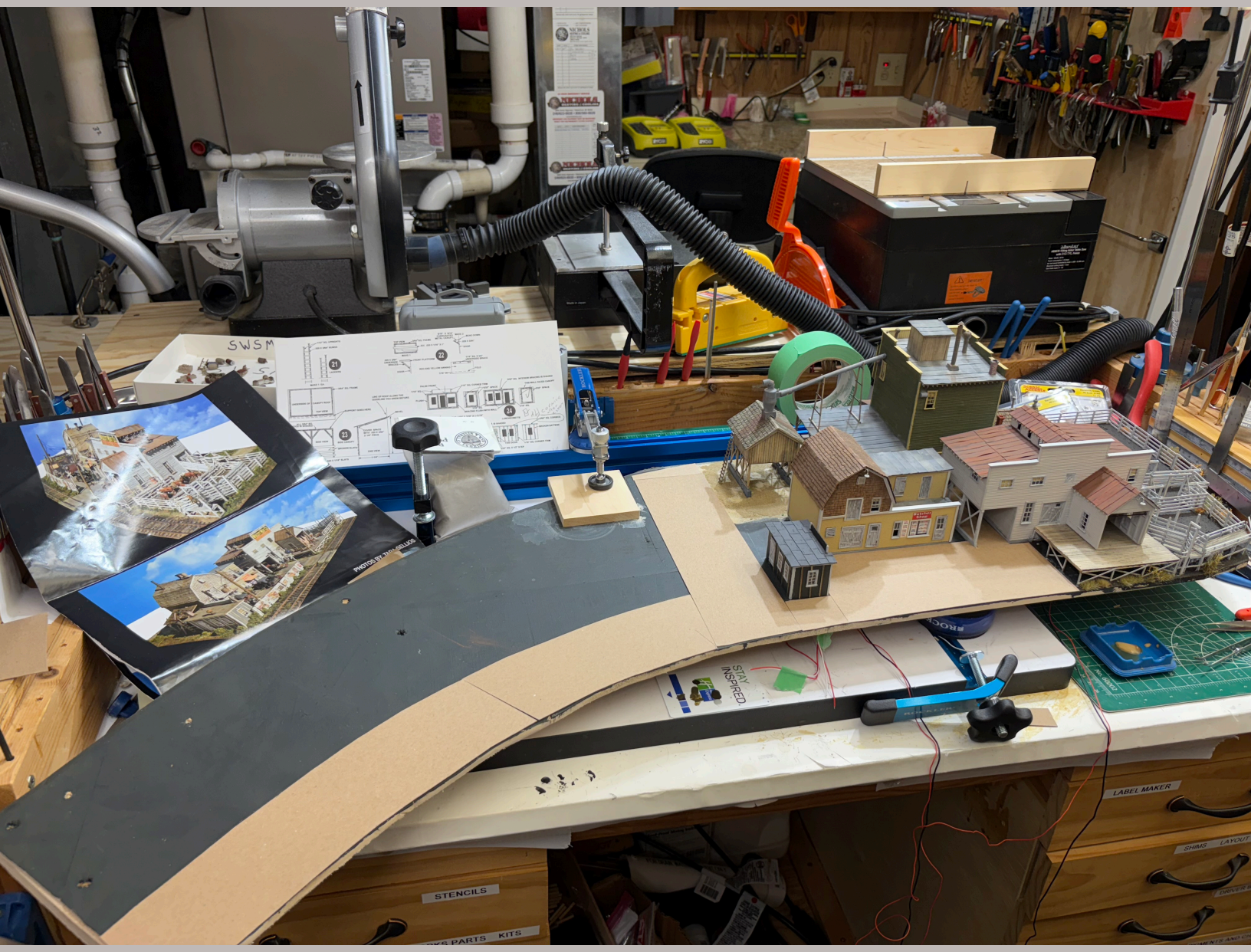

The task board fitted in place and ready to be painted.

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Gluing down the painted task board. I used a grey primer spray can that will look like concrete if it shows through the top coat.

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For the pavement I used Arizona Rock & Mineral Co's. Rock Powder pigment #1290 called Concrete Paving. The Rock Powder (you can see it on the spoon) is mixed approximately 50:50 with white glue. I add enough glue so it becomes a thick paint (see photographs below).

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The paving begins.

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I make the first coat as even as possible (it self levels somewhat) and then let it dry completely (a few days).

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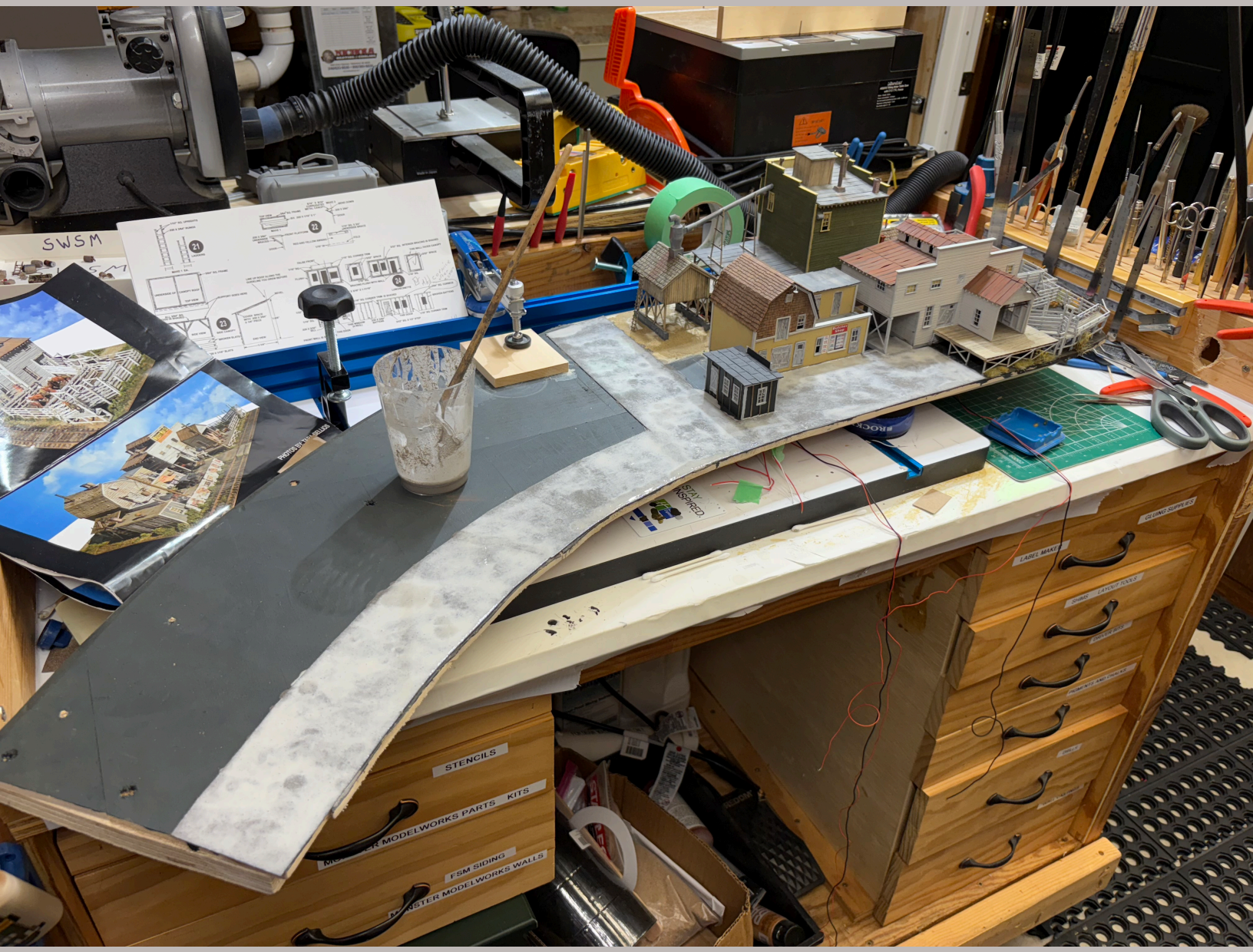

This is what it looked like before I left it alone for a few days and went on to what was on my detailing workbench.

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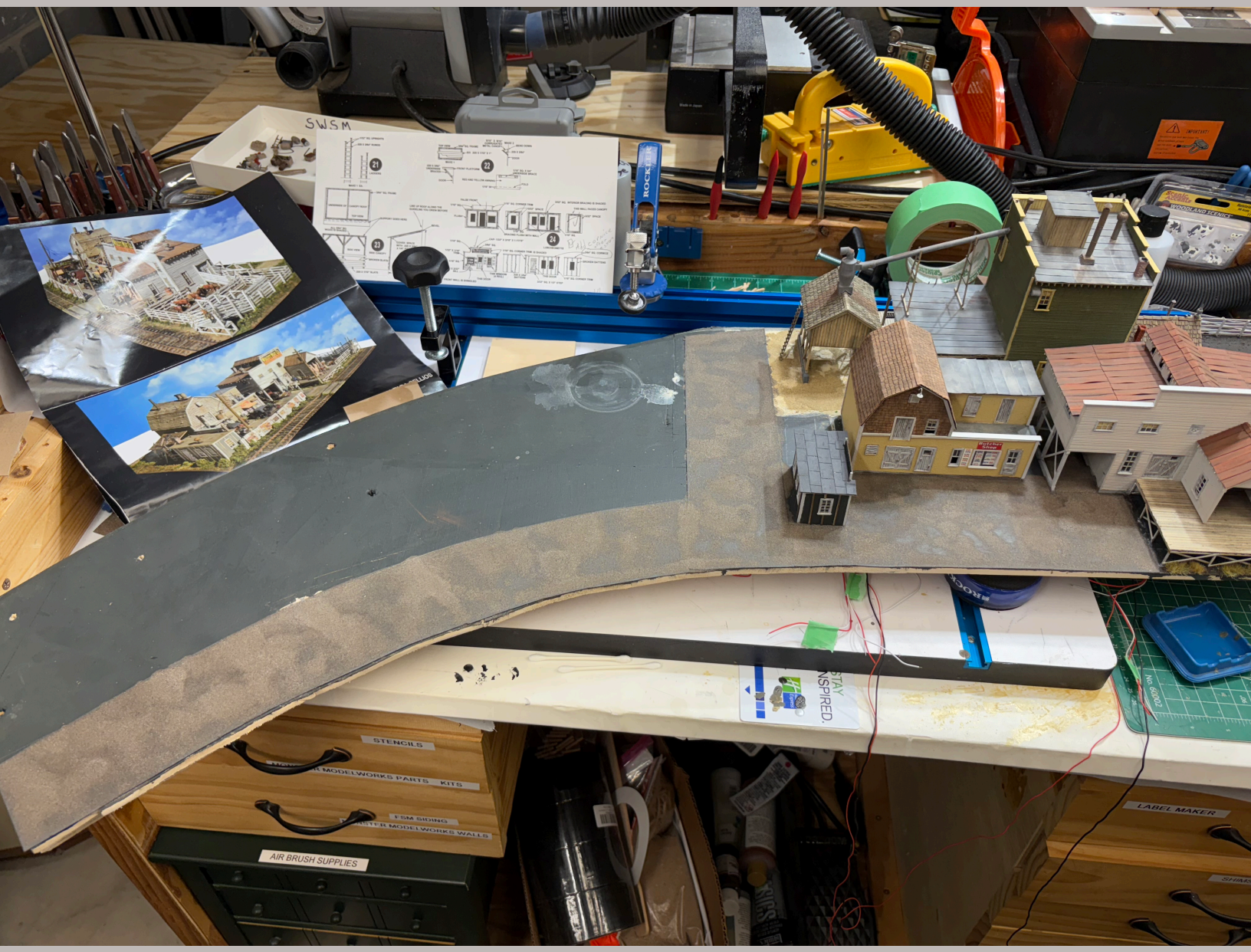

This is what it looked like after the first coat of the concrete mix dried.

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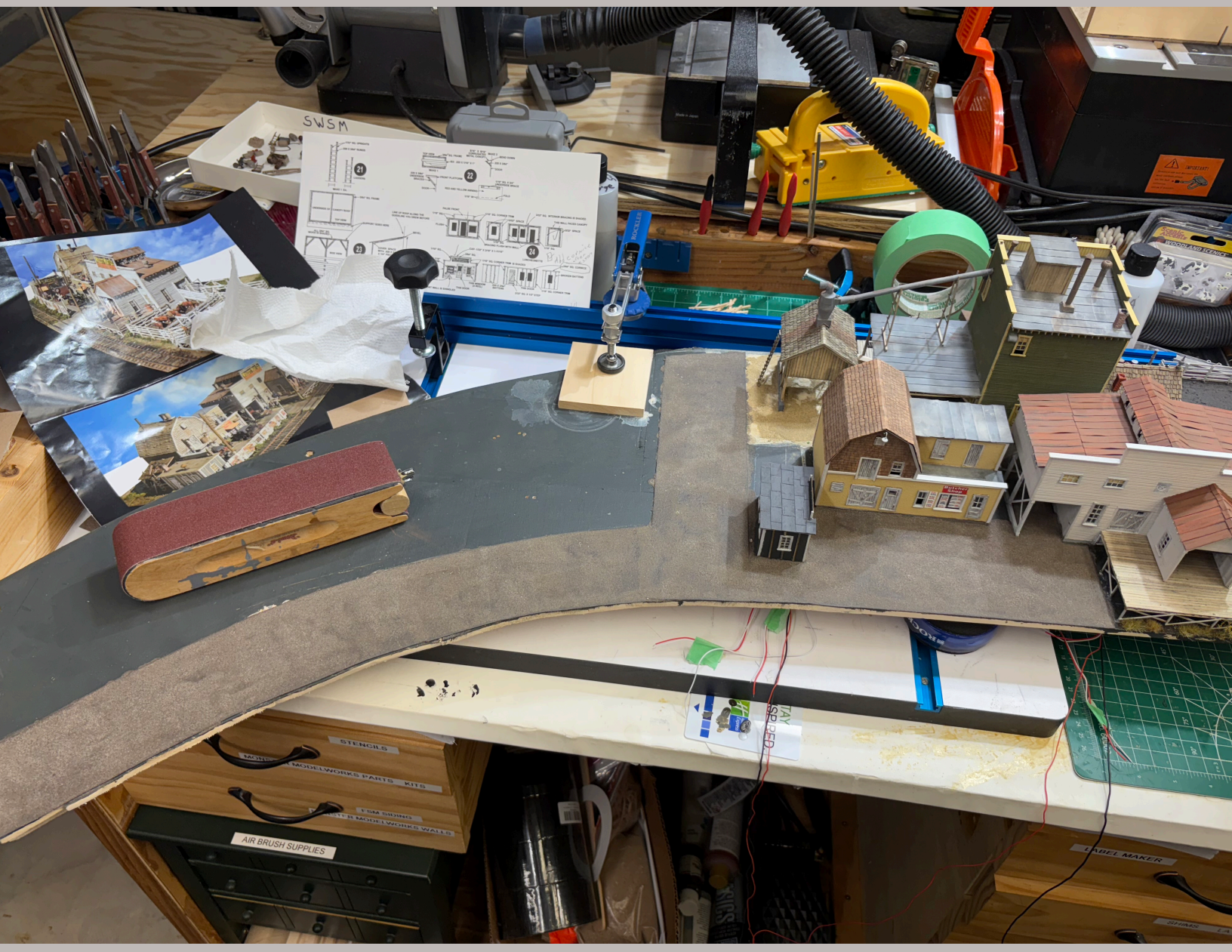

This is what the concrete looked like after the second coat dried. I'm about to take off the high spots with a sanding block.

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After removing the high spots with the sanding block. The concrete mix turns much lighter when you sand it.

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In this photograph the expansion joints have been added using a square and a scribe. I start the coloring process with two colors of pan pastels. The concrete will be weathered once it is on the layout and all of the pavement on multiple baseboards can be colored all at once.

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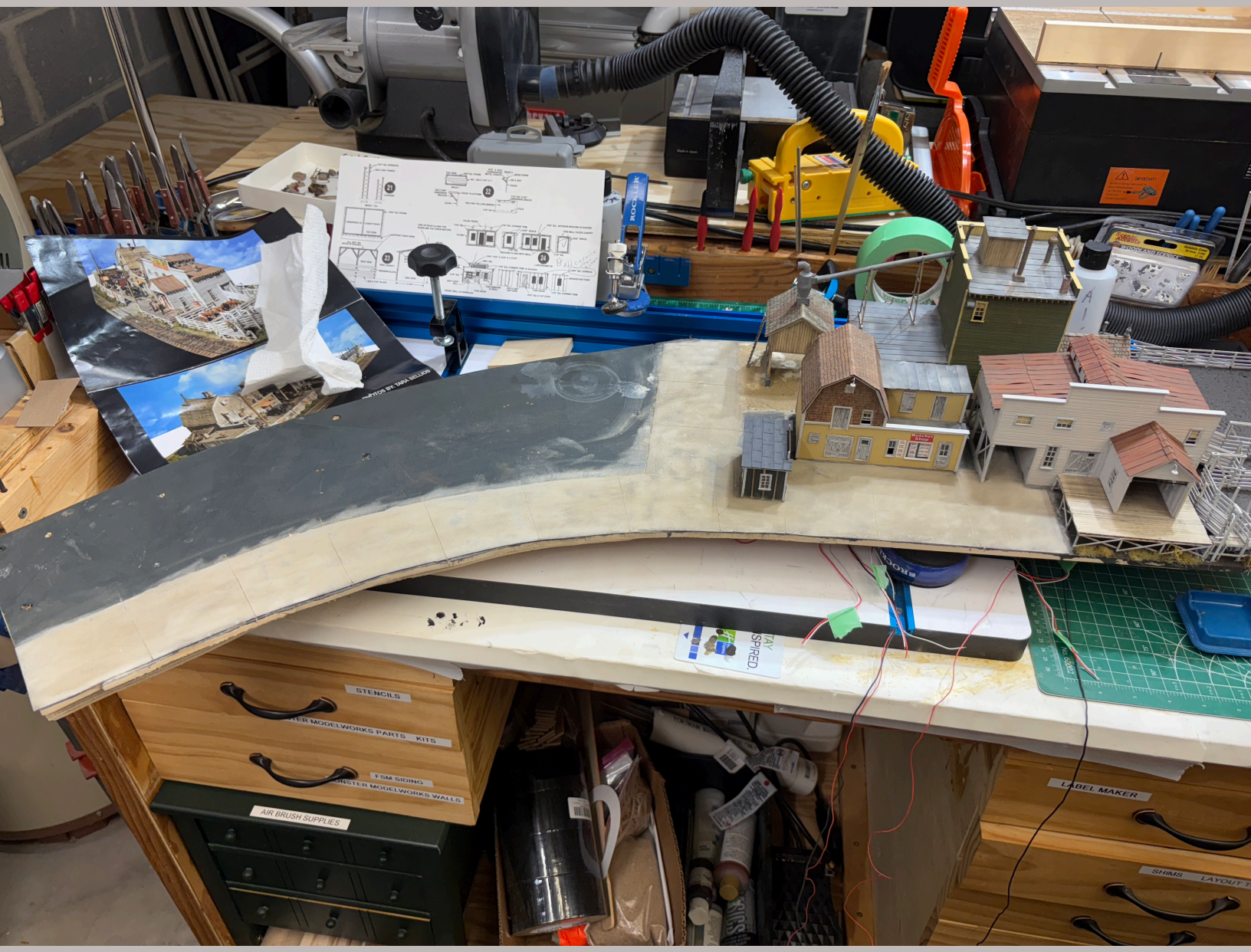

In this photograph all the pavement has been colored with the initial coating of pan pastels.

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At this point, I started to add the detail castings which makes this scene come alive. This is a slow process the way I do it. I add a few castings, and then walk away and work on something else. When I come back, I add a few more by looking for realistic places to add more details. When possible I try to have a story behind the placement.

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The butchered cattle provided a unique challenge when it came time to painting them. I pulled some photographs off the internet to use as a guide. I took a few photographs of the process, shown below. I grew up on my Grandparents farm so I have participated in the butchering process - the experience really helped with this build.

The truck in this photograph is a test placement. In the future I will have a full article or series of articles on vehicles for the S&S RR.

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There is a first time for everything. Painting sides of beef. Photographs from the internet.

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First task, finding the right colors. This took some experimentation. I had primed the castings with my “earth color” called Israeli Sand color from Vallejo. This has replaced my rattle can khaki for priming since my experience with rattle cans leaking. I have written about this in the past but I had some rattle can explode on the shelf and make a big mess a few years ago. I have since gone to using mostly the airbrush for my spraying needs. I still have some rattle cans in the shop but not any of the cheap ones that were our go-to’s 10 years ago. I cleared out a cabinet that is closed to store all of my spray cans, just in case.

Note: If I had this to do over again, I would prime these castings with white like we use for figures.

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Here we have a close-up of the sides of beef after the painting process. The two colors that I ended up using were Vallejo 71.075 Sand (Ivory) and Vallejo 70.926 Red. These colors matched the photographs I found on the internet. George supplied more castings in the kit than I needed for the rack in the doorway, so I will be placing some once the build is on the layout. Probably in a mini scene on a cart going into a truck.

I should note that I first tried the flesh colors I use for painting figures on these casting but they did not work, at least to my eye. The colors I used were the second try. I then gave the castings a coating of A&I to make the rib detail pop.

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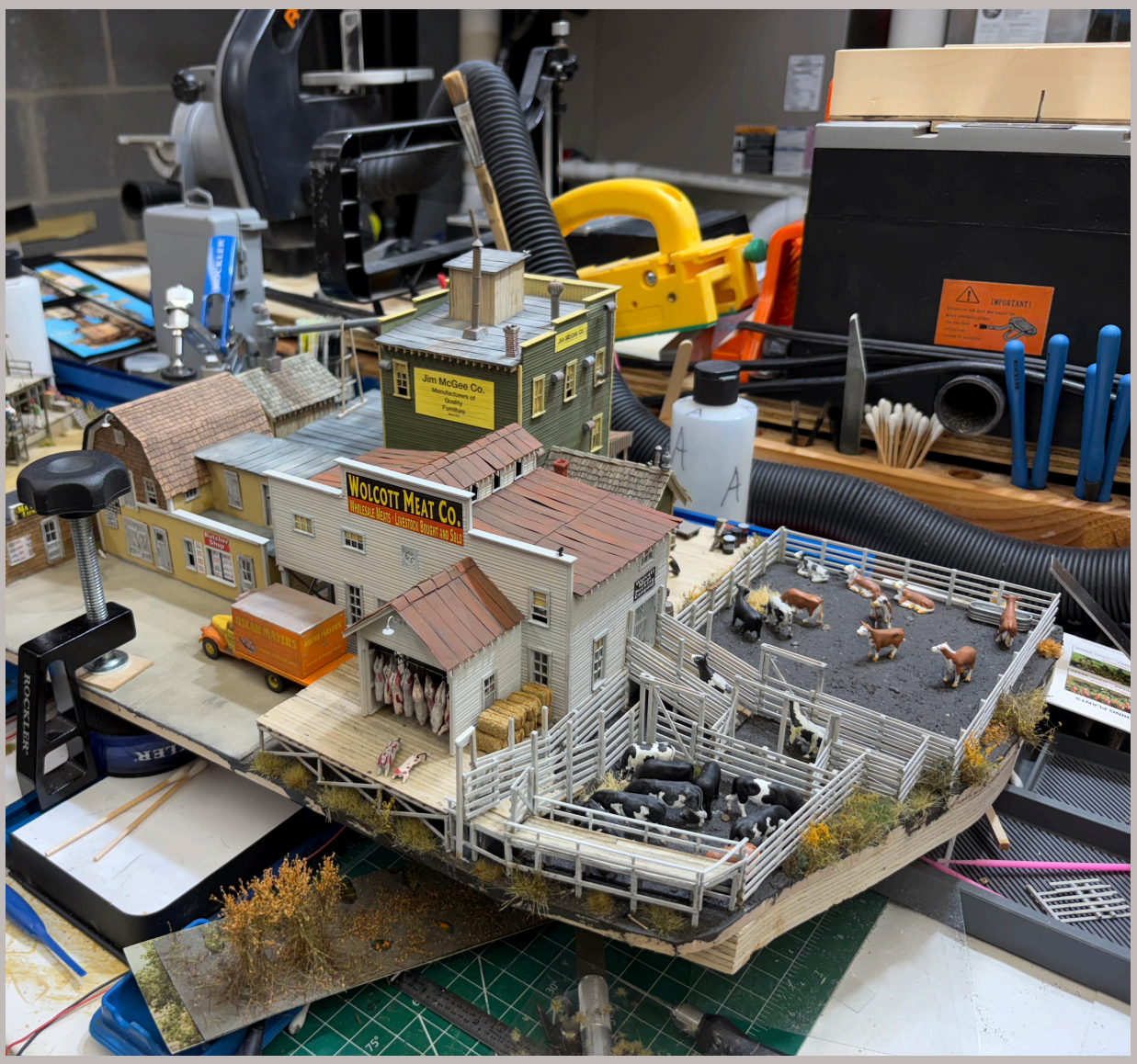

At this point, I have added as much detail to this build as I want to on my workbench. This structure is going to be very close to the front of the layout and I can add the details on the layout without reaching over other structures. I have also decided to add most of the roof details with the baseboards in place on the layout. I find that I will be reaching over these up front structures to add details to the structures behind them and it is better to wait or I just end up with many repairs.

Next month, we will start the build of George's FSM kit J-12 Oatman's Mercantile which will be called Christopher's Mercantile on the S&S RR for my nephew Christopher. This structure will go just across the road from Wolcott Meat Company.

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The Franklin & South Manchester Railroad - Part 41

John Siekirk for George Sellios



This issue we are going to start out in Filmore Yard, across the aisle from West Manchester. We are about to enter the Filmore Depot. The new town of Gorre can be seen in the distance behind the depot.

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The turntable on the left was near the end of Fillmore Yard and marked the end of the Franklin & South Manchester Railroad before the addition. George's spin casting machine was in this corner of the building and the space for Gorre was freed up when he sold it.

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We finish this month's article with a few photographs of the structures in this area taken from the aisle. In the background of this photograph we can see Trainor Industries that was moved here from West Manchester with a long wait sitting on the shelf in the storage room.

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In front of “The Home of Trainor Industries” we have T. McAvity & Sons. This is at least the third home for this structure over the years.

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F. P. Collins Paint Company also found a new home here.

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This switch tower controls the entrance to Gorre.

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Next month, we will continue our journey into Gorre.

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Karl Osolinski's Workbench - Part 13





Karl's bridge build. All photographs by Karl Osolinski.

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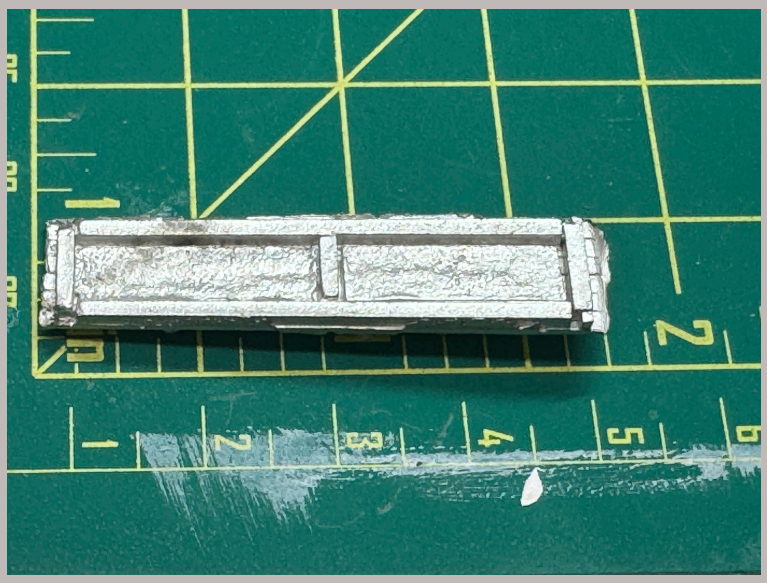
Here's a quick photo essay on how I took BEST tabletop castings and turned them into complete tables.

David Emery

I'm using BEST Set 3, along with their vise casting. For the legs, I'm using scale 3x3, and for the cross pieces scale 2x3 (sorry there's glare on the bag of 2x3 stripwood.



The first step is to clean up the castings. The larger table needs a bit of work to carve out flash so the 3x3 post fits into the corner. I do that with an X-Acto #11, being careful to not carve too much.



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Then I soak the castings for about 30 minutes in a solution of vinegar and dishwashing soap, rinse and let dry. Next I prime with Badger Stynlyrenz neutral yellow primer. This is a good wood tone. I let this cure thoroughly for a day before I do any more painting.

Since most of what's on these workbenches are metal parts, I'm using a set of different metal colors from Green Stuff World, including Silver, Gunmetal and Tin. I also use Vallejo Black Metallic. I'm using a cheap palette, putting a drop of each metallic into the cup, along with a bit of Titanium White and some water. The blue is used for the coffee cup cast on the larger table, and the roof brown for the wood handles. You can also see the 2 brushes I used for this, a 1/8" angled shader and a #1 pointed brush.

Once that paint has dried, I squirt everything with a relatively heavy coat of Alcohol & Ink wash, and let this sit overnight. The alcohol will soften the acrylics, so that needs to completely dry.

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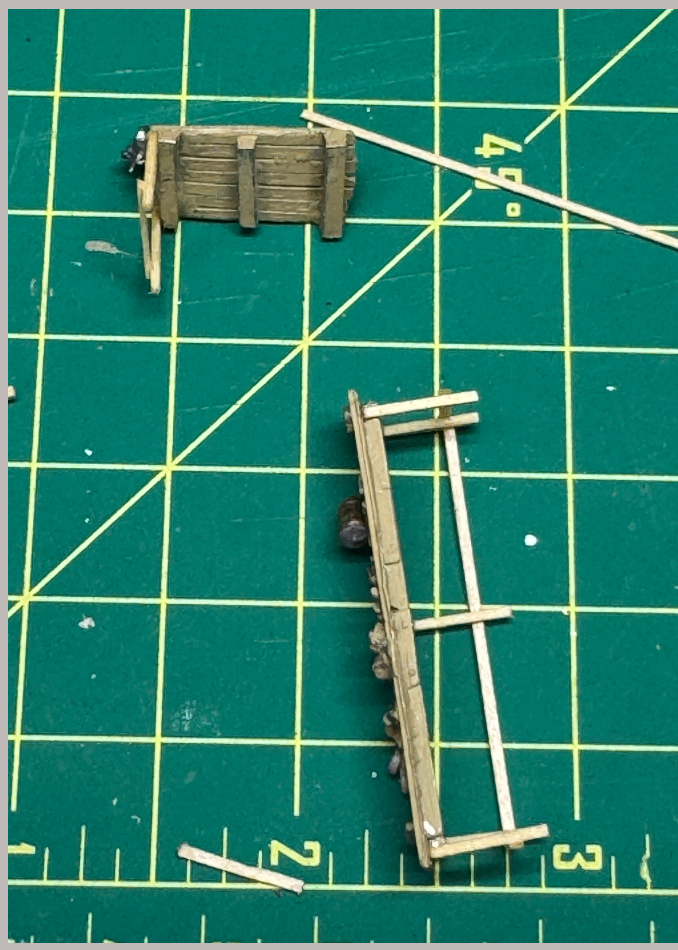

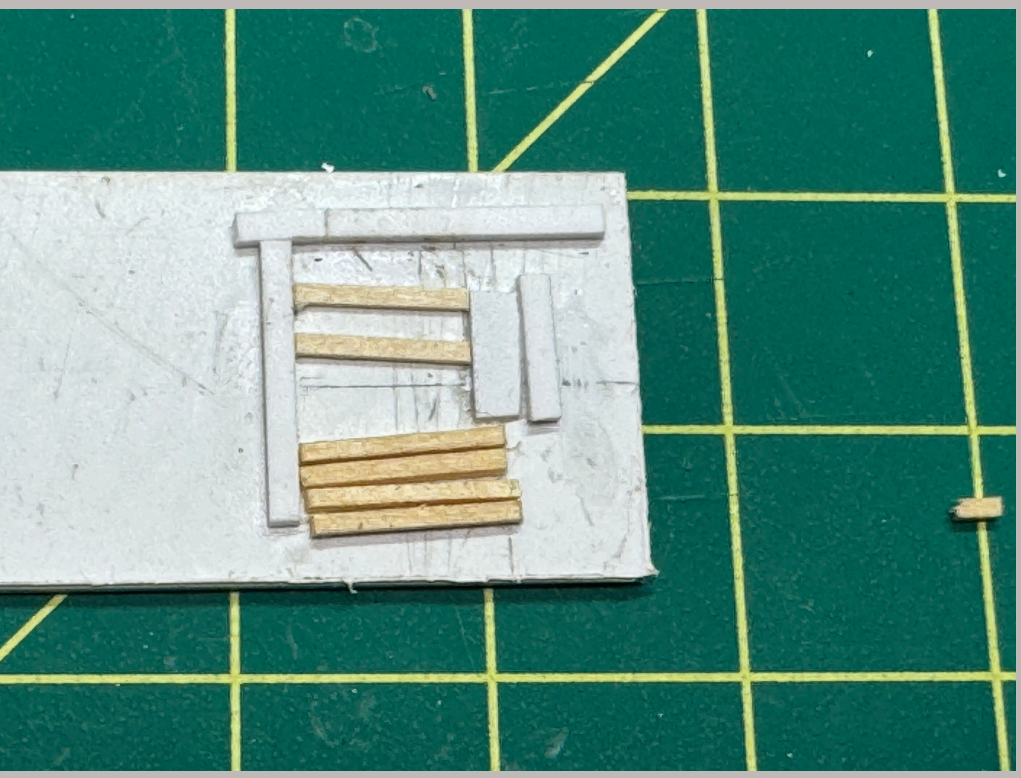

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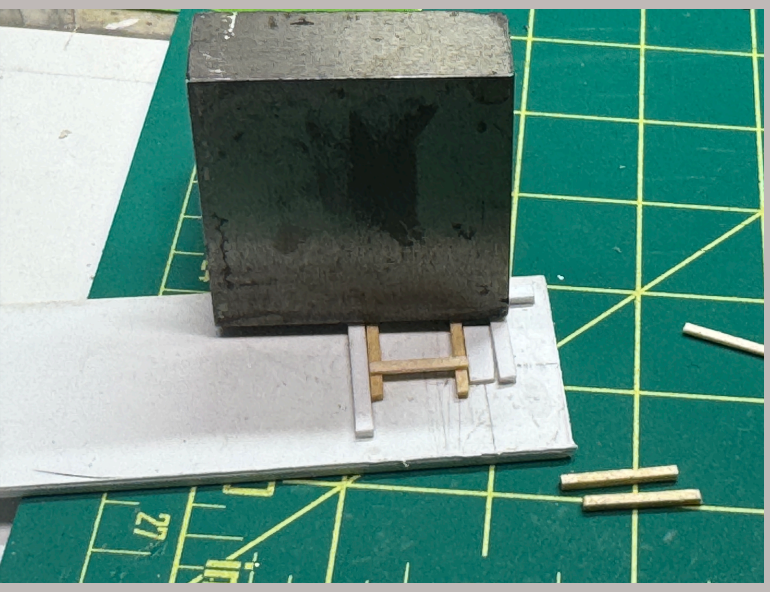

The next step is to construct the legs. The legs are scale 3' long. I constructed a little jig from styrene that lets me cut 3' length legs, and then assemble 2 legs and a cross-brace. This is set for the smaller table, which is wider. When those legs are assembled, I'll add another piece of styrene to shorten the distance between legs for the longer table.

Now if you use styrene strips that are slightly less thick than the scale 3"x3" legs, you can actually put a small weight on top to hold things in place while assembling. You want to use a wood glue that has good initial tack and good strength for this.

Finally, you can glue the legs to the tables. This sounds a lot easier than it actually is, it's fussy work. I use medium viscosity CA, so I have a bit of working time. Once the legs are on, flip the table over so it's sitting on the legs. This uses the casting weight to help clamp the legs, and you can check to be sure the table sits level.



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Progress on the Shadowlands and Tellynott Railroad

By Mark Dalrymple

I've been working away on the layout over the last couple of months, spending a good amount of time working on track laying. As I make my way around the layout, I find myself still with a few decisions to finalise, and sometimes the track laying must go on hold while I mock up a scene and perhaps add a bit of new benchwork. I've copied off the latest version of my track plan and am highlighting the track in yellow as I lay it. I find it motivating to see my progress on paper, and this also helps keep me on track (pun intended), as in laying track in a coherent order. There are a couple of difficult areas to go, but it would be nice to be able to get some operation going in the not-too-distant future. The summit line is an area that will take some time to complete. It requires three large, complex bridges – the John Allen High Bridge (a bridge inspired by John Allen's famous bridge of the same name), The Edith Cavell Parabolic Arch Bridge (a bridge I will need to scratch build, based on a New Zealand prototype), and a tall timber trestle (again, scratch built).

A second area that will be tricky is the replacing of the 'sandwich' of polystyrene with 16mm MDF around and between all the structures in Tellynott. I have begun this process, as documented in the April 2025 issue of the Gazette, but there are still several complex sections to go. By doing the section in the corner, in front of the original corner diorama, Tellynott could become the origination point for operations and the benchwork replacement at Tellynott South could be left until a later date.

A third section which requires the building of several bridges before completion is the loop spanning from both the left and right, just above the river beside the Snowy River Battery. This area requires the construction of the tall steel viaduct (well underway), Furlow's Folly (also well underway) and the Campbell Howel truss bridge. This section is higher up my priority list, as it connects the towns of Hope and Wilmot with the rest of the layout.

You can see I have laid track at the end of the North Hope yard. This was done so that I could permanently attach the MDF above and connect the helix with the trackwork at Hope. The second section requires the completion of the North Hope yard beneath, including the wiring of an electrofrog double slip and instillation of micro switches – which will be a first for me.

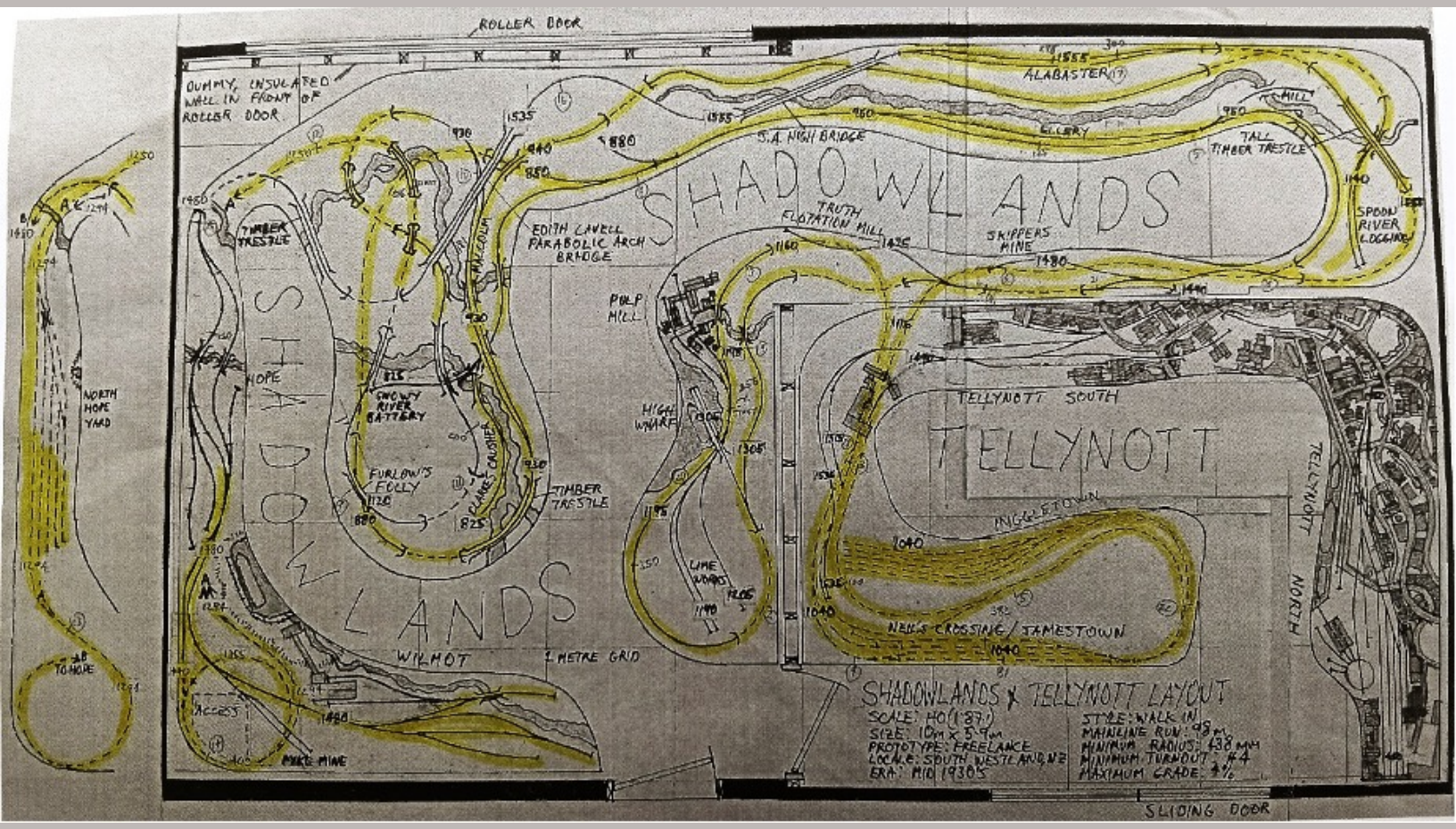

Figure 1 Photograph of my plan showing track laying progress highlighted in yellow.

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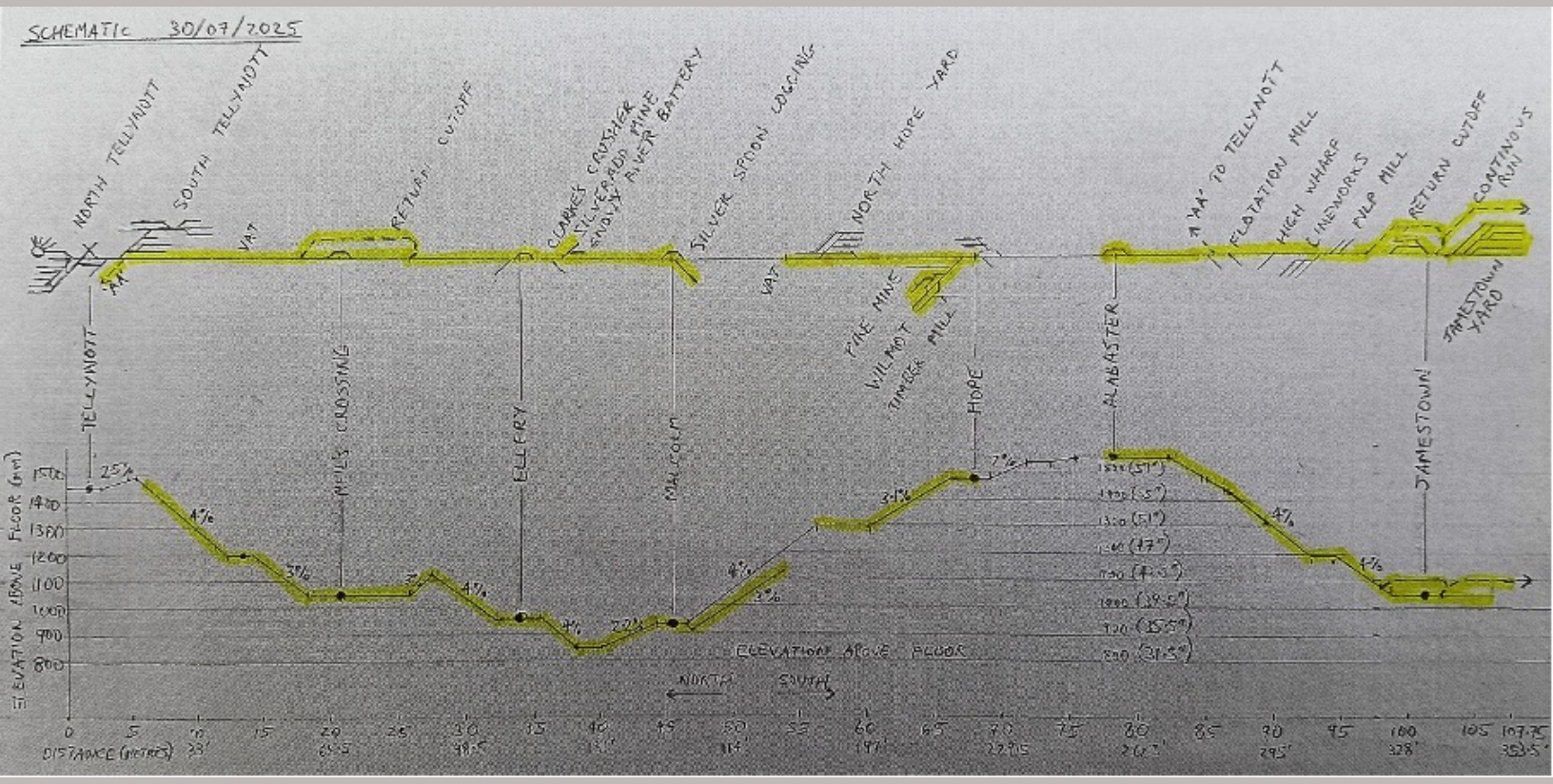

Figure 2 Schematic to help clarify my track laying progress and priorities.

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As I am building a 'spaghetti bowl' layout I decided a schematic diagram would help explain things better. This proved to be quite a task, as it is some considerable time since my last schematic version, and there have been many changes, some quite significant. So here is the updated schematic. Don't be fooled – I still have two unopened boxes of Peco flextrack – that's 50 yards – left to lay, along with around 35 turnouts. Tellynott swallows a whole box of flextrack and many turnouts on its own. The schematic clearly shows the two gaps in the main line. The gap between Malcolm and the North Hope yard is the one I am hoping to close in the next few months. You can see that if I also complete Tellynott North, some good operation should become possible. The 'AA' just to the right of Tellynott and just to the left of the Flotation Mill is the turnout which diverts either to Tellynott or to the continuous run. Until the bridges are built between Hope and Alabaster, the line can be operated through to Alabaster by travelling from Tellynott North to Neil's Crossing. After Neil's Crossing the return cutoff can be used to switch the direction of trains which can then travel back past the switch to Tellynott and on to Alabaster. The high wharf, limeworks, pulp mill, flotation mill and Skippers mine would all be switched on the way to, or back from, Alabaster. Trains going to Hope travel to Neil's Crossing and then take the continuous loop line, passing through Ellery, Malcolm, North Hope and terminating at Hope. From here wagons can also be switched with Wilmot. Neil's Crossing is also the interchange with the rest of the South Island, as in my fictional reality the Southern Alps were navigated via the Haast Pass. Finally, logging operations would be possible from the Silver Spoon logging camp to the timber mill at Wilmot.

I've been carrying on with track laying, among other things. We will start at Neil's Crossing/ Jamestown. Firstly, I ripped out all the 50mm polystyrene that I had put in and replaced with 16mm MDF. I decided I didn't want motors buried in the polystyrene. I left a small amount of polystyrene where there were no turnouts underneath. I had the cork glued down to the polystyrene, but track was not yet laid on any of it. I ripped some new joists and put in some new MDF at the correct height. I spent considerable time before laying track, centering the track and marking the front of the sleepers on the cork with a fine marker. That way, once the glue goes on, the difficult job of pinning it down in areas of poor visual and difficult access goes much quicker. It can be lined up quicker. I put one spike each end of about every tenth sleeper. Once done, I check alignment and give a little tweak this way and that from the side with a nail punch. The glue is still not quite set at this stage, so manipulation of the track is still possible. The tacks can be removed and reused once the glue has cured.



Figure 3 - Shows the view under Inglletown (all those polystyrene pieces with buildings pinned to them are above). We are looking straight along the side wall (at left) between the two rooms, towards the corner with Thorndike mills in it. You can see the three tracks just before they get to the curve (at the end of the yard) - that is the track leading to Neil's Crossing at left, the return cutoff in the middle and the continuous run at right. The five yard tracks are in the background and the front three tracks are the storage at Neil's Crossing. I laid the continuous run curved track last and made the track bed removable so I could pop my torso up through the gap for track laying. It was tight and difficult!

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Figure 4 - Here we are around the corner. Four tracks at Neil's Crossing and the return cutoff curving past them. There was a small discrepancy in height between the meeting of the two pieces of MDF here. I decided to bridge the height difference with some shims of styrene. The 'no spikes' is to remind myself I want the glue only to adhere the track here so it will flow nicely in height through the change. You can clearly see here the two tacks on the outside of the sleepers. These can be removed with pliers once the glue has set. I am using Woodland Scenics foam tack glue, which stays flexible after it sets. With changes I have found that I can work a builders snap off knife blade under the track and then wiggle it along to cut the track away from the cork. No water is necessary. The glue can then be sanded from the underside of the track and the track reused. I removed the whole yard I had laid at the old 'Hope' in this way and was able to reuse all 10 turnouts. I had to be careful using the knife blade around the wiring.

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Figure 5 - A side on view.

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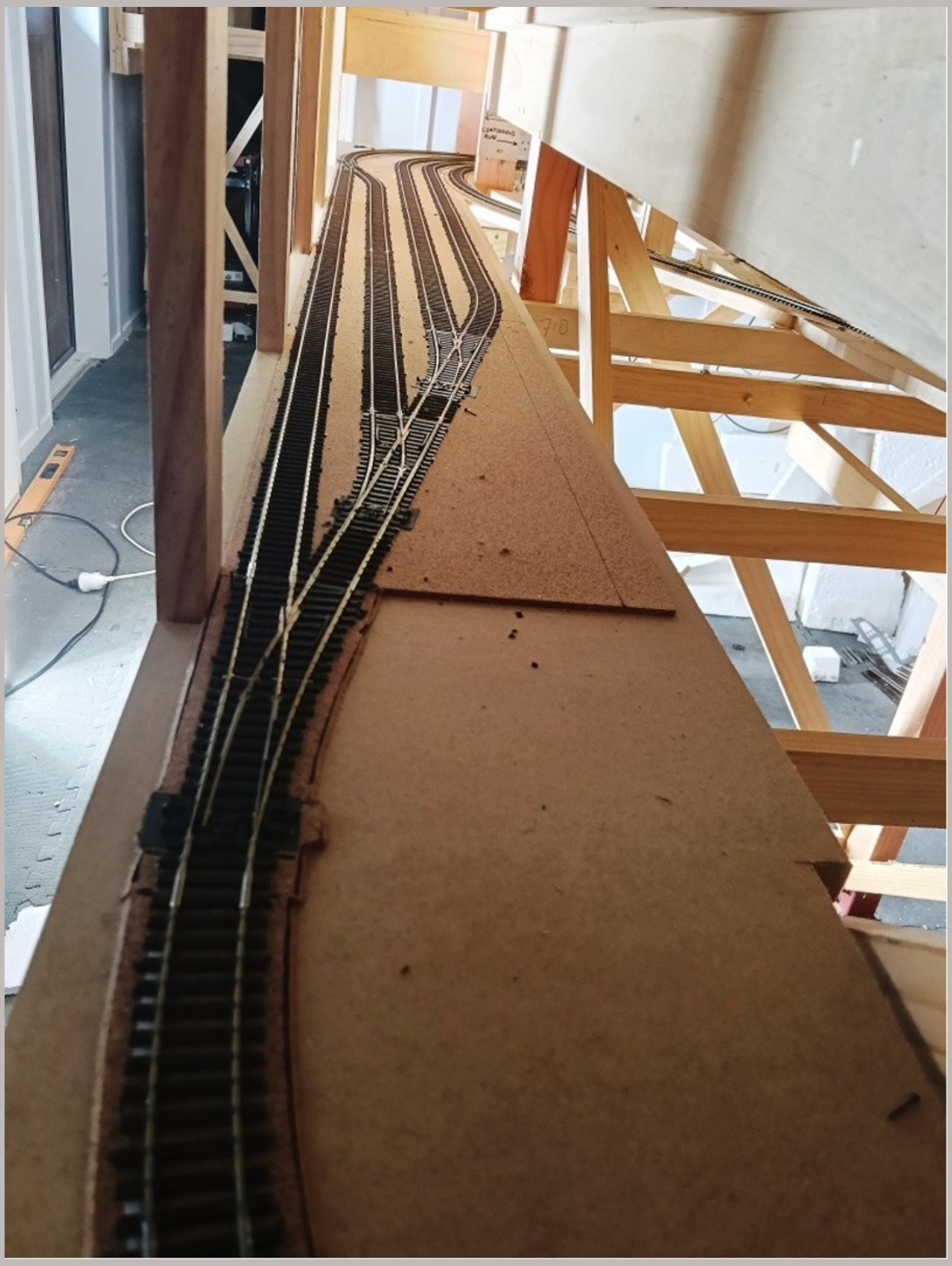

Figure 6 - Looking back from the other end. I opted to have the back track as a stub and increase its length.

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Figure 7 - A view from the far end of the peninsula. The curved track in the foreground leads to the yard (outer track) and the return loop and continuous run (inside track). This is the section I left on the 50mm extruded foam. You can see the curved turnout at left will have its motor under the 16mm MDF. This photo also shows the shorter joists on small risers (at left) which were needed to lift the new MDF to the correct height.

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Figure 8 - Here is the yard throat with the return cutoff/ continuous loop track in the middle. You can see where I left some of the 50mm polystyrene here.

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Figure 9 - A bit further along. There wasn't much head room in here. I did a lot of the inside trackwork by poking my torso up through between the joists. Hard on the back and knees - so I had to pace myself. I tell you, the positions I had to get into to sight and lay some of the track under there were pretty extreme! One in particular where I had to get my arms in the hole first and then force my shoulders through at an angle. Then I had to stand with bent knees. Kneeling I was too short, standing I was too tall. I could only stay in that position for a short while and I had very sore knees after I had finished in there!

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Figure 10 - A view looking across. The centre between the two vertical timbers is where modules 3 and 4 join. There are 11 tracks across this join. I glued the track in place, and once fully cured, cut the track and sleepers with my razor saw. I clamped an MDF guide in place to help keep my cuts good. The turnout for the return cutoff is just this side of the baseboard join.

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Figure 11 - The yard tracks. I used a few lengths of code 100 track in the yard to help save a bit of cost. I still have just over two full boxes of flextrack to go (and might have to buy a few more lengths). I'm just on halfway through the turnout installation. I believe I have put in 37 so far... It's been a few years of chipping away at buying those to spread the cost. Things have just gone up significantly, so I'm pleased to have bought most of what I need already. One of our local hobby shops recently had a 25% off sale and I managed to get the asymmetrical 3-way turnout for a great price.

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I have put in a lot of curved turnouts and several wyes, as I like the curves so much. I love the way those curved lines lead the eye into the scene, and the unusually shaped sites that are left behind for landscaping - especially for building structures. They force you to think outside the box and kitbash or scratchbuild to fit in with the trackwork.

Next up was the mining and logging town of Wilmot.



Figure 12 - Shows the view from partway along the town. There will be some fun building sites here!

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Figure 13 - The same view from the end.

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Figure 14 - A view from the outside end of module 10.

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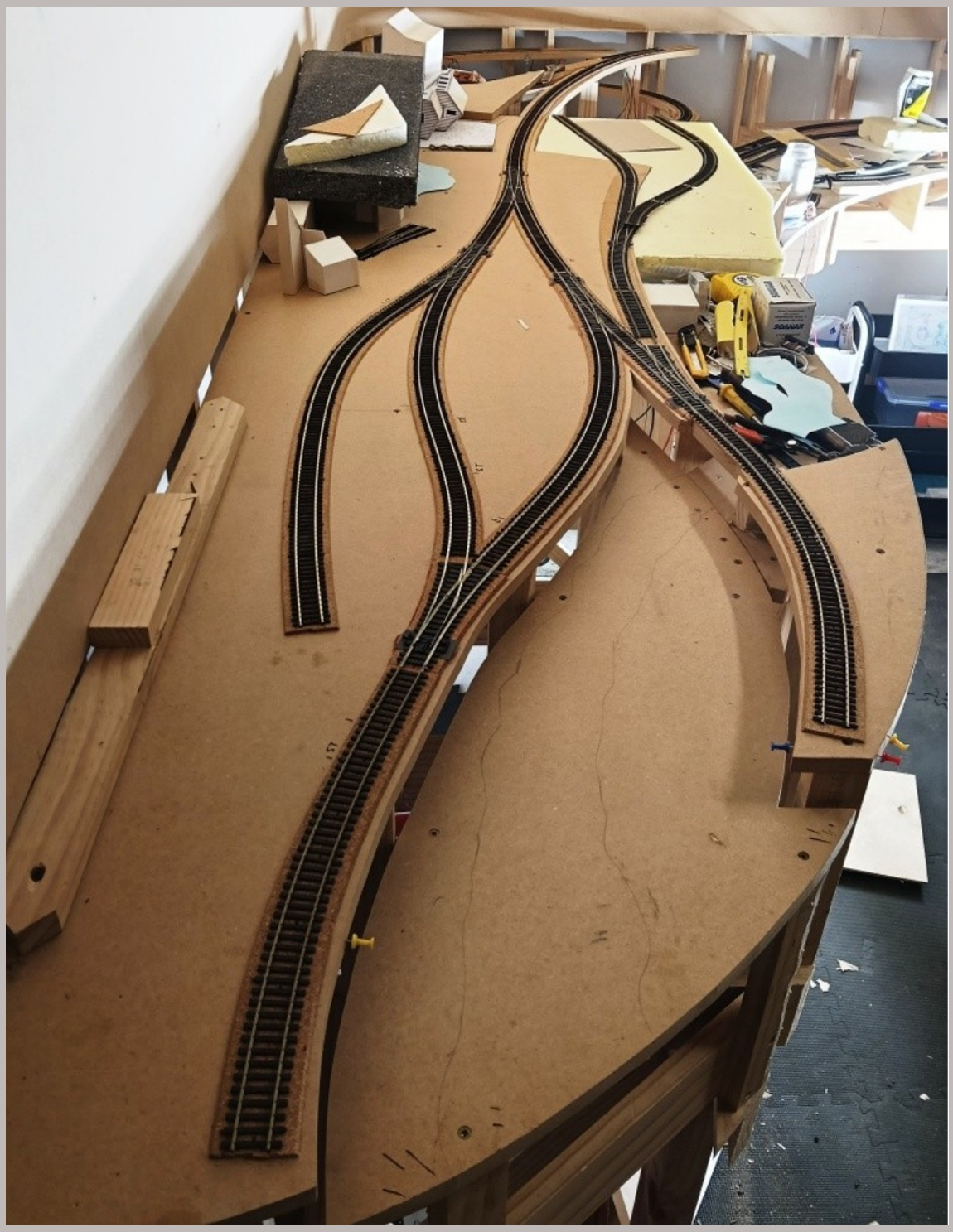

Figure 15 - An overall shot so you can orient yourselves. I plunged cut the sides of the trackbed for the bridge using my skill saw (something I have had a lot of practice with). I will glue modified Tichy Train 30' girders to the side of the baseboard and ballast the track above.

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This left the sawmill trackwork to lay. However, I still hadn't finalised the design work here, so track laying went on hold while I made some mock-ups and tried a few different configurations.



Figure 16 - Using sectional track to mock up the track arrangement for the sawmill.

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I quite liked the above track arrangement but needed to first consider the mill layout. I'm taking inspiration from the Port Craig sawmill combined with some other mills I like. The Port Craig sawmill transported cut timber down a timber conveyor with three toothed chains to the telly-yard below. to be stacked . From there timber was graded and loaded onto a trolly which Dolly, the draught horse, would pull around a tram line to be stacked on the wharf. Timber was lifted aboard the lighter's (punts) using the wharf crane, in slings, which were left attached to the timber bundles. The punts were then towed out to a waiting ship where the ship's derrick lifted them aboard. In later years a timber wharf tower was built, and timber was transferred directly to the waiting ship by an aerial loading system. I considered modelling this system, as it would have been a real showstopper. However, it didn't fit with other aspects of my layout, would have required a serious amount of longitudinal space and the modelling of a huge amount of water. Instead, I decided to draw inspiration from the Lake Brunner sawmill. Here, logs were transported across the lake from an abundant supply of good trees on the far side, loaded into punts, and offloaded for milling. I figured I could combine the two ideas with logs being transported across lake Wilmot from an abundant timber source on the far side, lifted off the punts, moved to the timber conveyor, and transported up the conveyor to the mill. I figured this would mean the conveyor should enter the mill from the end and so I needed a different configuration. I also wanted logs to be delivered to the mill via rail.

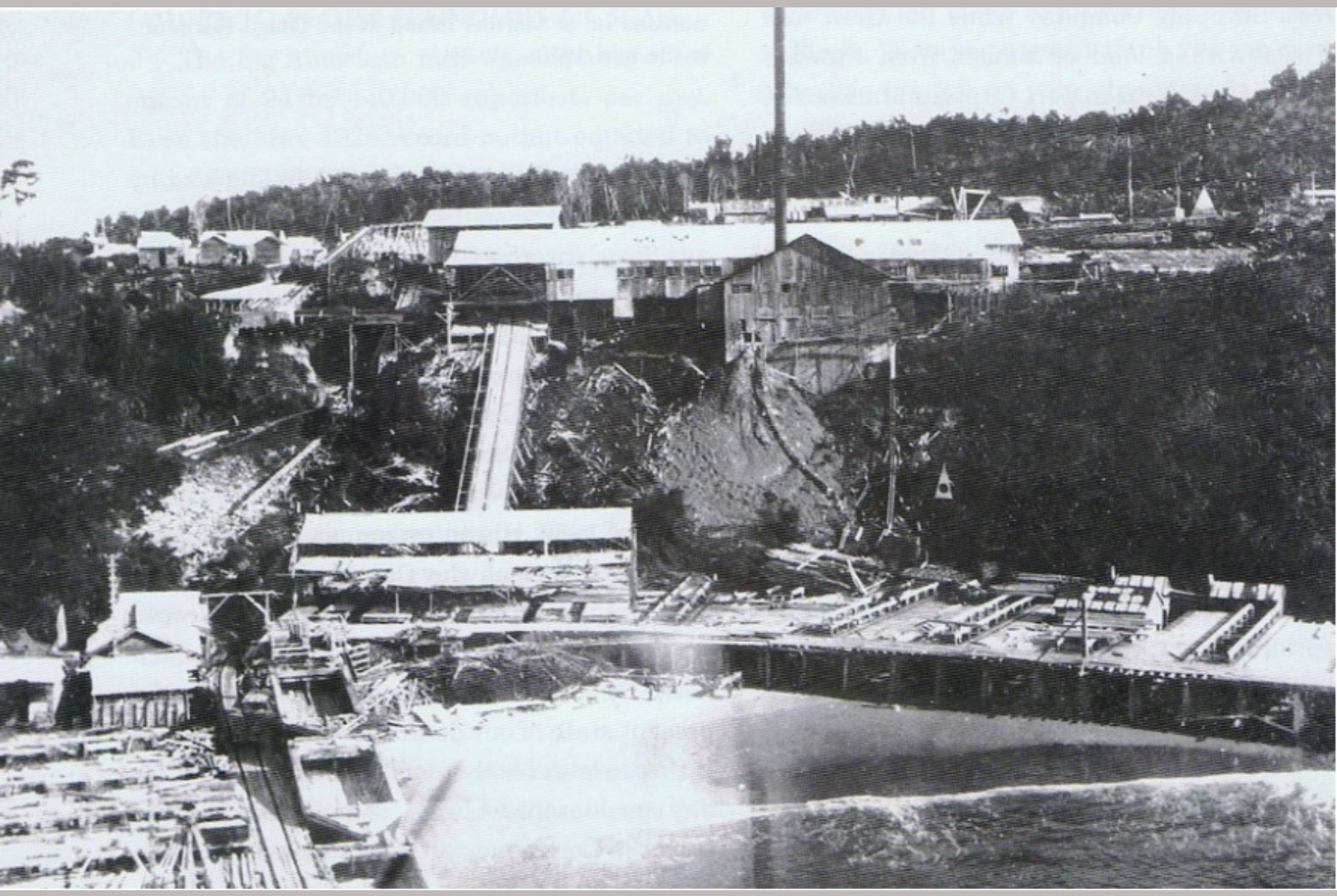

Figure 17 View of the Port Craig sawmill. Clearly shown are the waiting lighters, the tramway which Dolly, the horse, serviced, and the conveyor leading from the mill to the telly-yard. (Photograph taken from my book, 'Viaducts Against the Sky, the story of Port Craig' by Warren Bird.)

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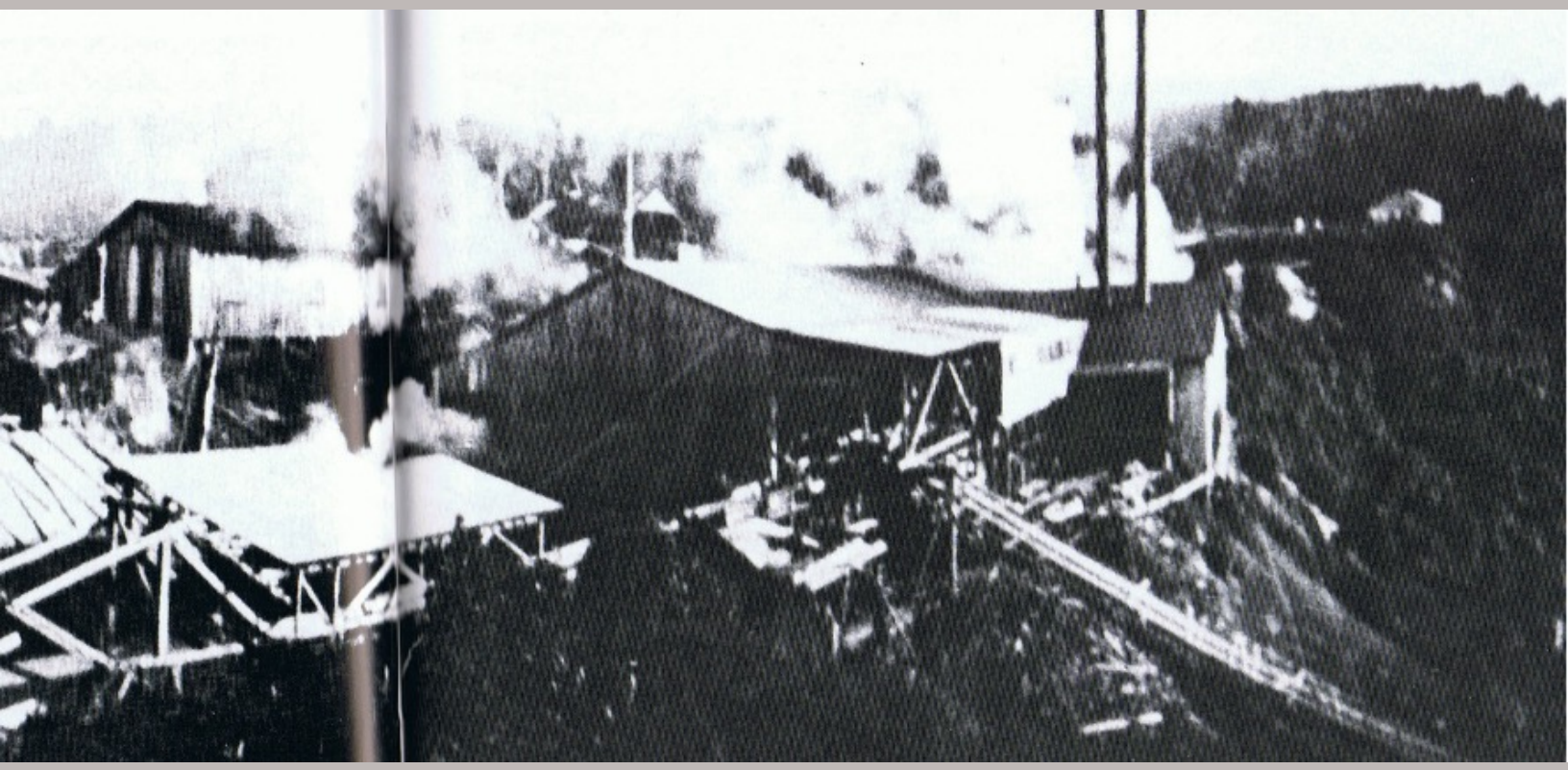

Figure 18 A side view of the conveyor. (Photograph taken from my book, ‘Viaducts against the sky, the story of Port Craig’ by Warren Bird.)

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Figure 19 I also found online some pictures by the artist Dan Quinn which I loved. These are images for the video game 'Days Gone'. I plan to use many ideas from this mill, including the extensive decking at the front and ends. It is taller than the Port Craig mill, but considerably shorter. This suits my limited space much better. I can see this mill sited in a similar fashion to the Port Craig mill.

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Figure 20 The other thing to consider was the position of the mine in the background. In truth, I don't really know what sort of mine this will be – which has taken me down a rabbit hole looking at how the logistics and interconnectivity of the various mines, wharves and other industries might work, and also examining the many prototype photographs I have collected over the years of different operations, local, abroad and models. In this photo you can see I have rotated the mine in the background clockwise to create an offset from parallel. The 30mm extruded styrene represents the timber decking here.

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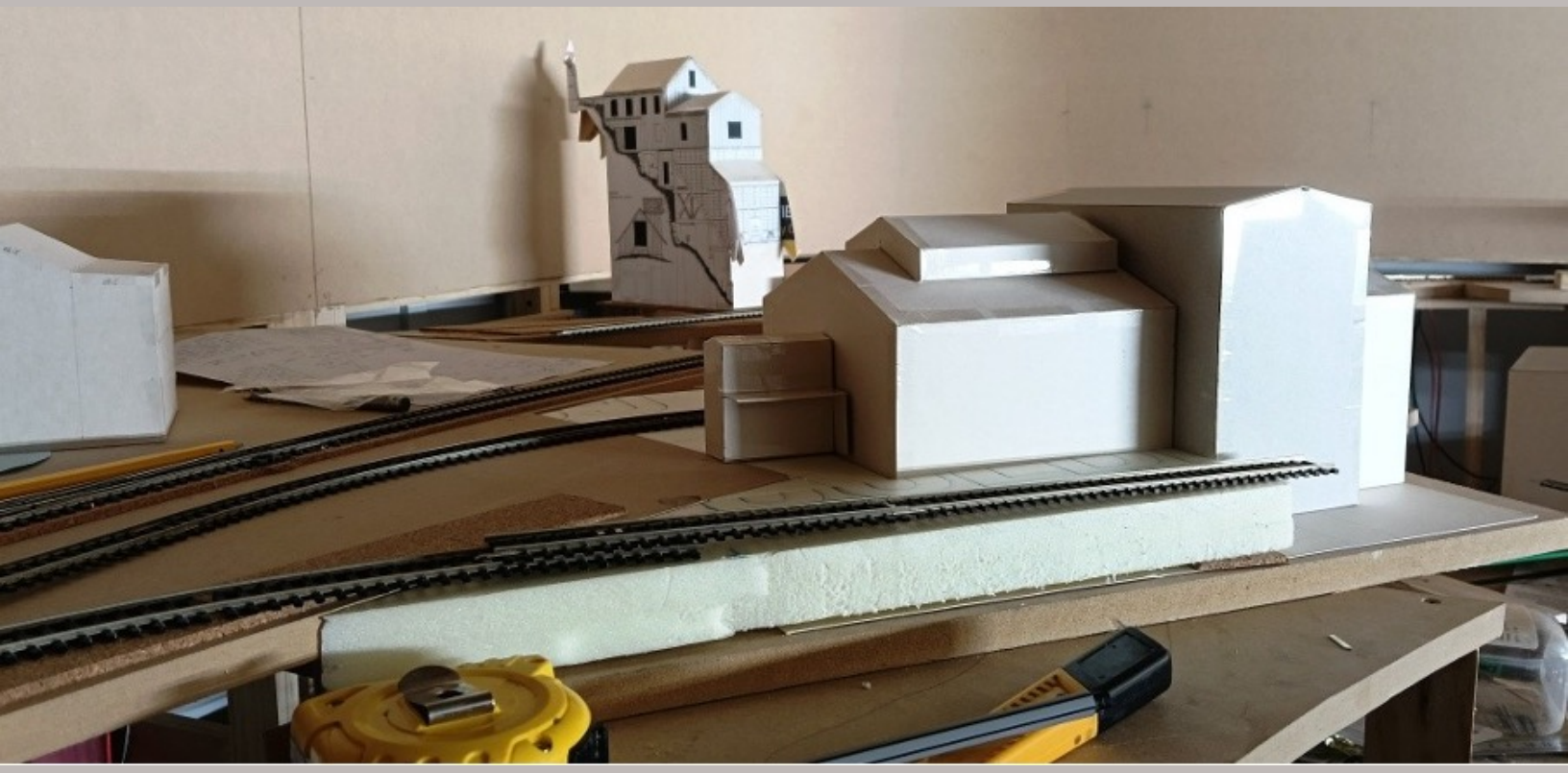

Figure 21 This different angle shows the mill better and the rotation of the mine behind. Much of the mill below the decking will be visible underneath, but it helps keep the mill from overpowering the scene.

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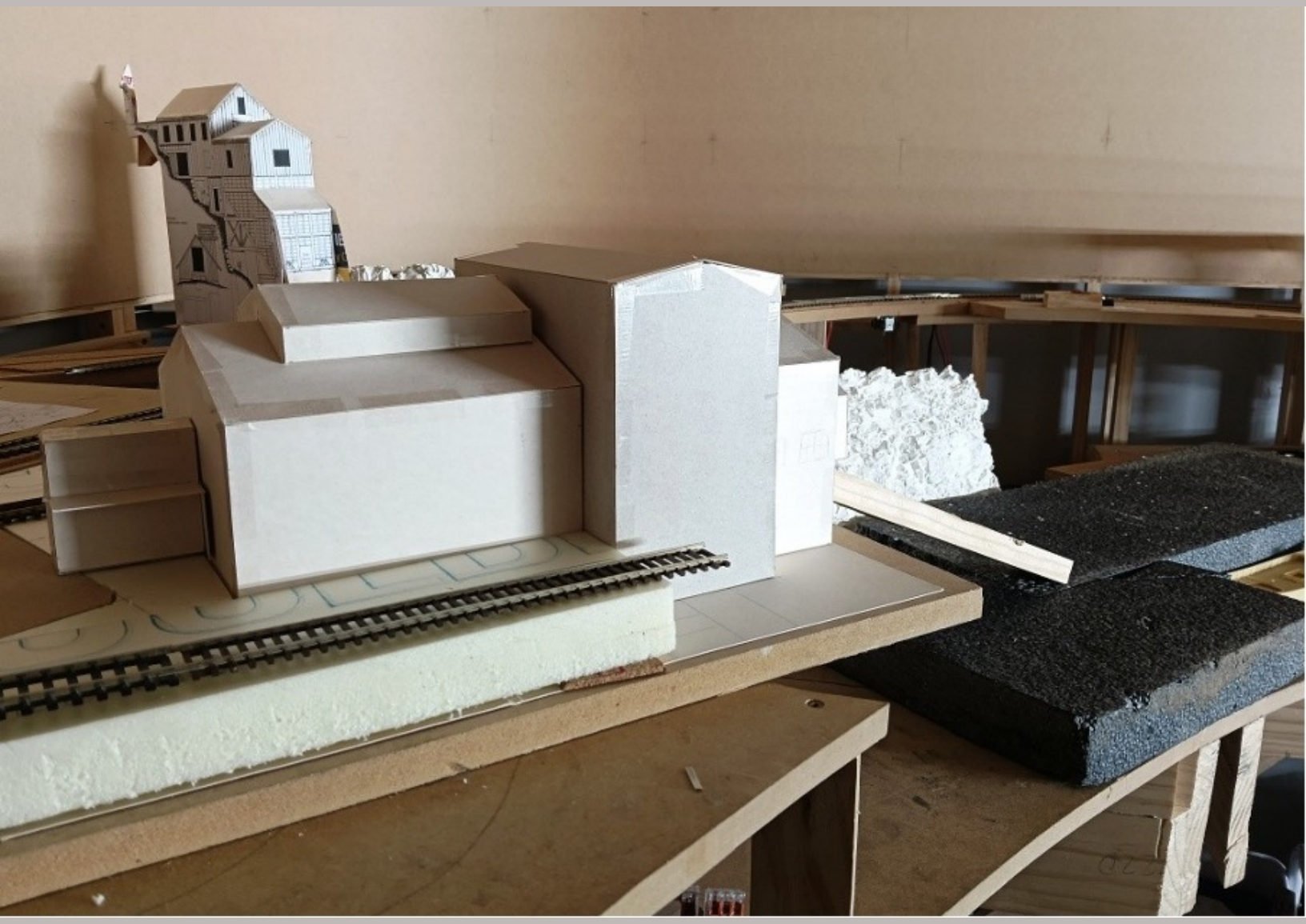

Figure 22 Here, I have added the wharf on the lower level with black polystyrene and a piece of timber shows the conveyor connecting the two. The boat hull represents a punt.

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Figure 23 A view from the other end. Scenery will hide the helix.

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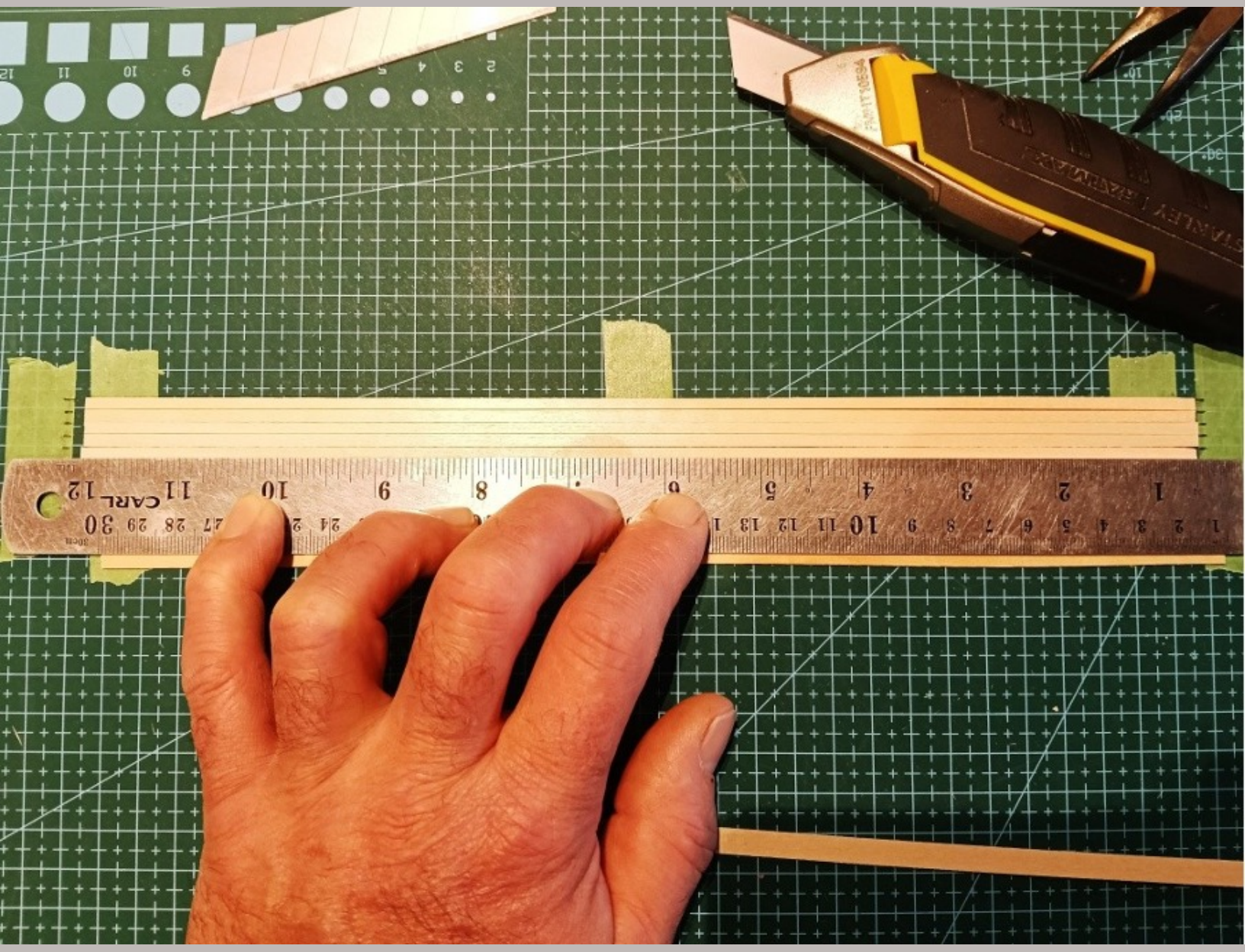

Figure 24 - Here I am getting the cladding ready. I bought an O-scale kit at a train show last year with a lot of stripwood in it. The kit cost a fraction of the basswood price. There were 150 lengths of 10x1", which translates to 20x2" in HO scale. Here I am cutting those 150 lengths in half. I set up measuring marks at each end and applied three pieces of double-sided tape to my cutting board and painters' tape, sticky side up, to this. I laid the strips down 5 at a time and using three passes with a sharp knife, carefully cut in half creating 10x2's. The eyeometre 1969 came in handy and I got quite good at estimating the halfway point. There is to be extended decking on this scratchbuild as well as rustic board on board cladding.

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Figure 25 – Here are the 10x2's. I cut these over several sittings and had to replace the double-sided tape about every 20 lengths. 300 lengths is the equivalent of around 30 packets of Northeastern scale timber! To me it was well worth the effort. I think I paid $30NZ for the kit.



Figure 26 – A cold winters morning at a dog show saw me sitting in the car while we waited for Wilbur to strut his stuff, adding grain and sanding the 10x2's.



Figure 27 – I painted up a few sticks with test colours. I'm leaning towards the centre one.

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Figure 28 - Here I am putting the NBW castings into the predrilled holes in my bents. I drill my holes by putting my pin vise in my battery drill. This is very fast and no doubt not for everybody, but it works for me. I then use a compass to make sure the holes are clear of any debris. Here I am showing the tweezers I use and how I pick up the NBW. I pick it up from the shaft near the nut. I then use a finger to gently rotate the NBW until it is at right angles to the tweezers.

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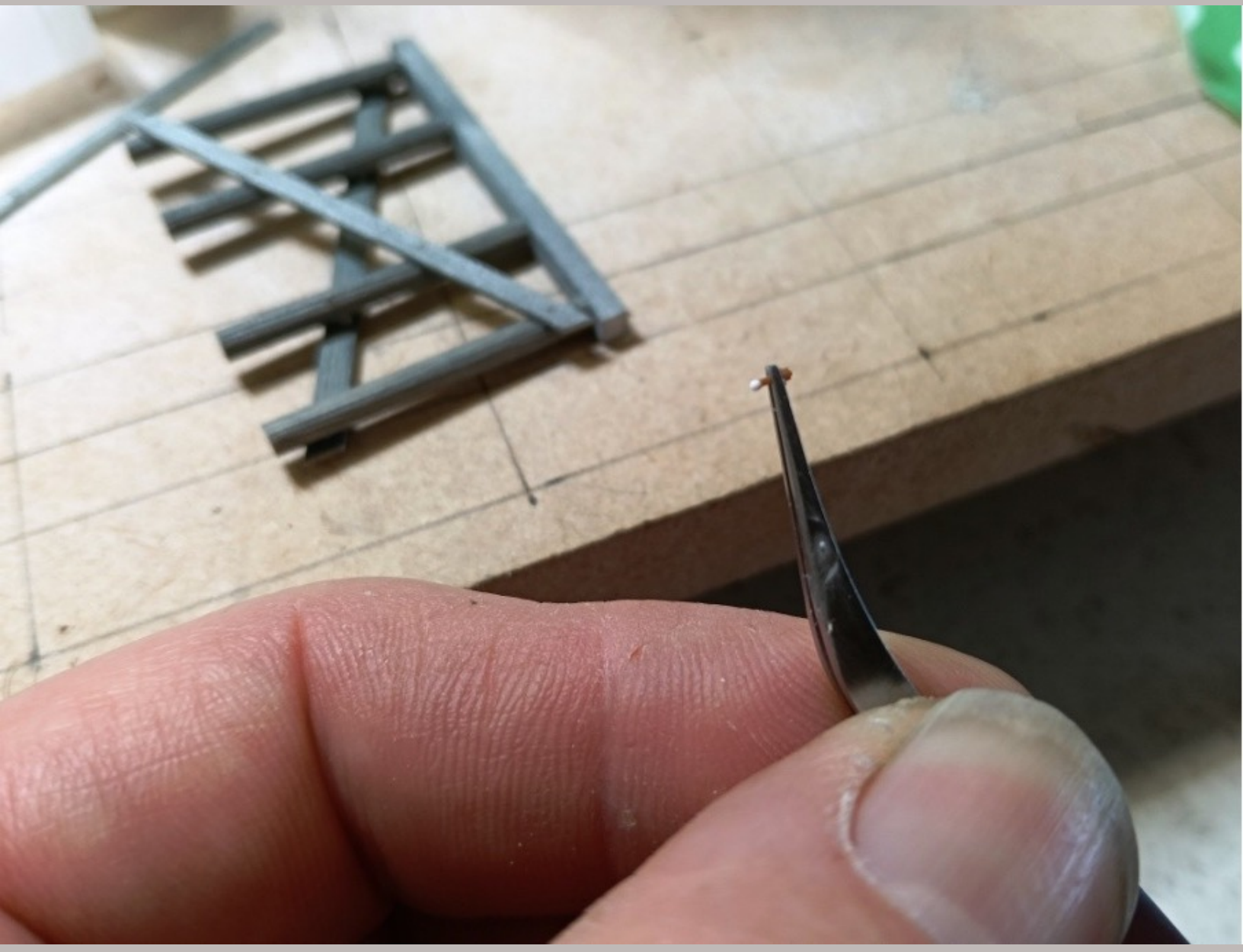

Figure 29 – I then dip the shaft of the NBW into a drop of canopy glue that I put on a piece of painter's tape attached to my desk. You can see I only add a tiny amount. The NBW is then inserted into the hole, the tweezers removed and then used to push the NBW home. I put in around 100NBW's and only lost two – but lost when cutting them off the sprues.

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Figure 30 – After the decking was added it would be very difficult to scenic, so this was next. I haven't really done much of this for a long time, so it was a good chance to practice, as the scenery will be largely covered up.

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Figure 31 - I made use of some of my newly acquired Martin Welberg scenic material. After this was done I used Woodland Scenics foam tack glue to glue the track and bearers to the top of the bents. A 2-foot ruler was first used to check for level and a little material was removed from the top of a couple of bents with a single edged razorblade. Here, the track is being weighted down overnight. I did this with the diorama screwed in position so the track work could all be lined up.

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Figure 32 – A side on view. You can see I made up a concrete bridge pier for the left end.



Figure 33 - A view from the corner. You can see this is right by the edge of the layout. The mill will be a real feature of this part of the layout.

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Figure 34 - Here is a shot with the weights removed.

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Figure 35 – A shot from the corner.

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Figure 36 - Here we see the sawmill after the 2fatpossums weekend down at Timaru. Things always take longer than you think!

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Figure 37 - I added 6x6's to the top of the bents so that the joists would be flush with the top of the sleepers. Another option would have been to deck the whole area and then hand lay the track, but I tried this on my tall timber viaduct and really disliked the process. I painted the side of the tracks with rust tracks by Mig, before gluing it down. The joists were checked against the material I used for my track bearers and the perfect ones put aside for joists. Remember, I hand cut these to size. Rustic is fine for cladding and decking timbers, but the joists needed to be uniform in size. I made up a styrene first floor for the mill and clad most of this with some thin styrene brick material. I painted and grouted this, added some framing to the front section and then glued on some pre-painted cladding, leaving a cut out for a door (still to be painted)



Figure 38 – A view from the corner. The first-floor base was then glued into position and weighted overnight. I figured it would be very difficult to build the whole structure and all the decking without integrating them at this early stage. I want to point out the realism of cutting the decking boards to prototypical length before gluing them in place. Personally, I find the realism of the boards meeting being different colours very pleasing. This cannot be achieved by running full length strip wood across a large deck and then adding joints with a blade. It is time consuming, but to me, the trade-off is worth it.

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Next, I moved over to module 5. This module will display a small logging camp and tall trestle. The summit track goes into tunnels at each end of the tall trestle. The Spoon River logging spur curves through a tunnel, then crosses a stone viaduct before arriving at the logging camp. The lower main line curves around in front of these scenes. I tried various track arrangements for the logging camp. Space is very limited, so I needed to keep things towards the front to make room for some very steep scenery behind.



Figure 39 - The curved turnout looked OK, but it had to start just past the point where the grade started, and I was worried that that would cause operation problems (kind of half on the slope and half on the flat).



Figure 40 - I tried multitudes of other track arrangements. The small straight turnout looked wrong to me. Anything following the curve around towards the back of the scene looked OK but allowed no room for scenic elements. So, in the end, I decided to go without a turnout. This means a longer shunt during operation, or the loco waiting while logs are loaded. NZ prototype photos seem to show loading skids without a turnout regularly, anyway. We'll call it operational fun.

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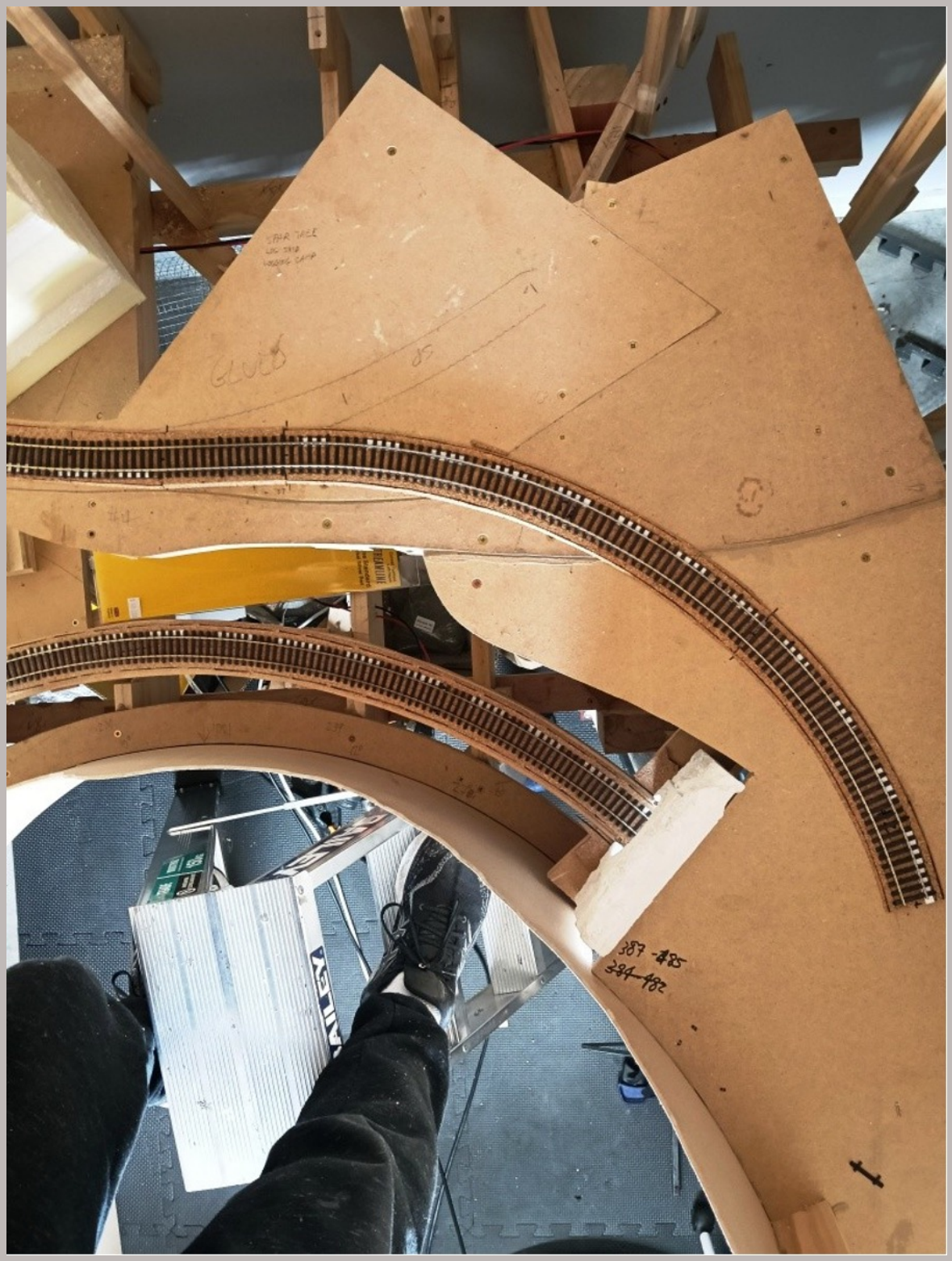

Figure 41 - Here is a view looking straight down. Cork and track now laid. You can see the main line in the front curving into the tunnel. Of course, I'll need access to this tunnel.

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Figure 42 - You can see I have added the fascia. I made a tunnel out of two pieces of 50mm black polystyrene, put this in position, and then glued and nailed the 3mm MDF fascia in position. I added glue to the polystyrene tunnel side which was cut to the curve of the fascia. Once the glue was set, I carefully marked and used my skill saw to plunge cut the tunnel out. I then made up a larger facing to glue to the front of this (clamped up and gluing currently). This will create a kind of drawer in the fascia that will remove the front side of the tunnel for access. I did something similar for the large tunnel to the right of the tall viaduct on the summit. My intention is to make the top piece of scenery above this tunnel a lift out section, again, to give access to this tunnel. I'm presently honing my tunnel cutting technique, but things are going pretty well. I'll show my technique when it is refined.

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Figure 43 - I have now laid the track on each side to join the tall viaduct. The tracks are connected here, and the tallest bents shimmed to the correct height. Two of the track jointers can be pulled to one side to remove the bridge. I had to shunt things 5mm to the right to give sufficient clearance for the track below to pass the bent, which involved trimming the right end of the bridge and splicing a ripping to the left end riser.

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Figure 44 - Shows the front of the 'drawer' as I wait for the glue to cure.

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Figure 45 - Shows the inside of the drawer. I used white polystyrene for this section but have used black for the other tunnel sections I have done so far. I find it much easier cutting the tunnel portions out using two 50mm pieces, spliced together after cutting.

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Figure 46 - The drawer front fitted and screwed to the fascia. Once it is all painted matt black it should be barely noticeable. I can also add screw caps in black if desired. You can see the two layers of black polystyrene on the summit line above, here. I added small cleats to the underside of the track bed and then marked, cut and glued more 16mm MDF to the outside of the track bed to support the tunnel pieces. I will glue further polystyrene scenery formers to the top and front of the tunnel pieces, and the whole piece will then be removable, giving access to the track behind/ below. It will likely be cut into two removable sections.

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There is very little benchwork left to build. I have scenery props and support/ fixing for the fascia left to do, along with splicing for support for my tunnels. Also, the rebuilding of the baseboard in Tellynott. As my layout is all curved, the support/ fixing for the fascia is a bit more time consuming, as most of the jack studs need to be ripped at an angle - and every one is different.

That's all for this update, cheers, Mark.

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Building Bar Mills Kit…Klinger's Pharmacy

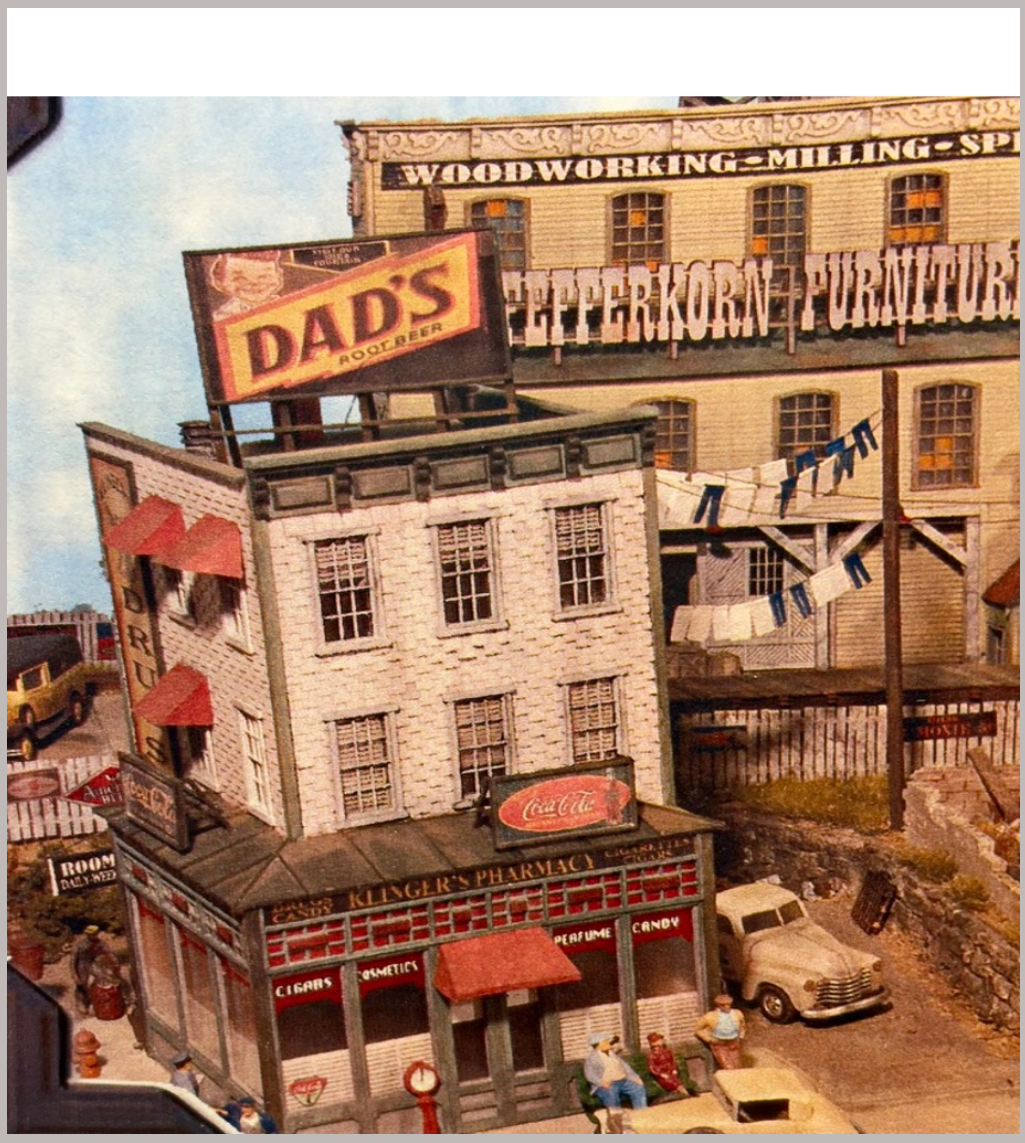
By Bob Courneya

Background

The following article chronicles my building of a Bar Mills Kit-Klinger's Pharmacy. This kit has been recently released for direct sales from Bar Mills to the end user and I purchased it. Below is the current box that you will receive when purchasing it.



I found out several weeks ago at the Novi Train Show that the Klinger's Pharmacy model was part of the multi-model limited run kit "Raglans Road" sold by Bar Mills in 2006. While I was still working, I didn't have a model railroad but was accumulating steam engines, box cars, track, and model kits. When I got home from the train show, I immediately checked my kit supply to see if I did have the Raglan Roads kit and I did! I hadn't looked in the special box that Bar Mills used to package the kit in many years but sure enough, there was the original Klinger's Pharmacy. Below is a picture which you can see is quite different looking than the current version. I think I can utilise the three other buildings from the Raglan Road package elsewhere on my layout.



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Start of Kit Building Process

After reviewing the kit's instructions, I decided what color I wanted the brick to be and was surprised that nowhere in the instructions were there suggestions about brick, window sill or corner stone colors.



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I sprayed the walls with the satin Fire-Orange paint+primer from Rust-Oleum. After allowing the paint to dry, I coated the walls with Hunterline Black creosote weathering mix to darken them down a little; after allowing this to dry, I used the Playmarkers AK black to randomly blacken some of the bricks. Next, I used Roberts Brick Mortar (see below) on all the surfaces to color the mortar lines. After I assemble the building and apply the window treatments and stone on the corners, I will touch up the mortar lines with chalk to darken some areas for a more realistic appearance.

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I painted the windows and doors with Rust-0lem Flat Black primer+paint and then used Plaid clear crystal to glaze the windows. In a later picture, I painted the ground floor front and side building with the flat black paint but used clear acetate for the window glazing since I was going to install an interior detail photo.

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As you can see below, I used many 123 blocks to hold the bracing in place and provide support to glue three of the walls together. I have previously utilized 4 marble blocks for this type of model work but find the 123 blocks better suited because of the accuracy of the corner angles and sharpness of the edges.

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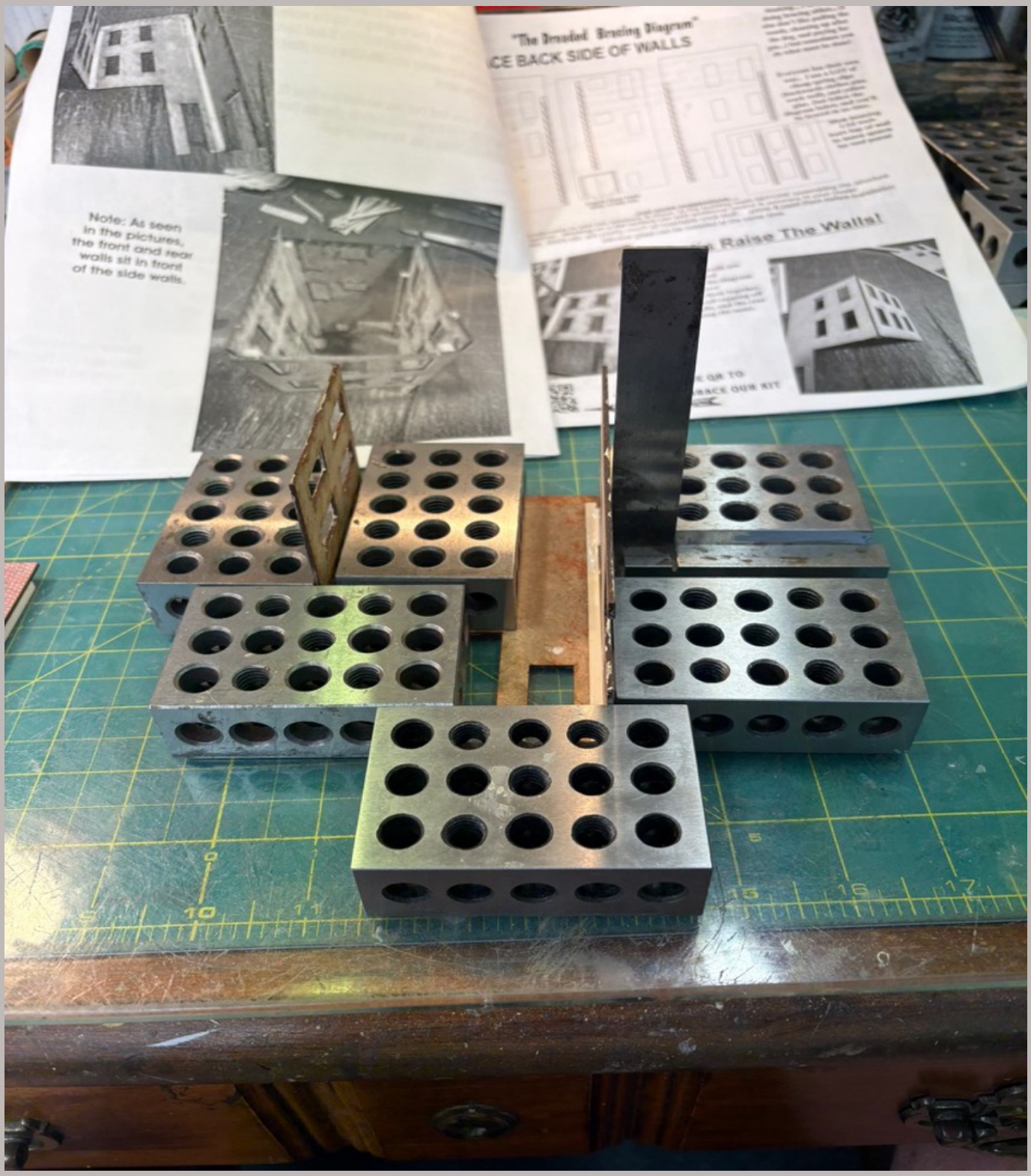

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I used the fourth wall to start the window installs, top and bottom window sashes and headers. I also added full window drapes and blinds to this side of the building. There are two porches that will be fabricated and installed on



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this wall. Because of all the railings, floors and roofs, I thought it would be easier to keep this wall separate while I built and attached them. You might also note that the third-floor door does not yet have window glazing applied and how it contrasts with the second story door that is glazed with the Plaid glazing product.

Notice that I have glazed the 3rd story door window and left a little white chalk on the door to show the “dulling” effect on the door. The two deck floors were the first to get installed on this wall.



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The remaining pieces of the balconies and roof were added.



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Next came the front and side store window assembly and model base. I put all models on 1/2-inch plywood. The area where this pharmacy model will go requires that I use ¾ inch material to minimize the drop from the RR track behind this model. The black and white simulated tile floor was provided as part of the kit. In a later picture, I will show how I plan to provide an interior.



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I temporarily placed the building with the front window assembly to determine where I needed to drill holes for the LEDs that will light the area behind the front and side window and interior photo.



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This is the interior photo for the pharmacy kit. It doesn't look too much like a pharmacy but when the building is set in position over it, I think it looks fine. I darkened the black and white floor with black chalk because it was too prominent otherwise.



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This is a photo of my gluing the front and side window assembly to the main building.



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This is the completed Klinger's Pharmacy kit. I need to add chalk highlights, figures, appropriate garbage cans, empty bottles etc. to complete the scene.



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Left side view.



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Right side view.



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Structure lit.



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Conclusion

This was a challenging kit to build not withstanding the poor instructions. I had to call Bar Mills to get a missing piece of etched signage for the main front window assembly and informed them of the instruction issues I had encountered. They made some of the changes while I was on the phone with them. Klinger's will make an attractive structure on my layout.



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Adding LED Lighting to your models.

Introduction by John Siekirk

We had a discussion on the daily “S&S RR Gazette” this past month on installing LED lighting into your models. My contribution to the discussion was the techniques that I use, which I learned at a Narrow Gauge Convention Clinic many years ago. I have my notes from the clinic written on the publications presented below in a well used notebook on my workbench. If you have been reading my S&S RR build threads you will have seen the techniques in use in most of the structure builds. I am happy to report that I haven’t “let the smoke out of an LED”, since I started using these techniques.

NOTE: The “daily” is an email chain where we discuss what’s on our workbench. It doesn’t happen daily but when one of the members has some progress to report or a topic to discuss. If you would like to join just send me an email asking me to add your email address to the email chain.

The Narrow Gauge clinic was presented by Bill Sartore the owner of Microlumina Miniature Lighting. Bill gave everyone at the clinic a copy of 4 different publications called Light Bites which described the techniques presented in the clinic. I contacted Bill and asked him if I could republish his Lite Bite articles here in the S&S RR & I Gazette. He said “sure” and sent me some clean pdf files that didn’t have all my notes scribbled on them. He also sent a copy of a fifth article, that I included, that describes a project that ties all of the information together. Bill’s website address is on the publications below if you would like more information.

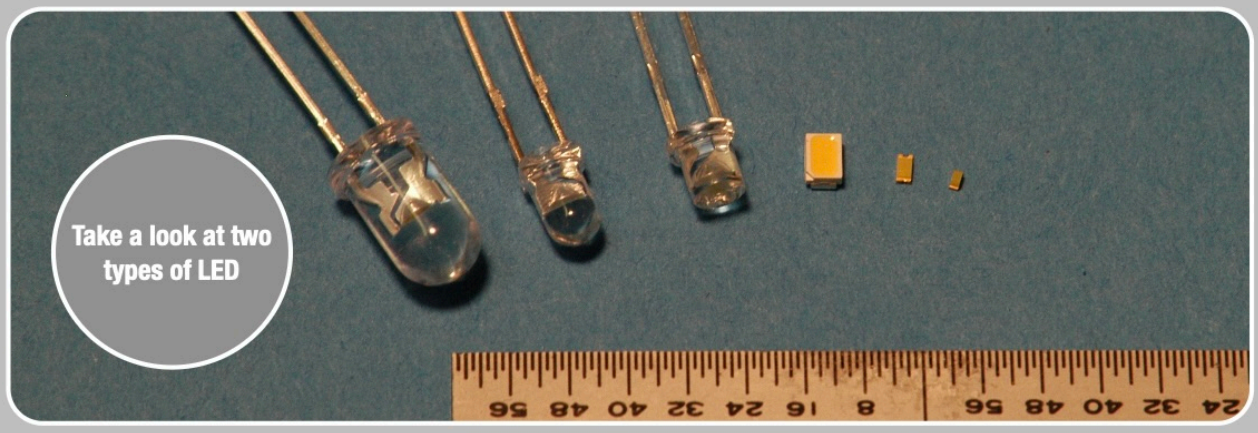
The 5 publications are presented below.

Number 1

Light Bites

Information that won't weigh you down

MICROLUMINA MINIATURE LIGHTING



LED TYPES

Through-Hole and Surface Mount

The Light Emitting Diodes [LEDs] that we use for lighting our model structures, rolling stock or for creating special effects come in two basic styles: Through-Hole and Surface Mount. Through-Hole LEDs are the easiest type to work with and are great for starting out with LED lighting. Through-Hole LEDs come with the wire leads built-in. They're ready for installation into your project.

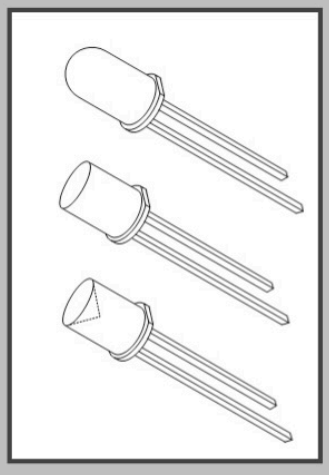
Surface Mount LEDs are very small and have no wire leads on them. They require some special preparation before we can incorporate them into a project.



Through-Hole LED

Through-Hole LEDs

Two common styles of the Through-Hole LEDs are ones with rounded ends and those with flat ends. LEDs with rounded ends act like spot lights. The rounded end of the LED acts like a lens to focus the light into a narrow cone. Flat-ended LEDs are more like flood lights. Without that built-in lens to direct the light, the light from the flat-ended LED is dispersed in a wider pattern. A third and less-common style of Through-Hole LED is the Inverted Cone type of LED. This type of LED looks much like a flat-



Top to bottom: Round, Flat, Inverted Cone

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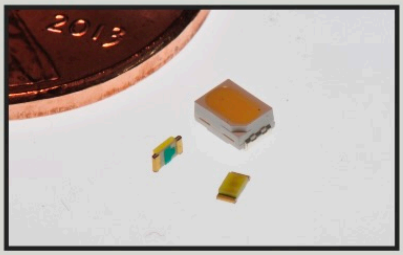
ended LED that was drilled into slightly. This type of LED directs light evenly out of the sides of the LED. This type is great for use in lighthouses and beacons.

Surface Mount LEDs

If you were to take the business part of the Through-Hole LED - just the portion that makes the light - and put this into a tiny block shape you would have a Surface Mount LED. Surface Mount LEDs are designed to be mounted directly onto a circuit board. Unlike the Through-Hole LED, Surface Mount LEDs have no wire leads. This creates a problem if we want to use them for our hobby. However, their tiny size permits us to use them in places where Through-Hole LEDs would be much too large.



Surface Mount LEDs

The big challenge when working with Surface Mount LEDs is that they have no wire leads on them. They have two small solder pads onto which we must solder a pair of very fine wires. The process of soldering wires onto Surface Mount LEDs is the topic of another edition of Light Bites. For now we will just cover the essentials of the LEDs themselves.

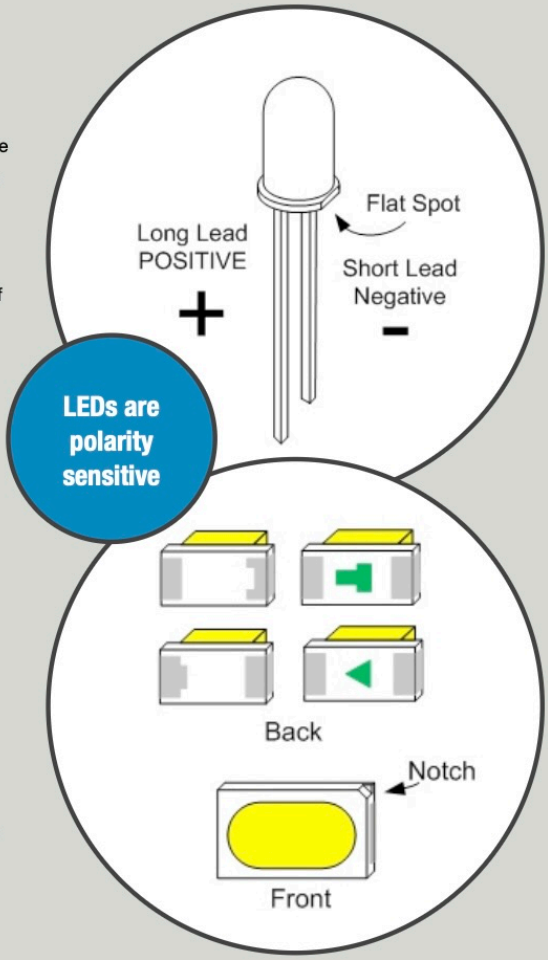
LEDs are polarity sensitive

Unlike plain old lightbulbs, LEDs have a positive and negative connection point. This means two things: first, the LED must be connected a specific way in order for it to work properly. Second, the power source for the LED must be a DC (Direct Current) power source.

Determining the positive and negative leads on Through-Hole LEDs is quite simple. The industry developed a standard where the positive lead (anode) of the LED is longer than the negative lead (cathode). Additionally, common round Through-Hole LEDs have a flat spot on them to designate the negative lead.

Determining the polarity of Surface Mount LEDs is a little different. There is no Industry standard and each manufacturer has their own way to designate one lead from the other. The best thing to do in this case is to check with the information supplied by the manufacturer. Usually there is a symbol printed on the back side of the Surface Mount LED that will indicate the positive or negative side. In other cases, the solder pad itself will have a notch or protrusion to designate one end from the other. Sometimes a notched corner on the front of the LED will indicate the polarity. Regardless of the marking system used, Make sure you can identify these markings and are able to compare them to the information provided by the LED supplier.

The illustration to the right shows examples of some typical marking methods for indicating polarity on Surface Mount LEDs. Actual polarity is not shown in this illustration as it can vary from one manufacturer to another.



LEDs are sensitive to current

There are two things to keep in mind when dealing with LEDs: Voltage and Current. Think of **voltage** as a big roof top water tank filled with electrons. In order for the electrons to do their thing (turn on a light or spin a motor) we need them to be moving. Think of **current** as how many of those electrons move out of the tank and through a pipe (or wire) over a period of time. Naturally, we need our plumbing (electric circuit) to be complete but we'll leave the details about wiring for another issue of Light Bites. For now lets just worry about the electrons flowing through the LED.

Since we've been doing some thinking, let's think of the LED as a highway at rush hour - it can handle just so many vehicles before traffic jams and accidents occur. Current in the electronics world is measured in Amperes or "Amps" for short. SInce an Amp can be a rather large amount when talking about small electronic devices, the term **milliamp** (1/1000 of an amp) is usually used. The typical "current limit" for an LED is 20 milliamps. Therefore, we must make sure that the current flowing through the LED is no more than 20 milliamps. The actual current that the LED can handle should be referred to in the manufacturer's specs. However, 20 milliamps is a good "rule of thumb" amount that can be used when working with LEDs.

The other characteristic that we need to consider when working with LEDs is the voltage that the LED needs to light up. Again, this is a spec that the LED manufacturer always provides. However, another rule of thumb says that white LEDs (including the various shades of white) and blue LEDs usually operate at 3 volts DC. Red, green, and yellow LEDs usually operate at 2 volts DC.

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THE YUCKY MATH PART

But don't worry - it gets better. Trust us.

Many articles written about LEDs caution us that we must **ALWAYS USE A RESISTOR TO KEEP THE LED FROM BURNING UP**. This is essentially true but it is not always the case.

Usually the voltage supplying the LED is higher than the LED itself so something must be done to limit the surplus electrons and keep them within the "current limit." This is usually accomplished with a device known as a **resistor**. Unfortunately, resistors aren't available in "one size fits all." In order to find the right resistor to do the proper amount of current control we need to use a little bit of arithmetic.

Get the facts

In order to determine the proper resistor for our LED we need to know three things:

- LED voltage (V_{LED})
- LED current (I_{LED})
- Power source voltage (V_{PS})

Let's say that we have a regular white LED that needs 3 volts DC and 20 milliamps. Our power supply is a nine volt battery. In order to find the proper resistor we'll use this formula:

$$R = \frac{V_{PS} - V_{LED}}{I_{LED}}$$

The term I_{LED} must be expressed in amps and not milliamps for the equation to work right so plugging in our values will make our equation look like this:

$$R = \frac{9 - 3}{0.020} = 300$$

The equation tells us that we need a 300 **ohm** resistor to limit the current flowing through the LED to 20 milliamps. **Ohms** is the term used for describing the amount of resistance.

If you head on over to the local electronics store you might find that that they don't keep 300 ohm resistors in stock. They might have 330 ohm resistors in stock though.

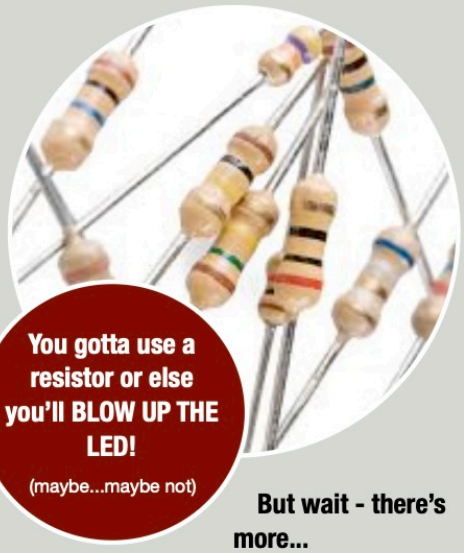
When using the equation, chances are that the number you calculate for the resistor value isn't going to end up being a number that matches up with a common resistor value. Always round up to the next common resistor value and you should be fine.

What's this about not using a resistor?

Look at the equation again but this time let's say we're using a 3 volt battery with the same LED.

$$R = \frac{3 - 3}{0.020} = 0$$

Whoa! According to the equation we don't need a resistor this time. This is true because there is no extra voltage to deal with. We can safety use the LED without the need of a resistor in this case.



But wait - there's more...

One more thing needs to be discussed about resistors. Power. Power is measured in terms of watts.

$$P = I^2 x R$$

Using our 330 ohm resistor with 0.02 amps (20 milliamps) running through it we'll find out that we're consuming 0.132 watts or little more than 1/8 of a watt. Choose a 1/4 watt resistor in this case. Resistors that operate close to their rating can get hot. Play it safe and always go with a higher power resistor.

This math stuff really isn't for me!

No worries! The **Current Limiter** is the thing for you then. Current limiters automatically regulate the LED current regardless of the power source voltage and the type of LED. Learn more about Current Limiters in the next issue of Light Bites.

Coming Up...

In the next issue of LightBites we'll take a closer look at Current Limiters. We'll learn how to use them in our lighting projects and discover how they can make the lighting job a much easier one. We'll introduce a couple of wiring terms that we need to know as well.

Products mentioned in this issue:

- Through Hole LEDs
- Surface Mount LEDs
- Current Limiters

Check out the selection of LEDs and other lighting products available at **Microlumina.com**.

Special thanks to Bob Parrish for his assistance in editing this issue of Light Bites.

Light Bites

is a publication by:

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Number 2

Light Bites

Information that won't weigh you down

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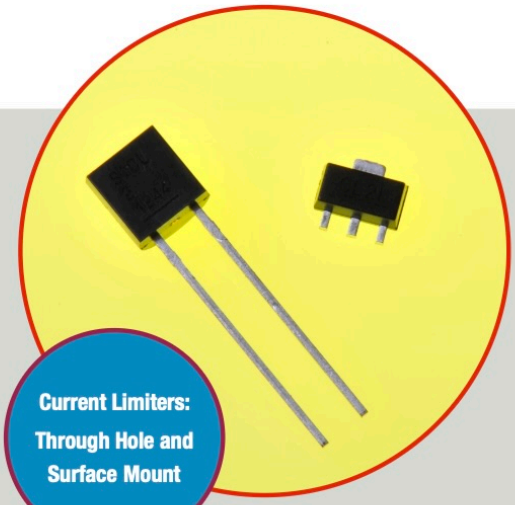
CURRENT LIMITERS

Resistors for people who hate math



Current Limiters: Through Hole and Surface Mount

In our last episode...

In the previous issue of Light Bites we discussed LED types and mentioned the need for current limitation. We compared the LED to a highway that could carry only a few vehicles at a time. We learned that we needed a way to limit the current (number of vehicles) traveling along our LED highway.

Resistors have always been the "go to" device for limiting the current going through a LED. The best thing about resistors is the fact that they're inexpensive and easy to use. However, resistors aren't a "one size fits all" device and must be carefully selected in order to provide the proper amount of current limitation.

Choosing the correct resistor requires the use of a little bit of math. Let's take a moment to review the formula that we used in the last issue of Light Bites for determining the resistor value:

$$R = \frac{V_{PS} - V_{LED}}{I_{LED}}$$

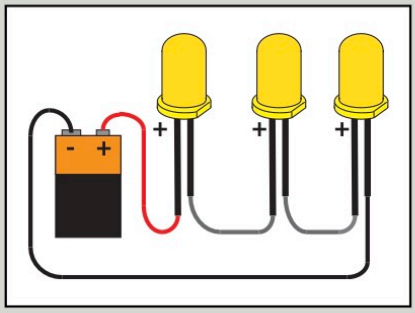
In this formula V_{PS} is the power supply voltage, V_{LED} is the LED's voltage and I_{LED} is the LED's current rating expressed in amps. White LEDs usually require about 3 volts to light up and draw about 20 milliamps or 0.020 amps. Remember, we must express I_{LED} in **amps** and **not milliamps** for the formula to work properly.

Take a look at that formula again. Notice that no resistor is needed when V_{PS} and V_{LED} are equal. Keep that in the back of your mind while we introduce a new concept: **Series Circuits**.

In a series circuit all of our components are wired together one right after the other. Think of it as something like a series of books on a shelf. When we wire LEDs in series the V_{LED} values get added. Let's say we have three white LEDs - each LED needing three volts. If we wire these LEDs in series the resistor equation will look like this:

$$R = \frac{V_{PS} - (V_{LED1} + V_{LED2} + V_{LED3})}{I_{LED}}$$

When we add the values of the three LEDs we will come up with a total of nine volts. This will give us a different value for the resistor ***R*** had we used only one LED.



The illustration above shows three LEDs wired in series and connected to a nine volt battery. Notice how the polarity is observed when connecting the LEDs to the battery and to each other. If an LED gets connected the wrong way or the battery connected backwards the circuit will not work.

"Going commando," as we have done in this example, will work without fear of burning up any LEDs but we might not use nine volt batteries and LEDs in groups of three in all of our projects. In those cases we must revert to using the resistor formula to determine the proper current limiting resistor.

Determining the resistor value is only part of the problem. Resistors must be sized to handle power as well. We looked at this in the last issue and learned about this formula for finding power:

$$P = I^2 \times R$$

Power is measured in watts. Usually a 1/4 watt resistor will suffice but this may not always be the case. Another thing to remember resistors will get hot when they operate near their rated

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capacity and this can lead to damage or discoloration of any material that might be too close to the resistor. Always leave room for air to circulate around the resistor.

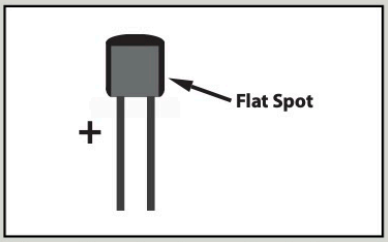
Enough of the math stuff!

If you find mathematics, or the job of calculating resistance and power values for your model lighting project, to not be a big ball of fun then consider using a **Current Limiter**.

Current limiters are small electronic devices that measure the current flowing through the circuit and automatically adjust the current flow to 20 milliamps - just the right amount for lighting an LED. The great thing about current limiters is that they operate on a very wide voltage range. A current limiter can light one LED with as little as five volts or dozens of LEDS with a much higher voltage. There is no need to pick and choose the right limiter; supply the right input voltage and the current limiter does the rest.

Taking a closer look

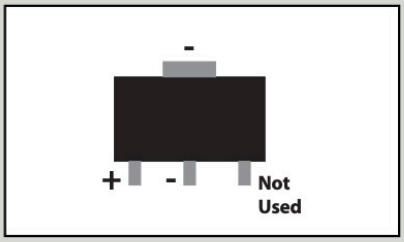
Unlike a resistor, the current limiter is polarity sensitive - just like the LED. It has a positive and negative lead.



Through Hole Current Limiter

The illustration above shows a through-hole current limiter. It looks like a small black cylinder with a flat spot. When looking at that flat spot, the positive lead of the current limiter is the one on the left. It is very important to properly identify the positive lead of the limiter. If the limiter is installed backwards it will not function properly and any LED connected to it could burn out.

The surface mount version of the current limiter is identical in function to the through hole version. The big difference is the packaging. Notice that the surface mount current limiter has two negative connection points. Either negative connection point can be used. Also take note that there is one connection point that is not used; it does not connect to anything inside the current limiter package. In an upcoming issue of LightBites we'll show how surface mount current limiters and LEDs can be used in structure lighting projects



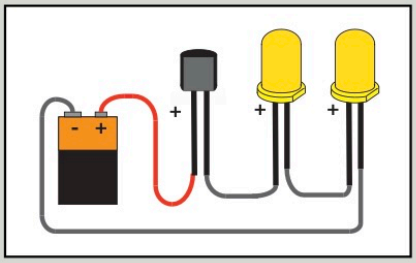
Surface Mount Current Limiter

The current limiter operates in a range between 5 and 90 volts DC. With a higher input voltage, or power supply, we can connect more LEDs in series to the current limiter. This large voltage range is what makes current limiters so versatile and simple to use for model lighting.

Learning by doing

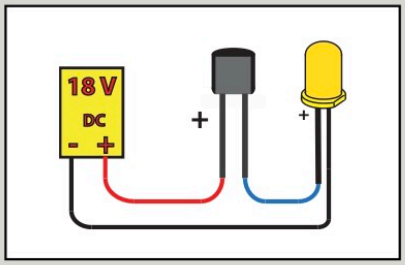
Let's look at some examples. The Illustration below shows a current limiter connected to a nine volt battery and two LEDs. We'll assume that these are white LEDs and they use three volts each.

The nine volt battery is supplying about three volts to the current limiter and six volts to the two LEDs. If we were to add another LED to the circuit none of the LEDs would light. This is because our devices (the current limiter and LEDs) require more voltage than what is available from the nine volt battery. The three LEDs themselves need nine volts - let alone the additional three volts required by the current limiter.

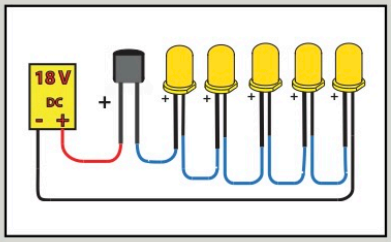


What we've learned so far is that the voltage of our power source dictates the ***maximum*** number of LEDs that can be connected in series to the current limiter. Also remember the rule of thumb for LED voltages: white and blue LEDs need about three volts, other LEDs (red, yellow, and green) need about two volts.

Let's look at an example using a larger power source. This time we'll use an 18 volt DC power supply. The illustration below shows a current limiter connected to the power supply and one LED. The current limiter will adjust the current in this circuit to the 20 milliamps required by the LED.



With an 18 volt power supply we have enough voltage to supply more LEDs.



The example above shows the maximum number of white LEDs connected to the 18 volt power supply. The same 20 milliamps is flowing through this circuit as the one with just a single LED and current limiter. The current limiter automatically compensates for the number of LEDs. Unlike the resistor there is no need to work out a formula to find the right limiter. The current limiter takes care of the math for you.

Coming up next

In the next issue of Light Bites we'll learn about series and parallel circuits and how they relate to bookcases. See you then!

Need Current Limiters? Go to Microlumina.com for all your model lighting needs.

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Number 3

Light Bites

Information that won't weigh you down

MICROLUMINA MINIATURE LIGHTING

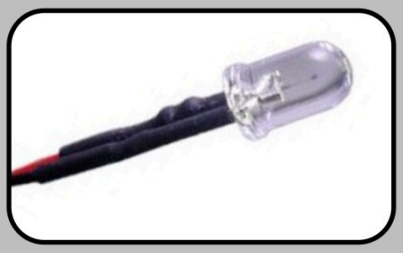


SERIES AND PARALLEL BOOKCASES...

LED wiring made simple

I know this is a bit of a stretch but I like to compare the job of LED wiring to building bookcases. This may sound strange but hopefully when I'm done explaining you'll have a better picture.

Let's take a look at one of the simplest LED circuits we can think of - an LED and resistor in series. Say that you have some LEDs that you purchased that were prewired for a common supply voltage like 12 volts. You might have something that looks like the photo below.



Underneath the heat shrink tubing is a current reducing **resistor** like the one we discussed in the previous issue of Light Bites. Remember we said that the LED can only have a certain amount of current flowing through it. Therefore, we need to use a resistor or a current limiter to keep the LED from burning itself out. The manufacturer of the prewired LED determined the proper resistor for 12 volts and installed it **in series** with the LED.

Illustration 1 gives us a graphical representation of the prewired LED connected to a 12 volt power supply. We're going to assume that we will be using white LEDs for our lighting project. White LEDs require about 3 volts DC and draw about 20milliamps (mA) of current. The first two editions of Light Bites discussed different LED types and touched on these electrical characteristics.

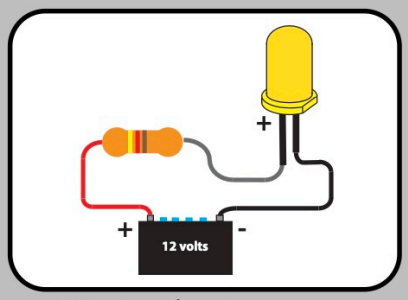


Illustration 1

One bookcase, two shelves

Let's add another prewired LED to our project and connect it to the battery. Illustration 2 shows the two LEDs properly installed.

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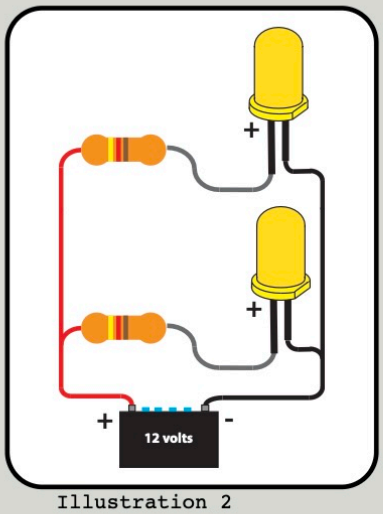

Illustration 2

When we added that second LED, we added a second series circuit in **parallel** to the first series circuit.

Let's adjust our drawing a little to make it appear simpler and less cluttered. We'll substitute yellow dots for the LEDs and move the battery out of the picture. The battery power is still there of course - we just chose to show only the power wires. Take a look at the results in Illustration 3 below.

See each series circuit sitting on its own shelf? The shelves are parallel to each other - just like the two series circuits. Think of the items on the shelves as being in a **series** - like the volumes of an encyclopedia. The two shelves are parallel to each other. The two

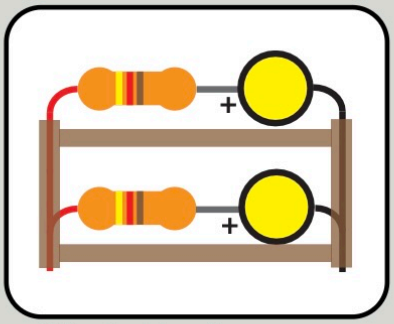

Illustration 3

uprights, left and right, represent the DC power bus.

Some folks are perfectly happy using many prewired LEDs for any lighting project that they may have. It's very easy and straightforward: connect the red wires to the positive connection on the power supply and the black wires to the negative. However, there are a couple of drawbacks with prewired LEDs. First, you'll end up working with a lot of wires. Each LED will have a pair of wires heading back to the power source. Second, you won't be using your power supply very efficiently. We'll explain why in just a second.

Tall bookcases, wide bookcases

Before we move on, let's start using the current limiter that we learned about in the previous edition of Light Bites. The current limiter will make things easier for us. Rather than messing around with different resistor calculations and finding the right resistance and power values, we can just use a current limiter instead.

The current limiter's (or resistor's) job is to limit the current "on the shelf" to 20 milliamps. Illustration 4 shows our bookcase with the current limiter/LED combination and the resistor/LED combination. Each series circuit (or "shelf") has 20mA running through it. Don't forget that our 12volt power supply is still connected but not shown.

The total current being used in Illustration 4 is 40mA. We add the current of each series circuit (shelf) to determine the total current.

Since we have 12 volts to work with we can add some more LEDs in series. Remember that each white LED uses about 3 volts and so does

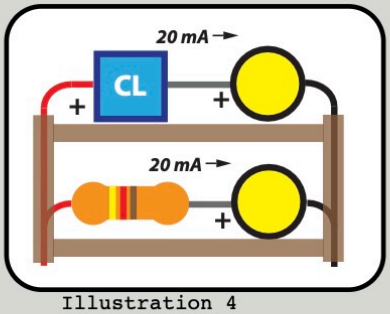

Illustration 4

the current limiter. Take a look at Illustration 5 and see what we've added.

We've added two more series circuits to the group. Since we have 12 volts to work with we can add a current limiter and up to three LEDs to each series circuit or shelf. At this point you might say that our shelves are 12 volts "wide." The top shelf still has room for another LED while the next two shelves down are at capacity. We've kept the prewired LED on the bottom shelf because we still need to talk about

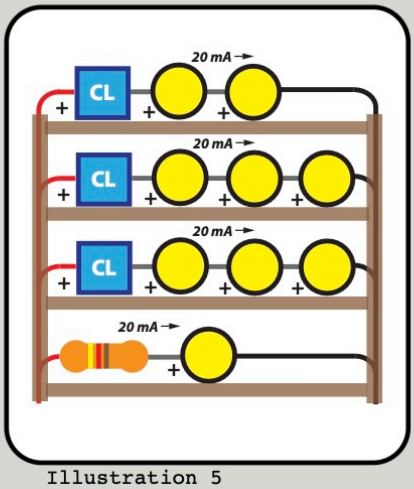

Illustration 5

them. Another thing to notice is that the same amount (20 mA) of current flows through each series circuit or shelf. The total current used in Illustration 5 is 80 mA.

Wider yet

Now things are going to get interesting. Let's use a higher voltage for our power supply and see what happens. We'll raise the power supply voltage to 18 volts DC. Again, we won't show the actual battery or power supply in the illustration. We're only going to show the power wires.

Illustration 6 shows our bookcase with a higher voltage supply. Notice that the shelves are wider. Naturally, with wider shelves we can put more things on them and that's exactly what we've done. We left the top shelf the same but

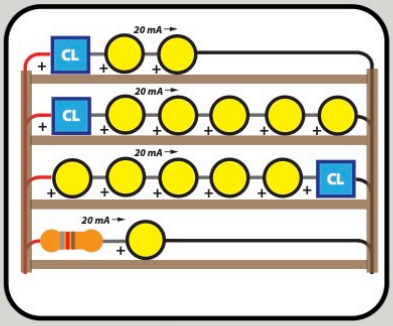

Illustration 6

added two more LEDs to each of the middle

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shelves. We also rearranged one of the middle shelves by placing the current limiter on the end of the series circuit. It doesn't matter where the current limiter is located in a series circuit - just make sure that you observe the polarity of the current limiter. Unlike resistors, current limiters can only be installed in one direction.

Speaking of resistors, we had to change the resistor on the prewired LED on the bottom shelf. The higher voltage required us to use a different resistor for the LED when operating at 18 volts instead of 12 volts.

Despite the extra LEDs and higher voltage, each series circuit still draws 20 mA and the total current used in this example is 80mA.

Time for a recap

Let's review what we've found out so far:

- The components in a **series** circuit are connected together like volumes of books on a shelf. The electrical path flows from one component to the next in a consecutive manner.
- **Parallel** circuits are like shelves in a bookcase. Each shelf being a **series** circuit
- A higher supply voltage means a wider bookcase - or wider shelves. More items can be placed on the shelves. More LEDs can be placed in our series circuits.

How high can we go?

Let's go back to our 12 volt power supply and our prewired LEDs, regular white (3 volt) LEDs and current limiters. The 12 volt power supply offered on the Microlumina site can supply 1.25 amps or 1,250 milliamps so we'll use that power supply for our example. Now take those 1,250 milliamps and divide them by 20 because each one of those shelves (or series circuits to be accurate) uses 20 milliamps. You'll end up with 62.5 but we'll just call it 62 since we don't deal with half circuits. That's 62 series circuits (the shelves) that can be wired in parallel to each other to form one tall "bookcase."

If you use only prewired 12 volt LEDs as we talked about at the beginning of this article you will be limited to using only 62 of them with the power supply. Remember that the white LEDs use about three volts and the prewired LEDs have a built-in resistor for dropping (using up) the extra nine volts in our 12 volt series circuit. The resistor simply turns the extra voltage into heat. However, If you decide to use LEDs and current limiters, and wire each series circuit with three LEDs and a current limiter, you can use up to 186 LEDs with the power supply. If you decide to "go commando" (remember that term from the previous Light Bites?) and use LEDs without resistors or current limiters you can run up to 248 LEDs from the power supply.

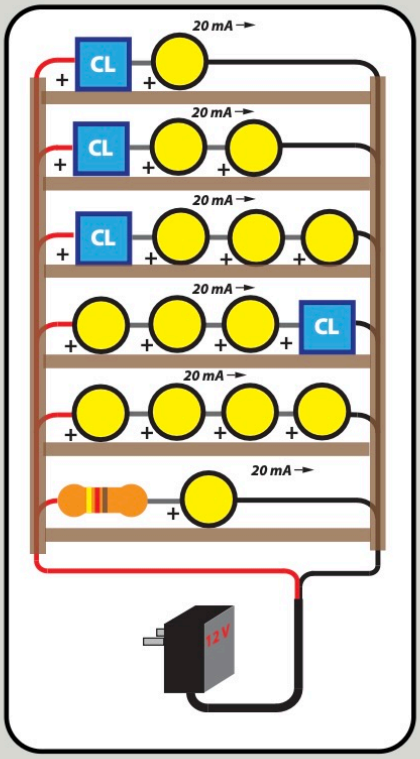

Illustration 7

Summing things up

Illustration 7 gives an overview of the combinations we can use with a 12 volt power supply. All LEDs used in the illustration are three volt white LEDs.

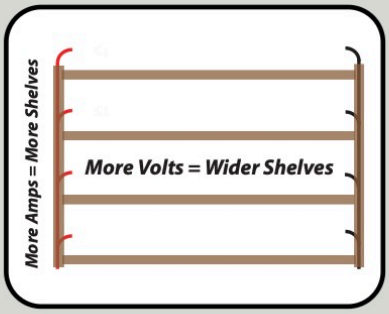

Illustration 8

Illustration 8 sums up the series/parallel bookcase idea. Whether you care to think in terms of shelves in a bookcase, rungs on a ladder or tracks in a rail yard, the concept is the same.

- As voltage increases, the "shelves" get wider and can hold more components.
- As power supply amperage increases, more shelves can be added to the "bookcase."

Now that we've learned about LEDs, current limiters, series and parallel wiring we are ready to start lighting things up. In the next installment of Light Bites we'll show how to light up a small project. See you then!

Power Supplies

Not all power supplies are created equal. Watch out for that old wall wart or cheap battery eliminator that you have laying around. On some, the voltage can be very poorly regulated - if regulated at all! This can result in burned up LEDs. Play it safe - use a quality power supply. They're inexpensive so why risk ruining your hard work?

Power Supplies from Microlumina

- N3512 - 12 Volt, 1.25 Amp
- N3518 - 18 Volt, 0.825 Amp

Coming up next...

In the next issue of Light Bites we'll put this theoretical information to use and show how to do some real wiring.

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Number 4

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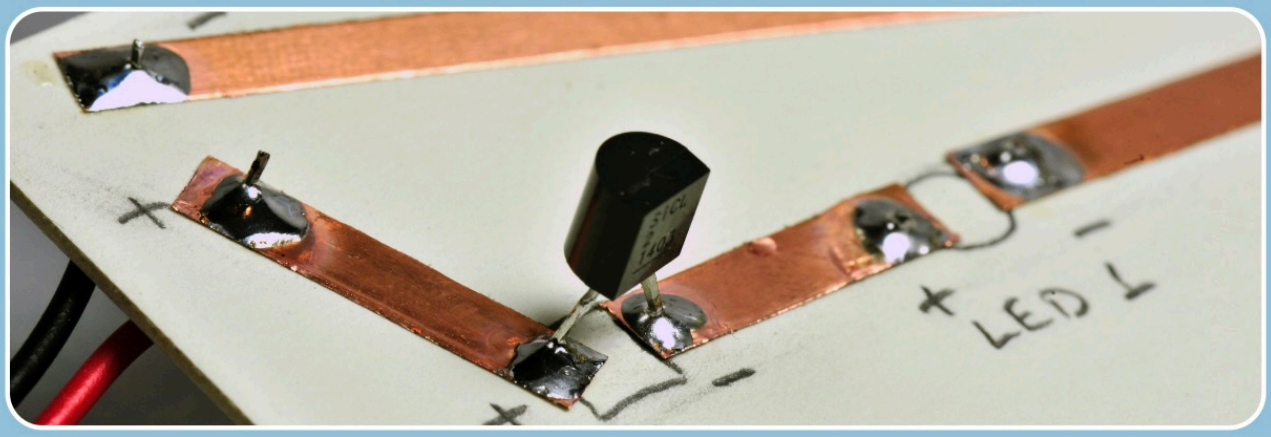


GETTING ON BOARD

LED wiring with illustration board

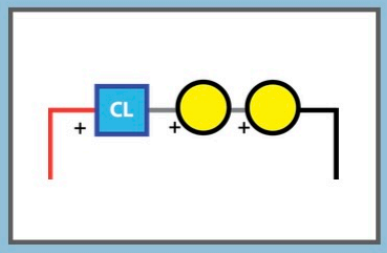
Now that we have a good understanding of series and parallel wiring (from Light Bites #3) we can put this information to practical use. In this example we're going to take a piece of illustration board and turn it into a circuit board...sort of.

Illustration board is a type of cardboard made up of many layers of paper pressed together to form a sheet about 0.05 inches thick. It is readily available in craft stores and on-line. The board is very easy to work with, inexpensive and well suited for structure model lighting projects.

Back to the bookcase

Before we get to work on the board, we need to figure out what we're going to do with it. Let's say we need a board with two LEDs on it. Going back to Light Bites #3, the circuit we need will have a current limiter and two LEDs in series. The shelf for the "bookcase" will look something like the diagram at right.

Now we need to take the information above and transform the diagram into



something that will work for our model. We can start by cutting the piece of illustration board to a size that will fit within the walls of the model. As mentioned, two LEDs are needed and they'll light an entire floor of the model. The LEDs will will hang down from the board. The board will act as a ceiling for the floor being lit. The LEDs will be located somewhat centrally so that the floor may be lit uniformly.

Taking the leap

We can start by drawing a couple of small circles to represent the two LEDs. LED location is important because light is the reason for the project in the first place. The next thing to consider is where to run the power wires for the model. Corners without many windows are good locations for hiding wires. In this example we'll plan on having the power come in through one of the corners on the board.

Take another look at the diagram to the left and notice that the current limiter is located between the positive power supply wire and the first LED. We learned in Light Bites #3 that we could put the current limiter between the last LED and the negative power supply wire and the circuit would still work. We'll stick to the diagram and place the current limiter between the positive power wire and the first LED. If we are doing any interior detailing we need to consider the physical placement of the current limiter so that it can be hidden from view.

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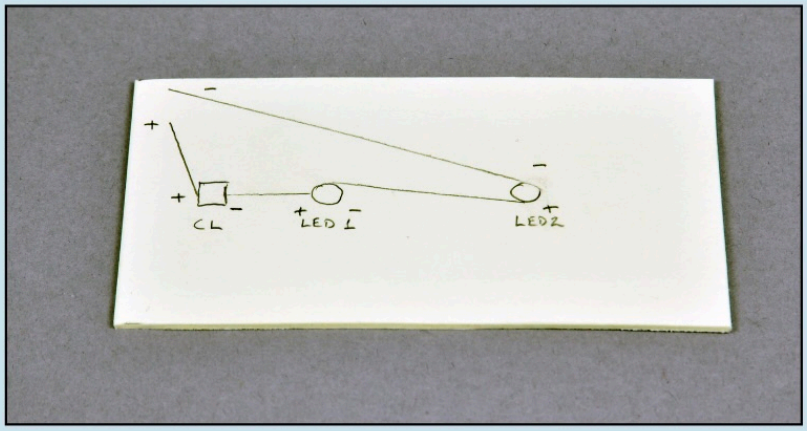
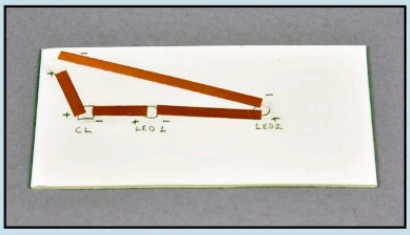


When all of the part positions are located on the board, draw lines connecting them as shown in the photo above. Mark the positive and negative terminals of the parts onto the board as well as the positive and negative power supply connections. Take a moment to compare the diagram on the previous page to the drawing on the illustration board shown above. Knowing how to take a diagram and turning it into an actual circuit is key to getting the lighting project rolling.

Walking the line

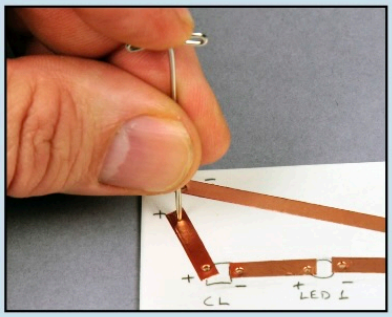
The lines on the illustration board will be turned into electrical pathways once we cover them with copper tape. Microlumina Copper Tape comes in 1/4" wide rolls. We can double the amount of tape by cutting lengths of tape and splitting them in half along the length of the strip. The 1/8" strip is the perfect width for the pathways.

Cut the 1/8" strip into segments that match the lines on the board. There should be a gap where the parts are located. If the tape covers a polarity marking, make sure you redraw he marking next to the tape so that it is visible. Smooth out the tape by pressing the back of a fingernail along the length of the tape.



Poking holes

Now that the tape is down, holes need to be made for the parts leads and the wires. This is a simple task by just pressing a T-pin through the tape where and wire or part lead needs to be. This is one of the nice things about illustration board - it is easy to work with.



Location, location, location

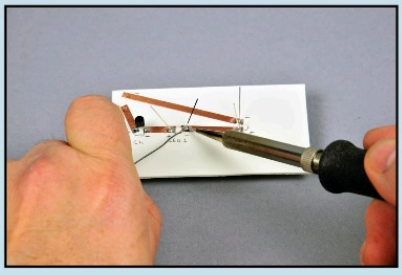
The parts need to be placed with their wire leads in the holes. Before doing this take the time to mark part of the negative lead of the LEDs and current limiter with a black permanent marker. It's not easy to tell the negative lead from the positive one once we locate parts onto different sides of the board.

In this project the two LEDs hang down from the board (or ceiling) but the current limiter is located on the top side of the board. Through hole parts like these can be installed on either side of the board. Just be careful not to lose track of the part's polarity. 95% of all wiring problems can be traced to parts being installed backwards.

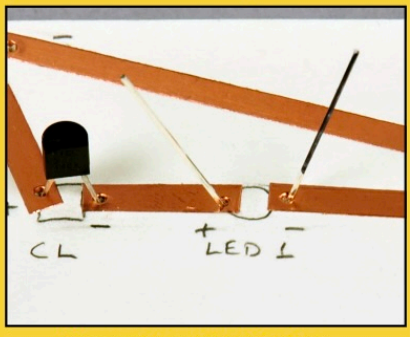
Yuck! Soldering

For some people there is a general fear or dislike of soldering. It's really quite simple and painless. First make sure you have the right tools. A regular pencil type soldering iron is all that is needed. Don't use one of those old trigger operated solder guns from the past. They generate way too much heat for the delicate parts we are installing. Next make sure you have the right solder. The only solder we will be using with electronic parts is rosin-core solder. This solder has built-in flux (the rosin) so extra flux isn't necessary.

With a soldering iron in one hand and a length of solder in the other, touch the tip of the iron to the spot where the wire lead meets the copper tape. Wait about a second for the joint to



Polarity!



When working with LED lighting always pay attention to the polarity of the LEDs and current limiters. These items must be installed correctly for the circuit to work. Most problems with LED lighting can be traced to a part installed backwards.

See if you can identify the negative lead of the current limiter pictured above and see if it is installed correctly. Refer to Light Bites #2 if needed.

With through hole LEDs the positive lead is always the longer one. Can you tell which lead is longer in the photo above? Probably not. Once the leads are bent and no longer parallel to each other it is difficult to tell the longer one from the shorter. That is why it's always a good idea to mark the wire lead one of the leads to distinguish it from the other.

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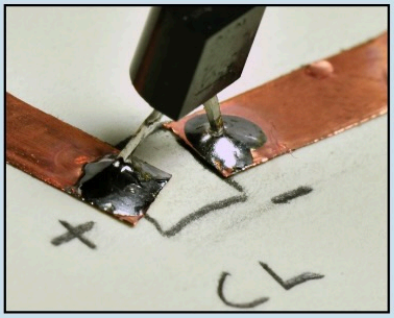
heat up and touch the solder near to the tip of the iron. The solder should flow up along the wire lead and down around the copper. Don't leave the iron on the joint too long. Too much heat is unnecessary and will damage the LED and current limiter. The heat from the soldering iron may soften the adhesive on the tape causing it to lift slightly. If this occurs just press the tape back down onto the board.

If you're new to soldering, practice soldering short lengths of wire together to gain confidence. A good solder joint should have a shiny concave appearance. Watch out for dull, clumpy solder joints. These can be a problem and one bad connection is all it takes to keep a whole circuit from working.



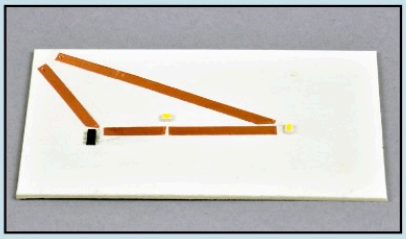
Clip off the excess length of the wire leads protruding from the board. **It's a good idea to hold the lead with one hand while clipping it off with the other.** Holding the lead prevents it from flying off and causing an eye injury.

Solder the red and black power wires to the board and connect it to a power source. If everything is working properly the LEDs should light up. If not, check for parts installed backwards or for poor solder joints. If the circuit still does not work (and the power supply is ok) it is possible that an LED or current limiter was damaged while soldering or defective from the start. However, these are rare occurrences and wiring mistakes should aways be sought out first.

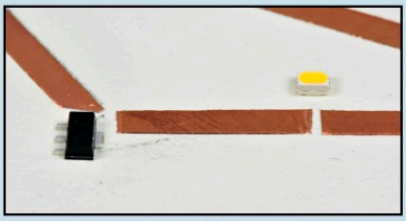
Going flat out

Let's take a look at the same circuit but do things a little different this time. Say that the illustration board that we need is going to be right up against the flat roof of our model structure. This means that we can't have any parts poking up above the board; all electronic parts must be on the bottom side of the board. To make matters worse, we have a detailed interior and we don't want a huge LED or clunky current limiter hanging down from the ceiling. What do we do? We use *surface mount* devices.

Start with the same board drawing as before but this time we need to pay close attention to the gaps between the path segments. The gaps need to be close enough to bridge the contacts of the surface mount devices.

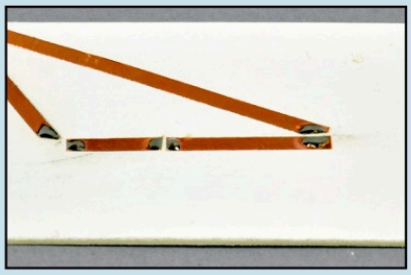


Configuring the tape for the surface mount LEDs isn't a huge problem. However, the surface mount current limiter is a little trickier. Look at the information on the package for the surface mount current limiter or check Light Bites #2. You'll The current limiter has connections that

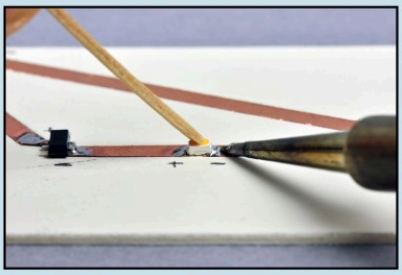


are closer together and not directly opposite each other like they are with the LED. Also, note that you have a choice connections for the negative terminals. In this installation we will use the wide terminal set by itself on the one side of the device.

Now that the copper tape is on the board, make a couple of holes for the positive and negative power wires. Next, take the soldering iron and apply a little bit of solder at the end of each path segment. Don't put any solder where the power wires go - the solder will just cover the holes. The board should look like the one pictured below.

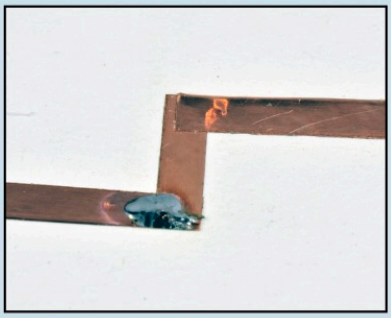


Place one of the LEDs across the gap where a LED is to be installed. Observe polarity! Take a toothpick in one hand and press down onto the LED. While holding the LED in place, touch the soldering iron to the solder on the copper tape. Let the solder reflow onto the LED's contact - this doesn't take very long at all so don't keep the iron near the part more than necessary. Repeat this for the other side of the LED. Do this same procedure for the remaining LED and current limiter.



Now all that needs done is to connect the power wires and test the circuit. Again, watch out for LEDs installed backwards. Make sure that the current limiter is installed properly and that none of the contacts are bridged with solder.

One last item before we finish this article - If we encounter a project where we can't connect two parts with a straight path and need to break the path up into segments, overlap the pieces of tape and solder them together to form a good electrical connection. Not all copper tapes have conductive adhesive. Even if they did, the conductivity of the adhesive might change in time. Therefore, apply solder to the joint to form a reliable connection.



Check out Microlumina **Project File #1** and see how to install LEDs into a craftsman structure kit. Download it from Microlumina.com.

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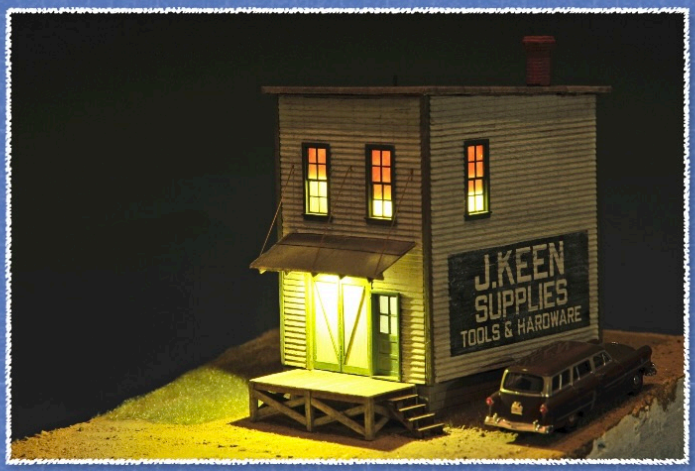

LIGHTING UP THE J. KEEN SUPPLIES *from* RailroadKITS

Scale Model Structures & Details www.RailroadKits.com

Welcome to Light Bites Project File #1. This Project File is a first in a series of files that will cover the step by step process of lighting a scale structure with LEDs. In this Project File we'll light up a simple kit - the J. Keen Supplies building available from RailroadKits.com. If you're new to craftsman kit structure building, an instructional DVD covering the assembly of this kit is also available from RailroadKits.

Before diving into the actual process of lighting the J.Keen building, **it is important to read and understand the first three issues of LightBites - especially Light Bites #3**. Light Bites #3 covers the topic of series and parallel wiring. Thoroughly understanding this topic provides a solid foundation for taking on any structure lighting job. Future Project Files will tackle larger and more complicated jobs. For now we'll take what we've learned about LEDs and wiring and start off on something simple.

FIRST THINGS FIRST - Figuring out what to light.

The photo above shows one way of lighting the J.Keen model. Unfortunately, when we buy a kit we're not shown what a model looks like when lit. It's up to us to determine what looks right for the model we want to light.

In general, having light coming out of every window isn't always realistic. Consider leaving some (if not most) of the windows dark. Although the photo above shows every window lit, viewing the model from the other side shows some of the unlit windows.

A good way to control lighting is to partition the inside of the structure. We can add partitions that

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separate floors (on multi-story buildings) and rooms within a floor. Adding partitions has the added benefit of providing a means to locate the LEDs and wiring.

Look for interesting features on the model that call out to be lit. These may include items like loading docks, entryways, alcoves, storefront windows or open garage doors just to name a few. Perhaps you want to stage a scene within the building that needs to be lit. Overhangs and dock canopies are great places to tuck an LED underneath. Make a list of the features you want to light and write them down. All successful projects starts with a good plan.

Getting back to the J.Keen model, it looks like the loading dock would be a natural place for a light. We can hide a 3mm flood LED under the overhanging dock roof centered over the freight door. Flood LED's have a lower profile compared to a spot LED so this makes them perfect in this situation; the flood LED won't appear to hang down as low as a spot LED.

We can plan on having Old Man Keen busy at work up in the office on the second floor. The office will be added to the list of things to light and a single flood or spot LED can provide enough light for the room.

The main feature on the first floor of the building is the loading dock. Other than the dock there's the door with windows leading into the building. Therefore, we should have a little bit of light shining through the door's windows. A single LED centered in the first floor should be enough for this. If the building had a large display window out front then we would install more LEDs. If we wanted to open the dock doors to reveal some detail or activity within the building then more light would be needed. For this project we'll stay with a single LED for the first floor.

WHAT ABOUT POWER?

Now that we've figured out how many LEDs we'll use, we need to consider how we will power them. We have two basic types of power source that we can use: battery power or a DC power supply that can be plugged into a wall outlet. For structure lighting on a model railroad it stands to reason that a DC power supply would be the best choice. Bus wires for lighting can be run under the layout and the structures can be connected to the bus. DC power supplies are available in many voltages. Typically, 12 and 18 volt DC power supplies are standard for model lighting.

For a stand alone diorama, battery power is very convenient. We can easily place the lighted model on a turntable without worrying about a power cord. Another thing to consider regarding power cords is that they can be a tripping hazard or a way for small displays to get yanked onto the floor. On the other hand, batteries only last so long and must be replaced constantly. Therefore, the type of power source must be considered before beginning the task of lighting. For this project we'll use a nine volt battery.

WHERE TO START?

A good point to start the job of lighting is before the walls get glued together. When the individual walls have been finished, a few decisions must be made. If interior detail is planned then the inside walls need to be prepared accordingly. Otherwise, the inside wall surfaces can be painted black. Painting the inside of the walls will keep light from shining through them. If no interior detail is planned, the inside surface of the window glazing can be painted with a flat transparent paint such as Dullcote. This will let light shine out without revealing the empty room inside.



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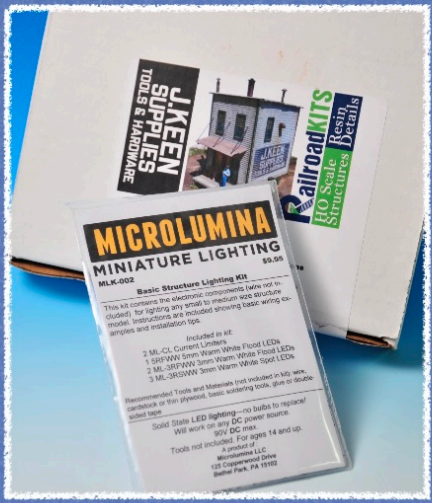


TOOLS & MATERIALS

Aside from the J.Keen Supplies kit and general hobby tools, glues and paints that go along with the construction of the kit, the following tools & materials will be used for this project:

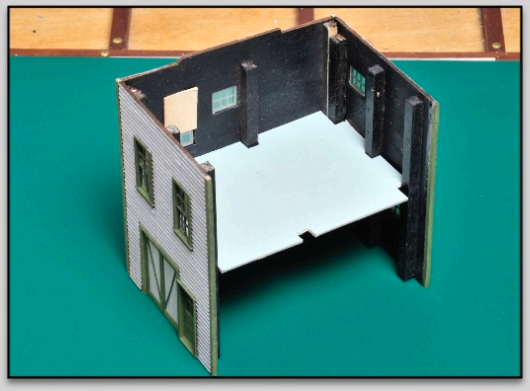
MLK002 Basic Structure Lighting Kit from Microlumina
ML-TAPE Copper Tape from Microlumina
Illustration Board - Available at most arts & crafts stores
Pencil type soldering iron, solder & wire

*The **MLK004 Structure Lighting Kit** contains all the materials included in the MLK002 **plus** Copper Tape, Illustration Board and wire.*

Step 1 - Getting Things Ready

We're going to use illustration board to make a couple of pieces for our lighting job. Illustration board is a heavy duty type of card stock. It's easy to work with, easy to cut, is opaque and doesn't melt when you get a hot soldering iron close to it.

Three of the four walls can be glued together. Next, cut two pieces of illustration board to fit neatly inside the building. Both pieces start out as identical rectangles. One piece fits between the first and second floor and will need to have notches cut into it to clear the bracing. Don't forget to cut notches for the fourth wall that hasn't been glued on yet. The photo below shows the first floor ceiling piece in place. Do not glue this piece inside the walls yet.



The second ceiling piece does not need notches cut into it provided that we trim the bracing first. In future lighting projects its a good idea to install shortened braces right from the beginning rather than trimming them after they have been glued in place. The photo below shows the shortened bracing. The second floor ceiling piece will rest on top of the bracing.



The first floor ceiling piece will serve two purposes: it will physically separate the two floors thus containing the light to the intended floor, and it will provide a way to mount the lighting components.

The second floor ceiling piece serves double duty as well. Not only does it provide a mounting surface for our lighting components, it will also keep light from leaking out from the joint between the roof and the tops of the walls.

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WATCHING OUT FOR GLOWING WALLS

Are the structure walls opaque? You might be surprised to find that the wood used in most craftsman structure kits will glow slightly if the inside surface is not painted black or covered with something to cut down on the light coming through. The same holds true for plastic kits.

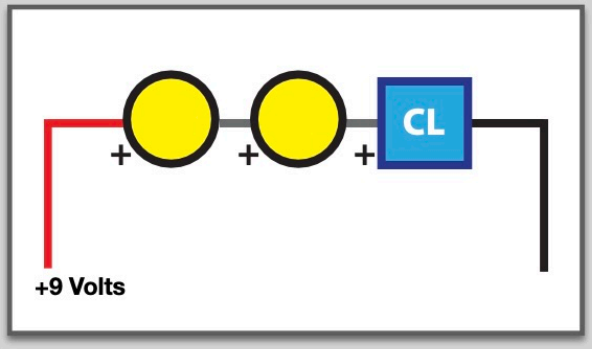
Hold the wall up to a light or shine a flashlight through the wall to check for glowing walls. The photo at right shows not only a gap in the freight door trim but the freight doors themselves are glowing. This can really spoil the lighting job and needs to be corrected. An easy fix for this is to just cut a piece of black construction paper to fit onto the back side of the problem area.

Other problem spots are thin plastic doors and windows that can glow. Be sure to check around door and window trim - especially with clapboard and board & batt walls. The surface features of the wall can create gaps that allow light to leak out from around the frames.

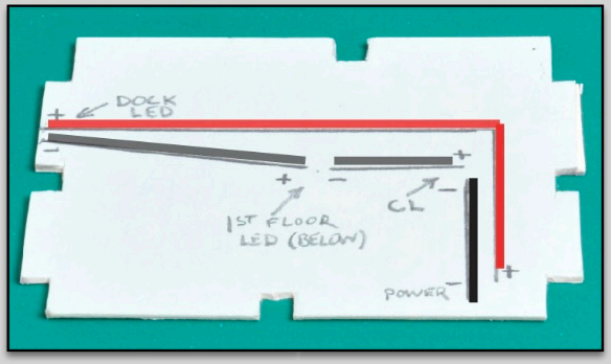


Step 2 - First Floor Electrical Plan

This is the step where we put the information learned in the first three issues of Light Bites to use. We mentioned earlier that we were going to use two LEDs for the first floor lighting: one LED for the loading dock and the other for the interior first floor. We'll put the two LEDs in series with a current limiter. A pictorial diagram of the first floor circuit is shown below. In Light Bites issue #3 we compared the circuit below to a shelf in a bookcase.



The trick here is to take the diagram and transform the information onto a piece of illustration board. Look at the diagram and compare it to the photo below. Start at the point marked +9 volts on the diagram and follow the red path to the first LED . Looking at the photo we can see the same path going to the positive connection point for the dock LED that will be centered over the freight door. Continuing from the negative connection point of the dock LED we go to the positive connection point for the next (first floor) LED that is



roughly centered in the first floor. Continuing from the negative connection point of the first floor LED we end up at the positive connection point of the current limiter. Finally we follow the black path from the negative connection point of the current limiter to the negative power connection.

Sketch out these path segments onto the illustration board. Mark the positive and negative connection points for power, LEDs and current limiter onto the board as well.

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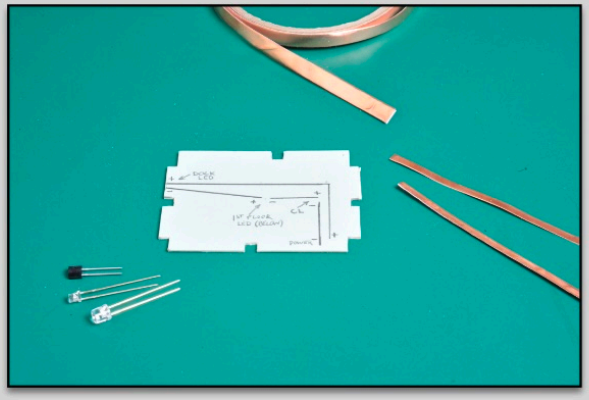
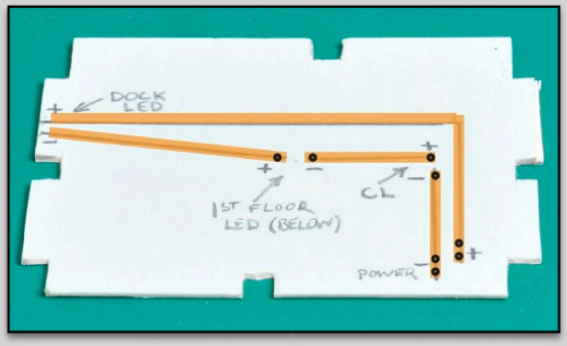
Step 3 - Making a "Circuit Board"

In this step we'll turn the illustration board from Step 2 into a circuit board by sticking copper tape onto the paths marked on the card.



Cut a four inch (approximate) length of copper tape from the roll. If you're using the MLK004 Deluxe Lighting Kit use one of the lengths of tape included in the kit. Place a straight edge along the center of the tape and split the tape into two strips with a hobby knife.

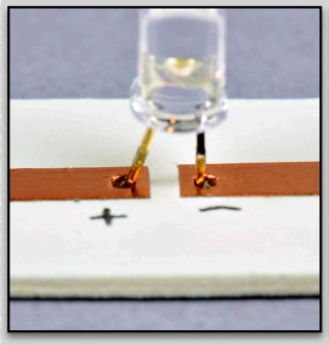
Cut the thinner strips to lengths that match the path segments marked on the board. Remove the backing from the copper tape and place the tape over the paths sketched onto the board from the previous step. Smooth out the tape with the back of a fingernail or scrap of smooth plastic and make sure the tape sticks well to the illustration board. There should be gaps in the tape between the positive and negative connection points for the LEDs and current limiter. Overlap the tape slightly where the two strips form a corner. Use the photo below as a guide for placing the tape.



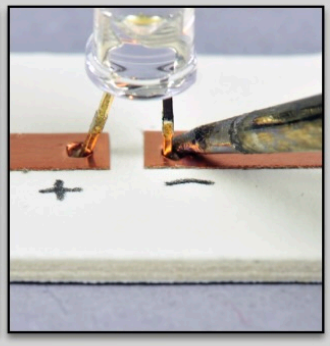
Use a T-pin or sharp probe and push it into the tape and through the illustration board at locations in the photo above indicated by the eight black dots. These holes will be for the wire leads of the LED, current limiter and power wires. No holes need to be made dock light LED. The dock light leads will be soldered to the top of copper tape.

SOLDERING 1-2-3

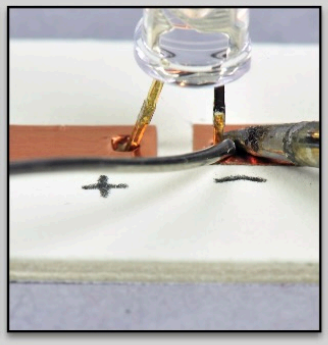
Soldering is simple. Follow these instructions for the next step.



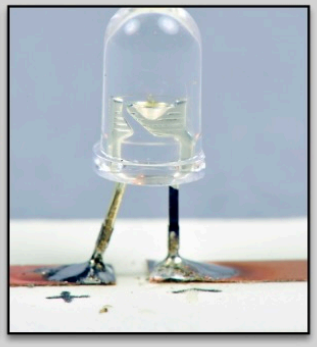
Step 1 -Place the component onto the board. Always check polarity!



Step 2 - Hold the tip of the soldering iron to the connection for a second.



Step 3 - Touch the solder to the connection point and let a little solder melt onto the connection. It should flow freely onto the tape and up the wire lead.



A good solder joint will be nice and shiny with a smooth concave fillet around the wire lead. Cold solder joints are dull, lumpy and make bad electrical connections.

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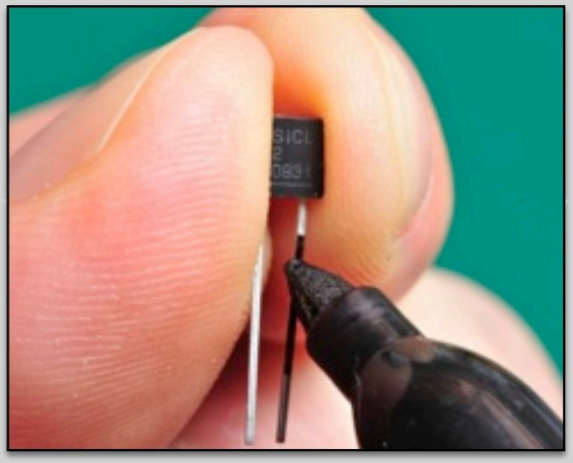
Step 4 - Soldering

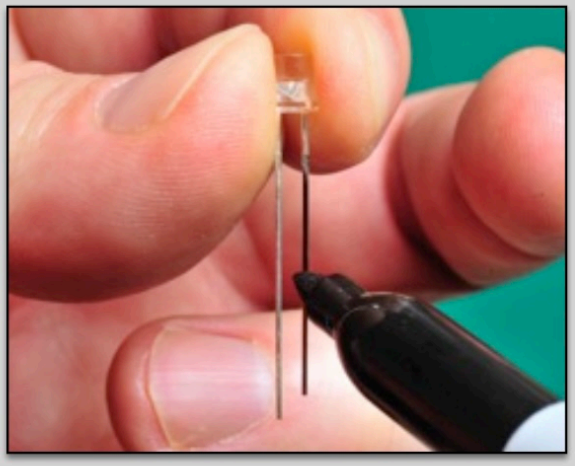
We're almost ready to begin soldering but first we should take some time to identify the positive and negative leads of the LEDs and current limiter. Since these parts are polarity sensitive they won't work if installed backwards. Another thing to consider is that when parts are installed on both sides of the board (as in this project) it's easy to get polarity mixed up if we don't properly identify the leads.

Find the current limiter from the lighting kit parts and hold it so that the flat spot on the device is facing you as shown in the photo below. When the flat spot is facing you the negative lead of the current limiter is



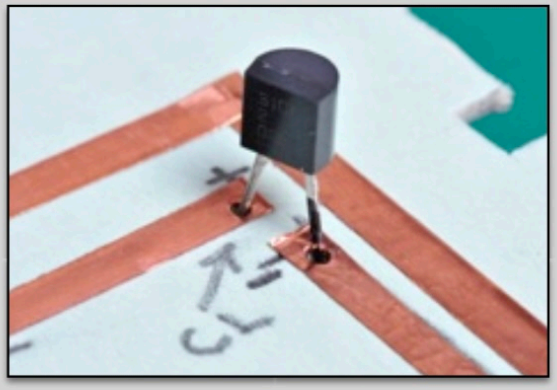
the one on the right. Mark this lead with a permanent marker.

The negative lead of the LED is easier to identify; the negative lead is the shorter one. This shorter,



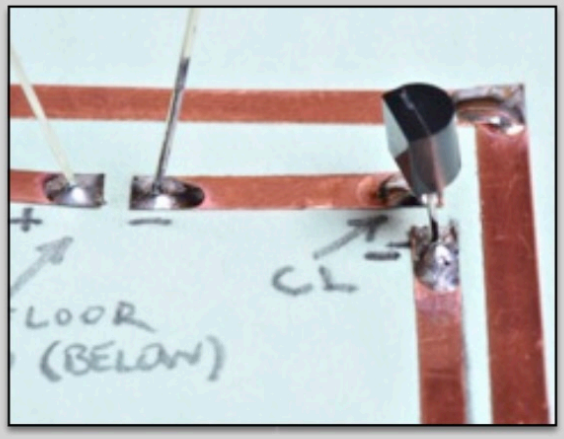
negative lead, is easy to spot when it's next to the long positive lead. However, once we bend the leads after installing them, and the leads are no longer next to each other, it can be difficult to tell which one is shorter. Therefore, mark the short negative lead on the LEDs with a permanent marker now so we don't get the leads mixed up later.

Take the current limiter and insert it into the board as shown in the photo below. Note that the negative lead has been inserted into the hole marked with the



minus sign. The 5mm LED will be installed from the underside of the board and its leads will poke up through the tape.

Solder the connections as shown below. There are five connections to be soldered. Four connections are for the current limiter and LED. The fifth connection is at the corner formed by the overlapping pieces of tape located in the upper right corner of the photo below.



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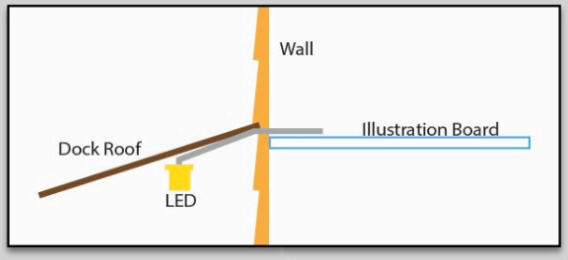
Step 5 - The Dock Light

Drill two holes over the freight door for the LED as shown in the photo below. The holes will be located just above the first floor ceiling board and just below



the attachment point for the dock roof. Position the ceiling board inside the structure but don't glue it in place just yet. The illustration at the right shows a cross section of how the dock LED is positioned.

Notice that the leads of the LED have two bends in them. One bend is close to the LED body. To make this bend, grasp the lead close to the body of the LED with the tip of a pair of needle nose pliers. With the lead held by the pliers, carefully bend the lead to the proper angle. We want to avoid bending the lead right at the LED itself because this could damage the LED. Using the pliers will prevent damage from occurring.



When the LED is in position and the leads properly bent, solder the LED to the copper tape on the illustration board. Make sure to observe the polarity of the LED before bending and soldering. Cut off the excess portion of the leads.

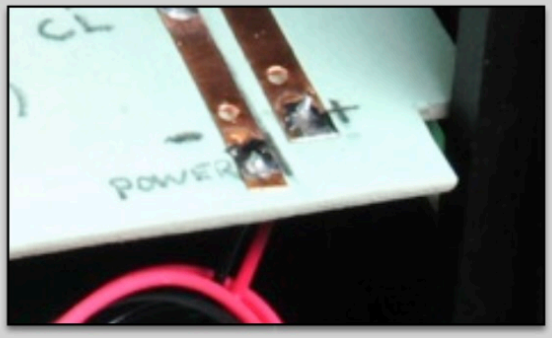


Step 6 - Test Your Work

Now is a good time to test the ceiling board. Cut two equal lengths of wire to connect from the board and extend down through the base of the model and through the diorama base or layout. Use two different colors of wire so that we don't get the positive and negative wires mixed up. Strip both ends of the wires and insert one end of the red wire up through the underside of the first floor ceiling board where a positive power connection is marked. The photo at right shows the power connections for the first floor ceiling board. Solder the wire to the copper tape. Repeat this procedure for the black wire but insert the black wire through one of the negative power connection holes. The other holes will be used for connecting power to the second floor ceiling board.

Touch the free ends of the black and red wires to a nine volt battery. The LEDs should light up. If the LEDs don't light then check the polarity of the two LEDs and the current limiter. The most common cause of problems with LED lighting is the failure to observe the polarity of the devices and power connections.

If the LEDs light up properly, glue the first floor ceiling board in place.



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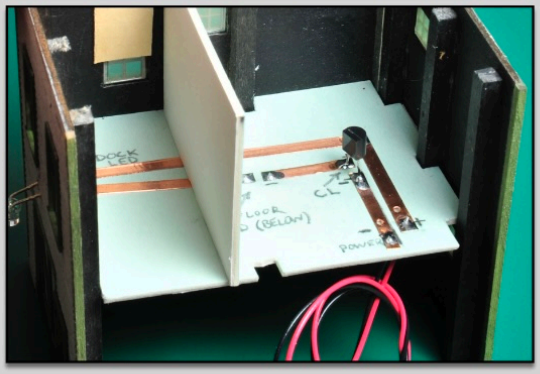
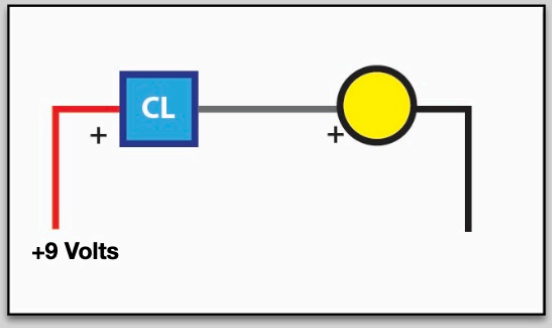
Step 7 - Onward and Upward (the second floor)

The second floor requires a partition to block light from coming out from the two smaller second floor windows. To do this cut a piece of illustration board the width of the building's interior and high enough to extend from the first floor ceiling board to the bottom of the second floor ceiling board. This piece is essentially a wall that divides the second floor into two rooms.

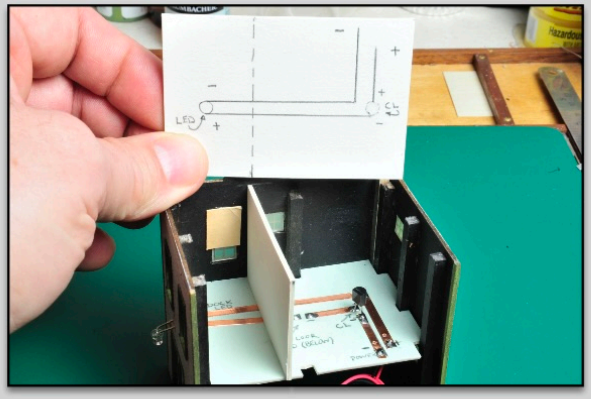


The electrical diagram for the second floor has only two components: a current limiter and LED. Using the bookcase comparison introduced in LightBites #3, the diagram below represents another shelf in the bookcase.

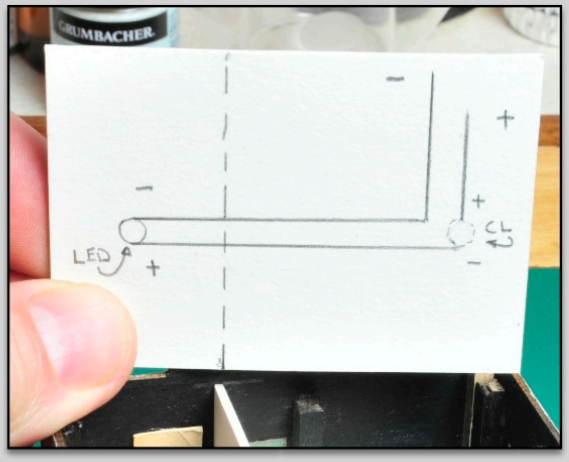


Once again, the diagram above needs to be transformed onto the second floor ceiling board. We're going to do things a little differently this time by placing the copper tape onto the underside of the second floor ceiling board. We'll locate the power connection points for the second floor board in roughly the same position as we did for the first floor board. There's not much going on in this corner of the building window-wise so this makes it a good area to run wires.

The photo below shows the second and first floor ceiling boards. Notice that the path segments on the boards are almost mirror images of each other.



Look at the close up of the second floor ceiling board below and compare it to the electrical diagram to the left. Follow the paths and match each segment on the board to the corresponding segment in the diagram.



Take the copper tape and cut segments to match those on the board and place the tape onto the board. Make six holes for the power wires, LED and current limiters leads with the T-pin or probe.

Cut a two inch length (approximate) of black wire and red wire. Strip the ends of each wire. These wires are jumpers that will connect the second floor ceiling board to the first floor board. Insert the leads of the current limiter and LED into the holes on the second floor ceiling board. Be sure to observe polarity. Insert

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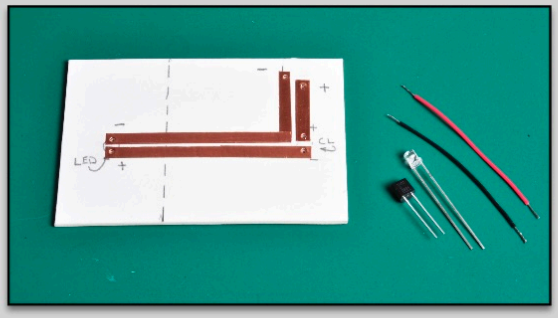
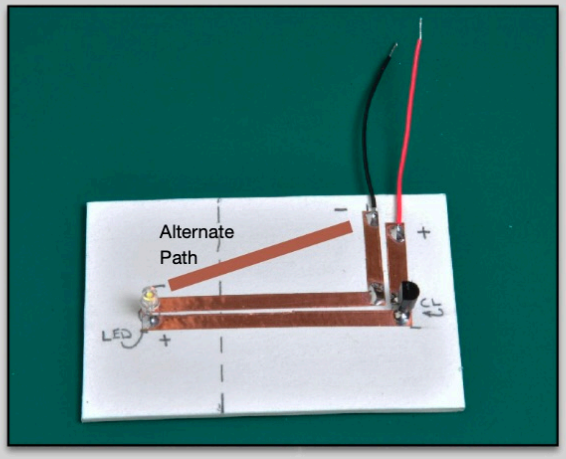
Step 7 - Continued



the power wires, solder the connections and trim off the excess lengths of wire and leads on the opposite side of the board. Be sure to place a little bit of solder where the two pieces of tape form a corner.

Note that a single length of copper tape could be used to connect the negative power supply wire straight to the negative LED rather than using two lengths of tape and soldering the corner joint. The photo above shows this alternative path. This goes to show that there isn't only one right way to go about lighting a model.

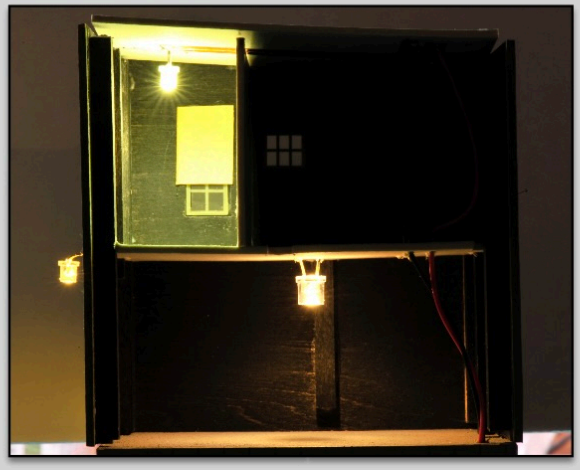


Step 8 - Test Your Work

Connect the black and red wires from the second floor ceiling board to the nine volt battery. The LED on the second floor ceiling board should light. If it doesn't, make sure to check for device and wire polarity; the usual culprit when it comes to troubleshooting.

Connect the wires from the second floor ceiling board to the two remaining power connection holes on the first floor ceiling board. Again, make sure you observe polarity when connecting the boards. Test the assembly by connecting the power wires from the bottom of the model to the nine volt battery. The photo at right shows what the lit model should look like at this point of the project.

Make sure the ceiling board doesn't extend above the top of the walls. Glue the ceiling board in place.



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Step 9 - Finishing Up

Hold the fourth wall in place with the other three walls. Don't glue the fourth wall on just yet. Place the walls onto the foundation and connect power to the model. You probably will see something that looks like the photo below. The photo below shows a classic example of a light leak at the base of the walls.



A simple way of dealing with a light leak like this is to take a strip of black construction paper and fold it down the middle along its length. Cut strips to lengths that match the width of the walls, fold them and glue them to the bottom of the walls as shown in the photo. Let the glued strips dry. Assemble the walls onto the foundation to complete the lighting project. Another way to deal with this kind of light leak (if you don't have open garage or freight doors) is to use a piece of illustration board for the floor.



In conclusion...

The lighting portion for the Keen Supplies structure project is complete. Now the remaining assembly steps for the kit may be completed.

This project was wired in such a way that a minimum of nine volts DC will light up the model. Since current limiters were used, the model can be supplied with higher DC sources up to 90 volts without damage to the parts.

A final last word - these instructions present only one way to light this model. There is no one right way to do this. Hopefully, this Project File has shed some light (no pun intended) into a new dimension of modeling.

Deluxe Structure Lighting Kit

A deluxe Structure Lighting Kit is available from Microlumina. It features all of the special tools and materials needed for surface mount and through-hole LED wiring. The kit contains seventy white LEDs in seven different styles, current limiters, copper tape, a12Volt Switching Power Supply *and more*. The kit is available with or without a fine-tip 12 watt soldering iron and stand.

- MLK-DLX Deluxe Structure Lighting Kit

Other lighting kits from Microlumina:

- MLK-002 Basic Lighting Kit
- MLK-004 Structure Lighting Kit

Coming up next...

The next **Microlumina Project File #2** will show a simple way for making a working "gooseneck" style light.

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Prototype Structures that need to be Modeled

edited by John Siekirk

This section of the S&S RR & I Gazette was created at the request of George Sellios. George mentioned in one of our phone conversations that he really missed seeing prototype structure photographs in the modeling literature. “It just doesn’t seem to be done anymore”. Well George, the response was fantastic to my call for help. So lets see how long we can keep this section going with fresh prototype structure photographs and when available models inspired by those prototypes. I always have the camera ready when we travel and welcome a stop to photograph a structure that in the words of my wife Amy “that looks like a building from one of George’s kits”. Please add your structure photographs to this section.

If you find something in this section that inspires you, please consider a build article for the S&S RR & I Gazette. And kit manufactures, we hope you also find inspiration in these pages, too.

Tom Boyd has been collecting Railroad related historical photographs for many years. This month we begin the first installment of his photograph collection. Thank you for sharing these photographs with us Tom.

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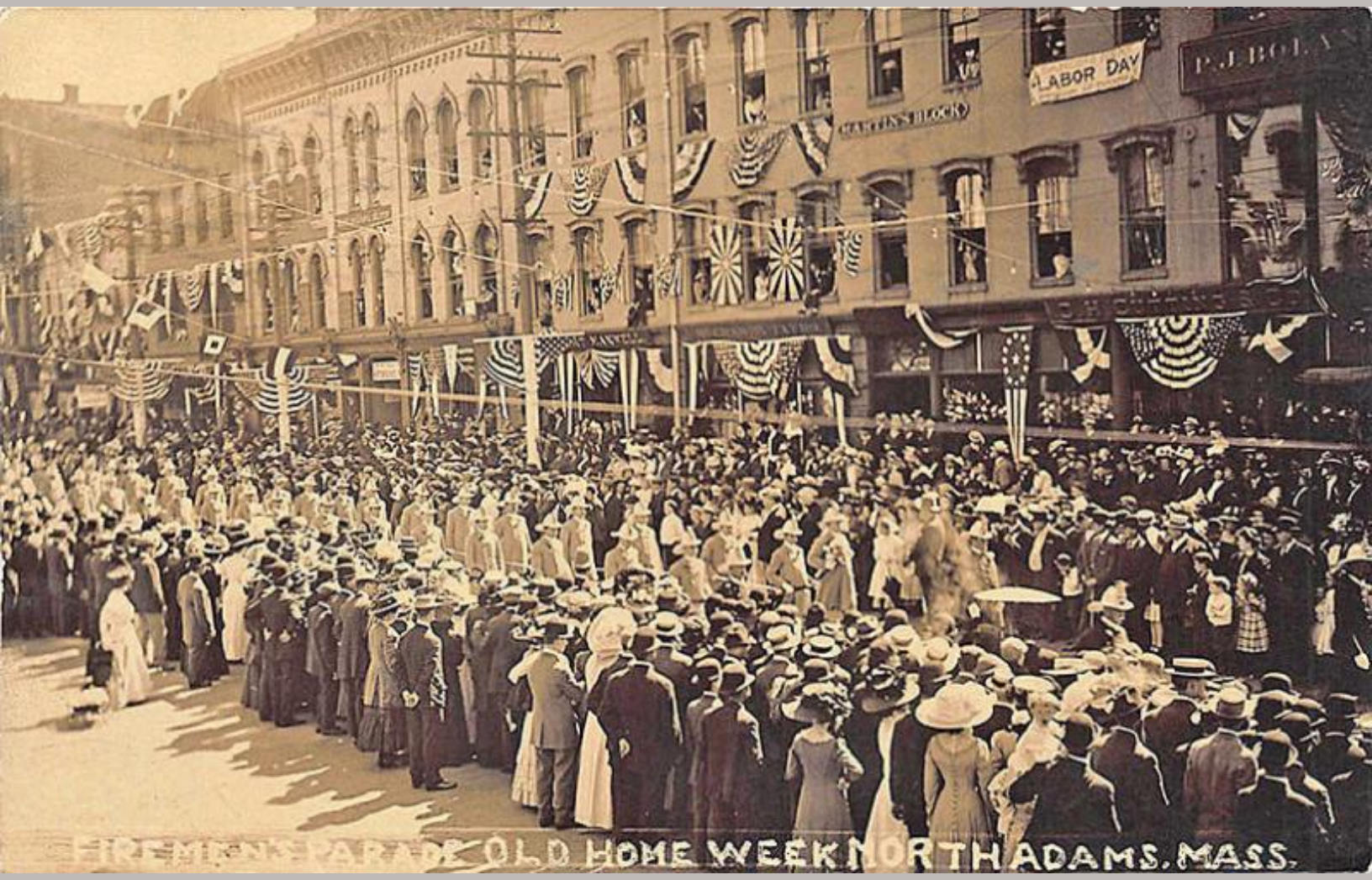

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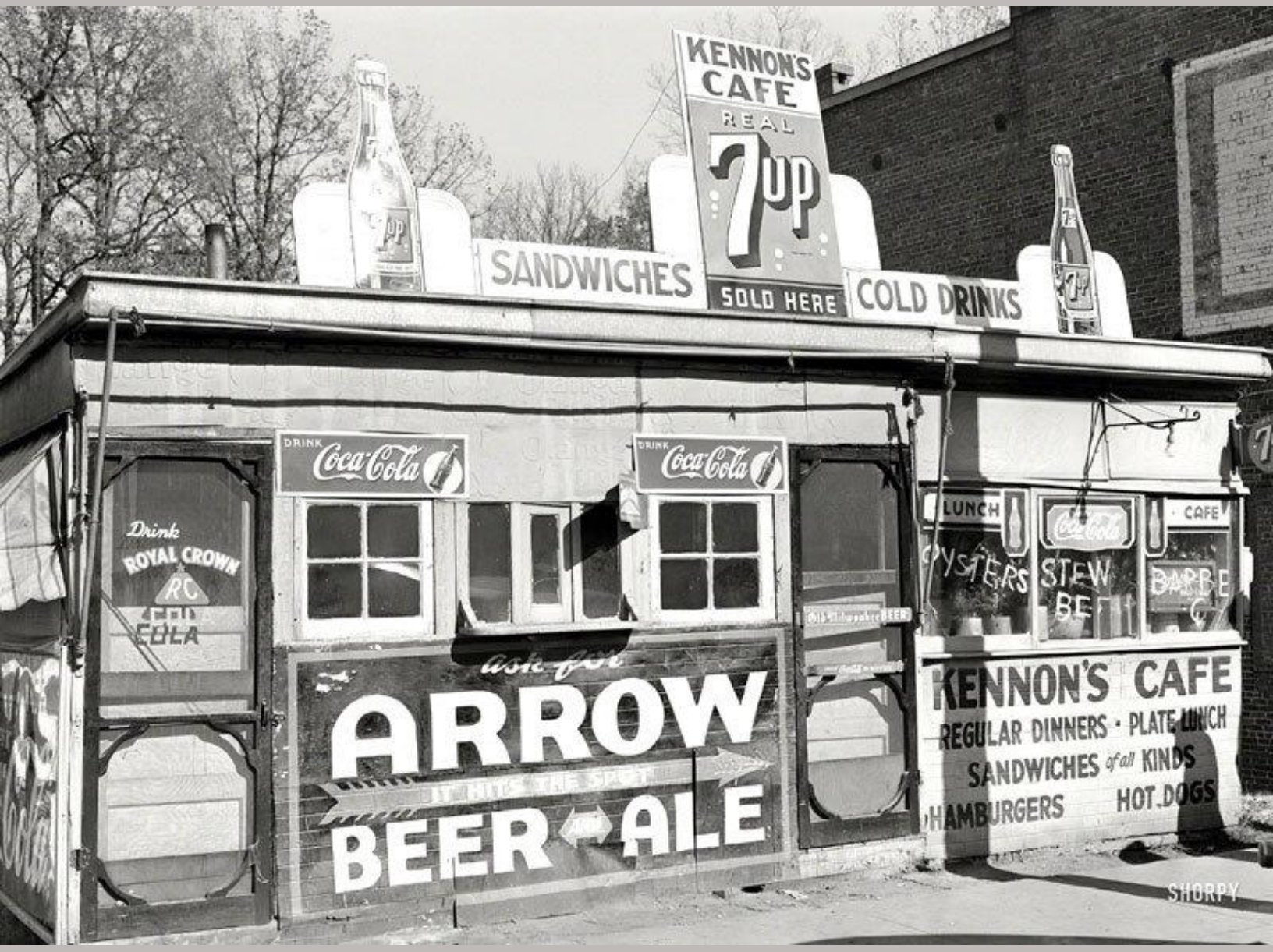

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Iain Collingwood sent in these photographs of a structure that needs to be modeled.



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A Building You Can Model

Bunn Wagon Factory / Feed Mill

By Jerry Beach

The Bunn Wagon Factory was located in Richmondville, New York across the valley from the Delaware & Hudson Railroad tracks, on the east side of Cobleskill Creek. The building is located on the hillside about a block from Main Street (State Route 7) next to a feeder stream that empties into Cobleskill Creek. Some recent flooding has resulted in a new bridge being built across the feeder stream that includes some bank stabilization and new guardrails.

I found a photo of the building as it existed in 1888 when it was used as a wagon factory. This view is essentially looking south with the feeder creek behind the building.



The building was later converted into a feed mill, though it retained the same ownership. I have been unable to find the approximate date when the transition occurred, nor have I been able to find the date the feed mill business closed. Even given the lack of specific information, I believe that a close examination of the photos will help to tell the story of this historic building.

The building is currently owned by the Richmondvile Historical Society. Photos of the creek side of the building are almost impossible to obtain due to the large number of trees growing on the top of the creek bank blocking that side of the structure. I did find this photo of that side of the building before the historical society started the building renovation.

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This photo clearly shows the twelve pane double hung windows as well as the fact the building lacked any kind of sheathing when originally constructed. As a side note, this kind of construction seems typical for buildings in upstate New York that were built prior to 1900, my house also lacked any sheathing under the clapboards.

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The building as it stands today has several additions. I believe that by looking at the construction itself we can make an educated guess as to what the building looked like at various stages in its life.



If we compare this shot to the original photo on the first page we can see the basic structure has really only changed by the addition of the pop-up on the roof that likely was added to house some type of feed elevator when the building transitioned from a wagon factory to a feed mill. I believe the addition in the right side of the photo may have been added next. It not only mimics the original clapboard siding, the concrete foundation looks "old" with a degree of deterioration that probably indicates its age. This addition also has similar twelve pane double hung windows. Could they possibly have been removed form the original building and used in this addition?

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The front dock area seems like it has been rebuilt relatively recently. Its shape and materials are not consistent with the older construction. The loading dock under it seems to be of much older construction although the concrete block under the corner and the deck appear much newer than the wooden stairs that access what appears to be the office door. The windows in the original building were single pane double hung rather than the six over six double hung windows used in the rest of the original construction. If you blow up the photo below it is clear that the lower portion of the original wooden wall has been replaced by a block wall.



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The photo above shows what appears to be the newest addition to the building (except possibly for the handicap access). It is obviously much newer construction, and blocks the bottom of what looked to be the first addition to the mill. If you look closely you can see the concrete wall, to what I am calling the first addition, ends without supporting the "back side" of the addition. While it looks like this area is enclosed by boards at this time, I have to wonder if there wasn't some type of access to this space when the mill was in use. If I were modeling this structure, I would use some sliding doors in the area.

This photo also shows that what appears in other photos to be a flat roof is not. The end wall of the addition is simply a facade that disguised the roof that slopes toward the rear of the structure.

I'm going to wrap this up with a photo of a portion of the rear wall. It gives some insight to the original construction, showing the remnants of a stone foundation. It might indicate that the feeder creek could at one time have powered a water wheel of some sort. At least I would like to think it might have been the case.

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Issue 2	40 Pages	May 10, 2022
Issue 3	35 Pages	May 28, 2022
Issue 4	120 Pages	June 22, 2022
Issue 5	159 Pages	August 1, 2022
Issue 6	204 Pages	September 1, 2022
Issue 7	128 Pages	October 1, 2022
Issue 8	119 Pages	November 1, 2022
Issue 9	166 Pages	December 1, 202
Total	987 Pages	Total 2022

Volume 2 - 2023

Issue 1	116 Pages	January 1, 2023
Issue 2	152 Pages	February 6, 2023
Issue 3	131 Pages	March 1, 2023
Issue 4	168 Pages	April 1, 2023
Issue 5	148 Pages	May 1, 2023 One year anniversary issue
Issue 6	127 Pages	June 1, 2023
Issue 7	191 Pages	July 1, 2023
Issue 8	181 Pages	August 1, 2023
Issue 9	146 Pages	September 1, 2023
Issue 10	252 Pages	October 1, 2023
Issue 11	249 Pages	November 1, 2023
Issue 12	241 Pages	December 1, 2023
Total	2102 Pages	Total 2023
Total	3089 Pages	Total Volume 1 and 2

Volume 3 - 2024

Issue 1	223 Pages	January 1, 2024
Issue 2	251 Pages	February 6, 2024
Issue 3	178 Pages	March 1, 2024
Issue 4	199 Pages	April 1, 2024
Issue 5	189 Pages	May 1, 2024 Two year anniversary issue
Issue 6	129 Pages	June 1, 2024
Issue 7	156 Pages	July 1, 2024
Issue 8	183 Pages	August 1, 2024
Issue 9	184 Pages	September 1, 2024
Issue 10	184 Pages	October 1, 2024
Issue 11	215 Pages	November 1, 2024
Issue 12	194 Pages	December 1, 2024

Total	2285 Pages	Total 2024
Total	5374 Pages	Total Volume 1 - 3

Volume 4 - 2025

Issue 1	189 Pages	January 1, 2025
Issue 2	215 Pages	February 1, 2025
Issue 3	221 Pages	March 1, 2025
Issue 4	260 Pages	April 1, 2025
Issue 5	256 Pages	May 1, 2025 Third Year anniversary issue
Issue 6	192 Pages	June 1, 2025
Issue 7	189 Pages	July 1, 2025
Issue 8	130 Pages	August 1, 2025
Issue 9	217 Pages	September 1, 2025
Issue 10		October 1, 2025
Issue 11		November 1, 2025
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Back Issues

We now have a web address where you can download Back Issues of the Superior & Seattle Railroad & Interchanges Gazette and the F&SM Structure Encyclopedia. This is provided by one of our contributors David Emery. Thank you David.

This will save my mail drop email address usage limit for sending out the new issues.

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http://www.earlyrail.org/sandsgazette/

*An Index to all issues of the Superior & seattle Railroad & Interchanges Gazette can also be found on this webpage.



Until our next Issue.

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