



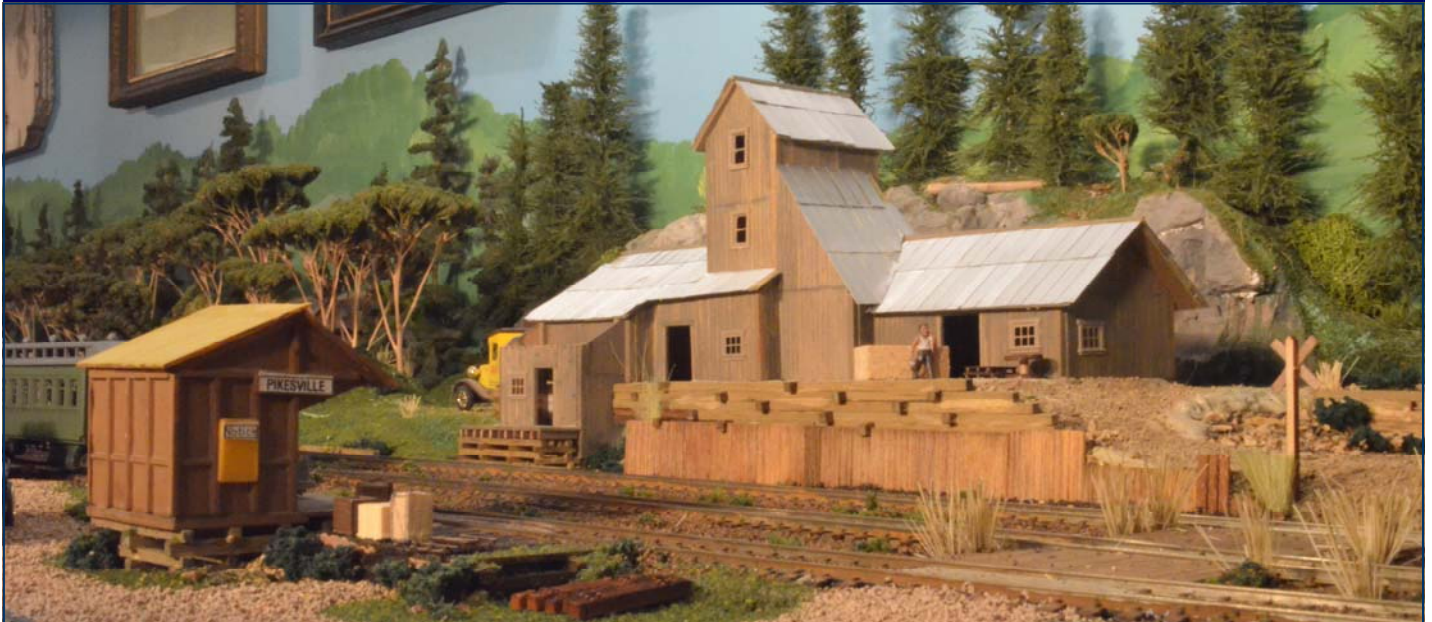
# THE "CANADIAN"

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CANADIAN  
CAORM  
ASSOCIATION OF  
RAILWAY MODELLERS  
FOUNDED IN 2000

FALL 2016 ISSUE #57



a quarterly publication of the "Canadian Association of Railway Modellers"





## THE CANADIAN ASSOCIATION OF RAILWAY MODELLERS

Founded October 15, 2003

Founding Members: John Johnston, Peter Moffett,  
David King, Lex Parker

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**FRONT COVER TOP PHOTO BY TED RAFUSE:** The flag stop station sign locates the site of Pikesville on the layout of Bryan Moorcroft. All the structures are scratch built. Above the layout on the walls and on a portion of the lighting valence overhead are black and white photos depicting nearby rail scenes long since disappeared through abandonment.

**FRONT COVER LOWER PHOTO BY RICHARD MORRISON:** A Bachmann Alco S4 sets out Union Pacific boxcar 127705 at Gibley's Furniture on Richard Morrison's Union Pacific layout. To simulate a request from the furniture maker's shipping department, Richard set a random number generator to select a number from 1 to 4. The program spat out a 2, representing Gibley's request for a boxcar to be spotted on its siding.



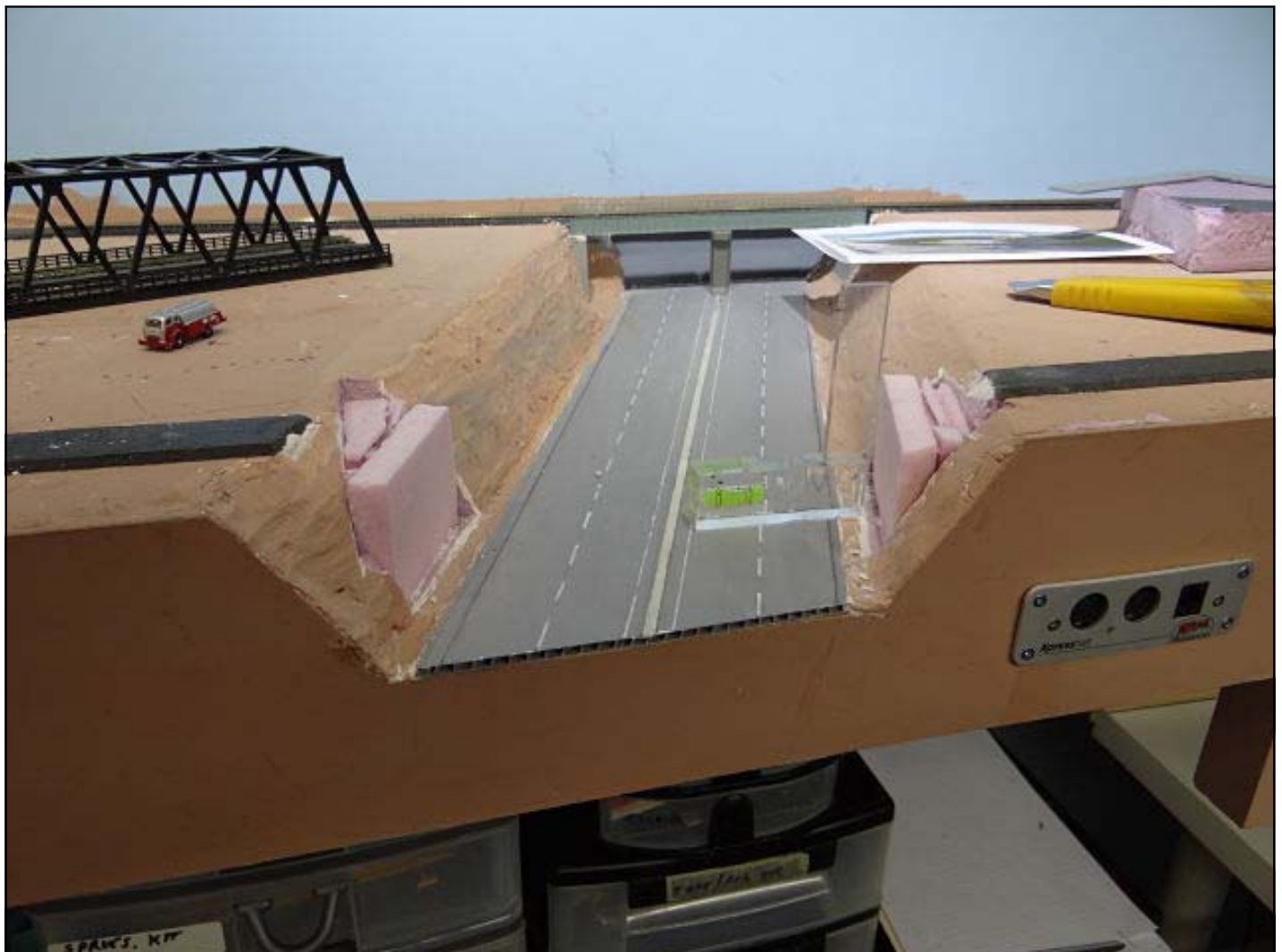
### MODELLING ROADS

I was preparing the article by William Waithe on rebuilding his N Scale Weston Sub and was quite impressed by the roads shown in one of the photos. (Photo 19 on page 13). I contacted William and asked for more details on how the roadways had been constructed. Here is the info he shared with me.

*Thanks for your interest John. For the general appearance, I got a photo of the Jane St overpass near the MacMillan yard from Google Earth. For the dimensions, I found on the internet one of several official guidelines for road construction in Toronto. I used a class of "narrow shoulders" and "narrow lanes" slightly smaller than standard\* for major arterial roadways but appropriate for the Jane St. speed limit. The final dimensions I ended up with are: shoulders 1.15cm and lanes 2.3cm.. For 4 lanes, 2 shoulders and the median the final roadway width was 11.5cm.*



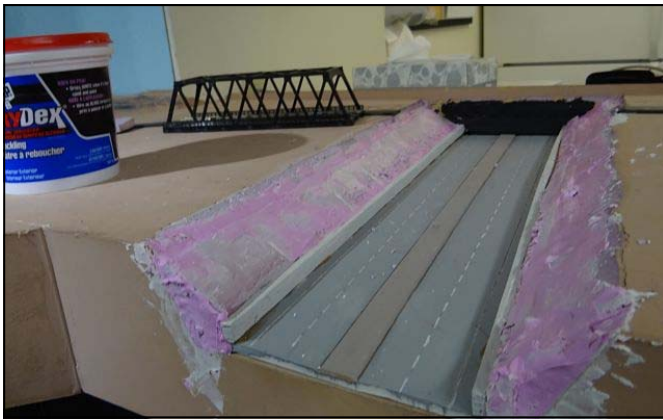
*To make the roadway I cut the 2" styrofoam layout base to a roughly 50 degree slope (the specified slope) and made a base for the roadway with a piece of 1" thick board attached to the front and back of the box frame. I then cut a piece of 11.5cm wide plastic (the type used for signboards, I think it is polystyrene). This material is made from 2 sheets of plastic with a plastic grid in between (the cross section can be seen in the photo). Before installation, I painted the plastic with two coats of*





flat white primer and then gave it a coat of grey asphalt color. I mix my colors using white latex primer mixed with powdered colors (black and a bit of yellow until I get the desired shade). I left the paint to thoroughly dry (overnight) To make the road lines, I scored the grey paint with a blunt probe and made 1 cm markings by exposing the white primer. For the middle of the road raised portion I glued a piece of 0.8cm wide strip styrene to the roadway with Walthers Goo (the official prototype median width is 1.2m). After the roadway was completed, I glued it to the wood base with No More Nails. The bridge clearance was 22ft.

In reviewing how I made the white lines on the roadway, I realized that I also used another method: I drew the lines with a white pen ("Pilot" super color extra fine pen). I think Currys art supply was the source. I made a guide line in pencil and drew the lines holding a ruler on the line as I mentioned before. This might work better than the previous method I mentioned. With my failing memory (80 next year!) I recall using both methods but when I took a look at the roadways today, I noticed that I apparently settled on using the white pen.



### SUPER TREES

Along with a number of my modelling buddies I have amassed several boxes of Super Tree material. I had used this material a little bit in the past but found the many bent pieces you get in a box to be troublesome. Magazine articles always talk about dipping the entire piece in a diluted white glue solution, then hanging it upside down with a weight (usually a clothes peg) on the bottom to straighten them out. Frankly, it seemed more trouble than it was worth, not to mention messy with white glue dripping everywhere.

However, one of those buddies shared a tip last week which solved the problem. With the curved tree on the bench, touch a hot soldering tool (modellers pencil type) to the stalk and the heat takes the bend right out. Since this is woody material you have to be judicious, but it works, quickly, and with no mess. Voila! Straight trees.

**JOHN JOHNSTON: EDITOR**

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# Calling All Photographers

Please submit photos for the 2017 CARM calendar

If you have an image that you would like to submit to us for use in the 2017 CARM calendar please read the following. We would like 6 high quality images of prototype scenes and 6 high quality images of model railroad scenes. These images need to be in sharp focus for most of the image, well lit, well composed and of interest. Images should be in landscape format. You do not need to edit the image as we would prefer to edit the image ourselves as to maximize the image for the printer. To submit an image for consideration follow these steps.

Submit a small JPG image (less then 100kb in size) for consideration

Obtain all of the information about the image including:

Location

Date

Photographer

Camera stats

Owner of items in the scene

Description of scene

Once accepted send the large file as a JPG, RAW, TIFF, etc.

Send your submissions to [calendar@caorm.org](mailto:calendar@caorm.org) before October 15<sup>th</sup>, 2016 Thank You



## CHAIRMAN'S REPORT

The arrival of the fall issue of The Canadian is always a good reminder that railroad modeling season has started. It is time to clean the track, test run some trains and start a schedule for operating sessions if you have the appropriate layout. If you are still building a layout then it is the time to start attending shows and flea markets to acquire the materials needed for scenicing the layout. If you are still contemplating building a layout then visiting shows and attending open houses organised by your local Chapter will assist you in determining what works well in a layout and what to avoid. Some of the shows also offer clinics with experts describing the best way to do things. While videos on U tube provide nice films of trains running around layouts they do not provide the critical information that you get from talking to an operator. Have you ever watched a video where the narrator says "that corner is too tight I must relay it".

As many of you are aware I have spent rather a lot of 2016 in hospital or recovering there from. That meant that I had to cancel out of displaying my new portable On30 "Knob Hill Mines" layout at the Narrow Gauge Convention in Augusta Maine in early September. However I am pleased now to say I am feeling much better and able to start participating in more modeling activities, attending

shows and meeting with members. Maybe the first viewing of Knob Hill Mines will be at Copetown next March or Schomberg in April. Displaying a portable layout that one has spent a lot of time building and detailing is a very rewarding experience. It finally allows one to discuss the layout with fellow modellers, learn from their suggestions and find the gremlins which creep in when it is being transported from one site to another.

If you are not in a position to take over a whole basement and build your dream railroad then think about building a small module either as a switching layout or as a component on a FREEMO style club layout. There are FREEMO clubs displaying at most shows so ask them how to join or contact your Chapter Executive to see if they can put you in touch with such a group.

Most of the upcoming shows are listed in The Canadian, on the CARM website and in Canadian Railway Modeller. If none of those sources work try googling "model railroad shows"!

**GERALD HARPER: CARM CHAIR**



## ONTARIO MIDWESTERN CHAPTER

Our fall meeting will be held at the Grey-Roots Museum in Owen Sound on October 16 at 1:30 PM. The focal point at the museum is the fabulous N-scale display which depicts the CPR railway activity in the harbour of Owen Sound during the early 1900's.

## NATIONAL CAPITOL CHAPTER:

The National Capital chapter has been a bit busy lately. At the end of June, we had a group lunch at a restaurant in Manotick, a convenient central location. Most of the members were able to attend and enjoy the gathering. One of the topics that came up was a call from a member to critique his layout plan before he starts construction. We agreed, and on July 19th, Ian Frost, Peter Jackson, Paul Anderson, Garry Comber, Jeff Hill and Bruce Leckie met at Jens Stehr's place to view the layout room and his plans for it. Most of the benchwork is up, most of

the track is in place for visual planning, but not laid, and most of the industries have been mocked up, again for visual planning. Jens has certainly set an ambitious goal, and after much discussion we offered to assist him in whatever tasks he needed to get on track (pun intended).

We then retired to the nicely landscaped backyard and enjoyed a delicious barbeque before heading home.

**PHOTO BELOW: Jens Stehr's layout is an asymmetrical 20x30. It fills most of his basement. While it is freelanced, it reflects the GTA to a large extent, with the Toronto Docks, Hamilton Steelworks and a GO train service. It also has a mine, container port and a sawmill, hence the freelance. Front to back we see Jens Stehr, Jeff Hill, and Garry Comber.**



# LAYOUT OPERATIONS USING THE RANDOM NUMBER GENERATOR AT RANDOM.ORG

Generating this random switch list is as much fun as operating the trains

By Richard Morrison

Since I enjoy trying to efficiently set out and pick up cars, I found John Allen's Timesaver switching layout puzzle to be enormous fun and decided switching would be the main focus on my layout.

For switching, you need to know which cars to send where. Some modellers use a card system and manually shuffle the cards before each operating session, but it's easier and more fun to use an online random number generator to stand in for the variety of requests that you may get from shippers and receivers at industries along the line.

On my layout, trains are made up in the main yard then sent out to any of 20 industries in three towns to set out or pick up cars. Then the train returns to the yard.

A random number generator determines which industry wants what, which in turn determines the length of trains and the resulting required motive power. In other words, how busy the railroad is depends on its customers -- much like real life.

I use the random number generator on the home page at Random.org. The site, developed by computer science and statistics experts in Dublin, Ireland, generates numbers based on atmospheric noise. Random.org includes

tons of information for mathematics geeks, statisticians, lottery ticket buyers and other with an interest in randomness, including model railroaders who want to run trains.

To start, for each industry along a train's route, run the RNG and get it to pick out a number from 1 to 4 to see what your yardmaster, dispatcher and road crew will be doing.

Each industry has one of four requests:

- 1 No need for anything today, thanks
- 2 Set out a car on our siding
- 3 Pick up the car on our siding
- 4 Pick up the car on our siding and replace it with another.

Since there are 4 possible numbers, you'll find that about 25% of your customers will have no need for your services but 75% of them will. If you have a big layout with many industries or less time for an operating session, you may prefer fewer car movements. In that case, ask the generator to pick a number from 1 to 5, with any 1 or 2 representing a "nothing today" message and 3, 4 or 5 representing the three active requests. A truly lazy dispatcher would ask for a random number from 1 to 100 and only send out cars if the generator spat out a 98, 99 or 100.

**An Alco S4 picks up a tank car from a fuel depot. The random number generator spat out a 3, representing the fuel depot's request that the car be picked up**





You needn't always use your industries to determine the make up of trains. If you create a numbered list of your available cars, your yardmaster can have fun using the random number generator to assemble trains and send them out, even if just to keep the track clean.

For example, the generator can:

Determine how long your train should be. If you want a train of between 10 and 20 cars, set the generator's range to 10-20 and let it decide exactly how many cars should be in the train.

Make up the train. Based on the numbered list, the yardmaster fishes out whichever car the generator has picked and couples it behind the previous one.

### Post-It Notes

Each available car on my layout is identified by one (and only one) small, coloured Post-It note that moves along with the car. Post-It Notes for cars in the yard are listed on cards on the cabinet door beneath the yard. I use a different colour of Post-It Note for each type of car (box, refrigerator, hopper, tank, gondola, flat).

If a customer requests a box car and there are a dozen available in the yard, I set the random number generator to pick a number from 1 to 12 to make the selection. Once the car leaves the yard, its Post-It note is removed from the yard list and stuck down to the switch list on a clipboard that follows the train.

When the car is spotted, the Post-It note is removed from the clipboard and affixed to the layout fascia board at a spot nearest the car. At the next operating session, the

**A Post-It Note follows each car on the layout. Cars in the yard are listed on cards inside a cabinet door beneath the yard. The lists show there are eight box cars, eight hoppers, seven reefers, seven tank cars, five gondolas and a flat car available for delivery to customers. Once a car leaves the yard, its Post-It Note is removed from the cabinet door and stuck down on a switch list.**



random number generator may request the spotted car be picked up, at which time the Post-It note goes back on the clipboard under the "Pick Up" column. If there is a request to exchange out the spotted car for a different one, the note for the incoming car goes under the "Replace With" column.

If a car needs repairs and is therefore out of service, the Post-It note is removed and stuck down at the workbench until the car is fixed.

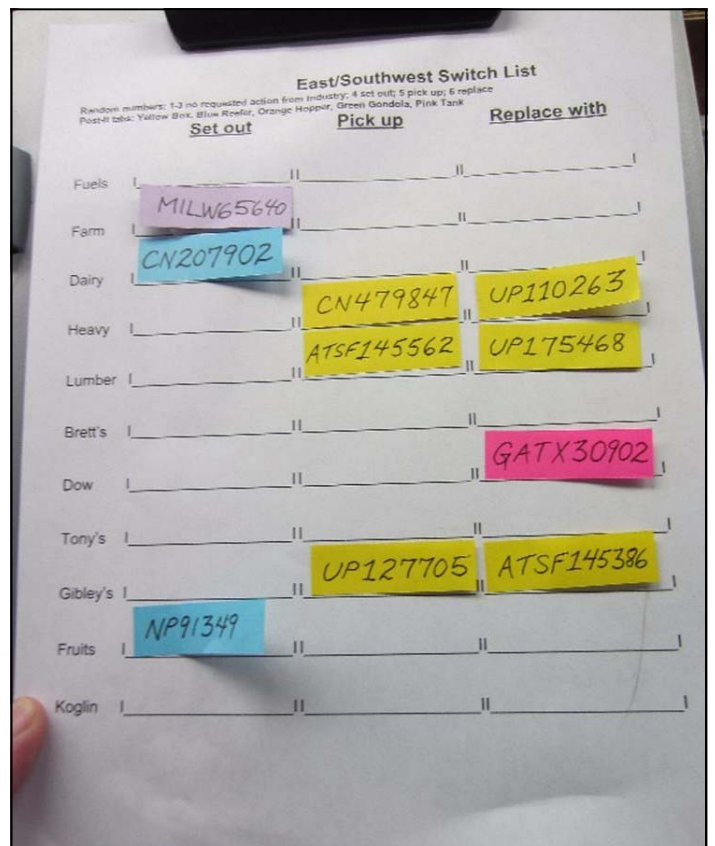
### Simplicity

With 20 industries, my trains usually have between 4 and 8 cars, which is plenty for me. Modellers who enjoy complexity might still find the random number generator useful, allocating a wider variety of numbers to a wider variety of requests.

To keep things simple, there are no inter-industry shipments. All cars picked up from industries go back to the main yard and all cars requested by industries come from the main yard.

No effort is made to imagine a bill of lading or the contents of any car, or whether the car is full or empty. As in the prototype, a big rush on a particular type of car may result in a shortage and the customer may have to wait. Although there are a few industries with capacity for several cars, to keep things simple, only one car is set out or picked up at a time.

**Post-It Notes affixed to the switch list tells operators which industry wants which car to be picked up or set out.**





# REBUILDING THE WESTON SUB PART ONE

ARTICLE AND PHOTOS BY WILLIAM WAITHE

## The Move:

In 2014 an arthritic knee made stair-climbing difficult for me so my wife and I sold our multi-story townhouse and moved into a condominium. The condominium (on the 31<sup>st</sup> floor) was just right for the two of us and there were no stairs to climb but the spare bedroom was a bit small for what I had in mind for a layout and anyway, building and operating a layout in our living space was not ideal. So, at my wife's suggestion, in October 2014 I purchased another condominium unit on the 16<sup>th</sup> floor of the same building. The layout condominium (we call it the "Train Room") is a 46 square meter (500 square feet) "studio" unit. The available layout space is about 37 square meters (400 square feet) (see photo 1).

The move to the condominium and demolition of the original fifteen-year-old Weston Sub layout provided an opportunity to incorporate some improvements to the new layout: the use of code 55 flex track, broader curves and turnouts, wider aisles and the elimination of grades. The new CN Weston sub was designed and is being built with my long term collaborators Bill O'Shea and Keith Martel and a recent addition to our group, James Rasor.

## The CN Weston Subdivision Layout:

The layout is an N-scale (1:160) point-to-point industrial switching layout. It is proto-freelanced, based on a section of the prototype Weston subdivision in Toronto. The industries modelled are a combination of free-lanced ones and prototype industries based on photographs of

PHOTO 1 BELOW: The "train room" condominium and the layout plan (shaded area).

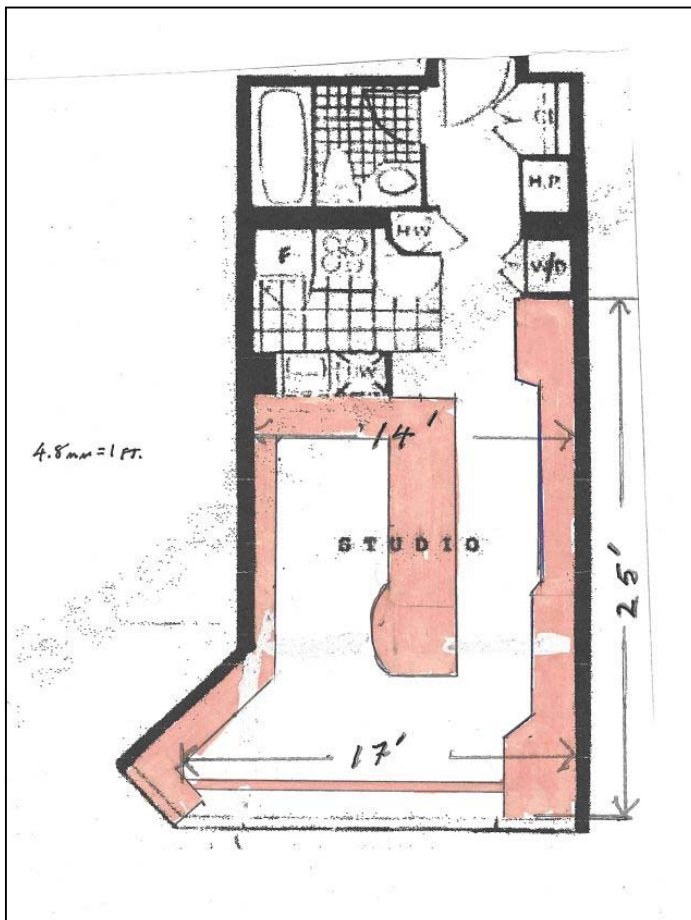
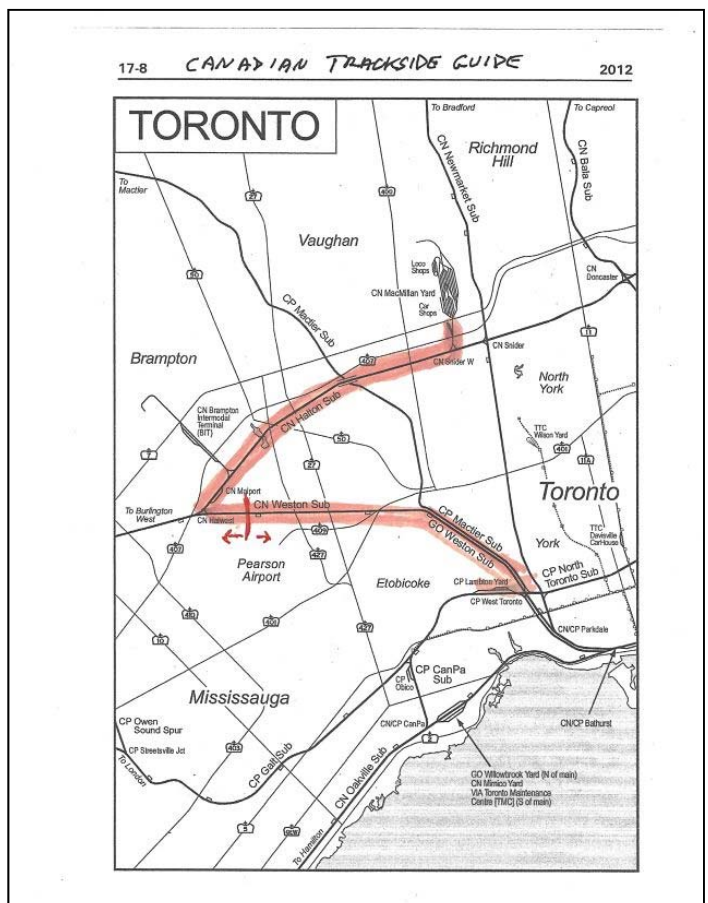


PHOTO 2 BELOW: The route: The Halton and Weston subdivisions. The highlighted section shows the portion modelled.



the industrial areas of Rexdale and Etobicoke North I took from 1994 to 1999 and details of the area's industries obtained from Scott's Industrial Directories and the City of Etobicoke industrial profiles from 1980 to 1984. These industries are mostly small to medium operations.

We retained the basic operational structure of the former layout. The new version has been expanded to include a more easterly portion of the Weston subdivision and the portion of the Halton subdivision extending to the MacMillan yard. Thus we are now modelling a 37km portion of the Halton and Weston subdivisions extending from the MacMillan yard to industrial areas at Rexdale and Etobicoke North and an interchange with CP at the Lambton yard near Keele Street (see photo 2). The era being modelled is the late 1980s. Local freight trains (turns) are assembled at the MacMillan yard and serve industries at Torbram, Rexdale and Etobicoke North. Yard transfers carry incoming and outgoing freight between the Torbram yard and the CP interchange at the Lambton yard.

Micro Engineering code 55 flex track and turnouts (number 6) and Atlas code 55 (21.25"/15"radii) curved turnouts were used. The main track is 118 cm long, the equivalent of 5 Km (3.1 miles) in N scale. The minimum curve radius is 46 cm (18") except for one hidden 36 cm (14") curve.

**Layout Construction (March 2015 to July 2016):**

**Room Preparation:**

Building a layout in a condominium involves some noise restraints. Before beginning construction of the layout I obtained a renovation permit (which allows construction noise for a limited period and time of day) for the removal of a room partition and the installation of room and layout lighting. Drilling of the concrete walls for the installation of shelf support uprights was done during this renovation permit period. All subsequent use of power tools was restricted to daytime hours (10:00 to 17:00) and noise from power tools was generally kept to a minimum. For this



**PHOTO 4 ABOVE: Shelf bracket detail**

reason, the plywood pieces for the box frames, the hard-board panels for the backdrop and the fascia were all cut to measure with a table saw in Bill O Shea's garage and then transported by car to the condominium.

Except for two overhead fluorescent fixtures, strip spotlights, 4 ft. overhead fixtures and other room ceiling fixtures are all LEDs. The room was already fully carpeted. Layout construction began in late March 2015. The design of the layout is around- the- room shelves with a free standing peninsula. To assure that the layout would be level, a tripod-mounted laser device was used to mark a level reference line around the room for the position of the shelf upright supports.

Progress of the layout construction was sometimes interrupted by watching two busy construction sites 16 floors below.

**Layout support structure:**

We decided on an around- the -room design using plywood box frames resting on adjustable shelf brackets (Rubbermaid). This arrangement avoids the need for

**PHOTO 3 BELOW: Rubbermaid adjustable shelf supports with the backdrop attached.**



**PHOTO 5 ABOVE: Christiane Dauphinais painting the backdrop.**

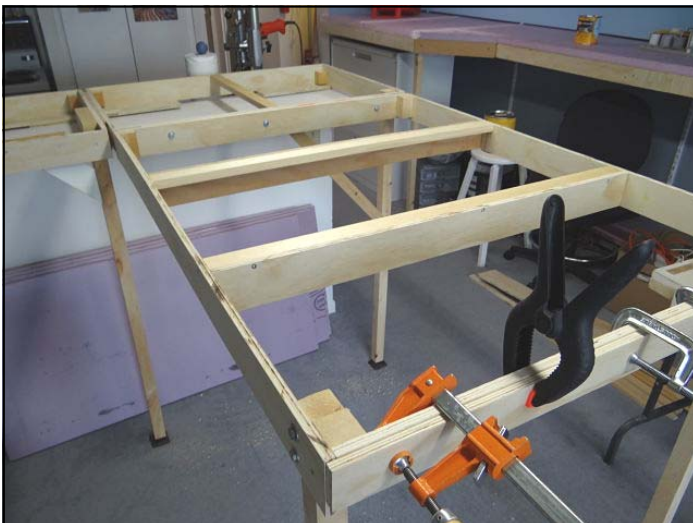


**PHOTO 7 RIGHT:** The Styrofoam base attached to the frame with “No More Nails” adhesive.

**PHOTO 6 BELOW:** The assembled frame.



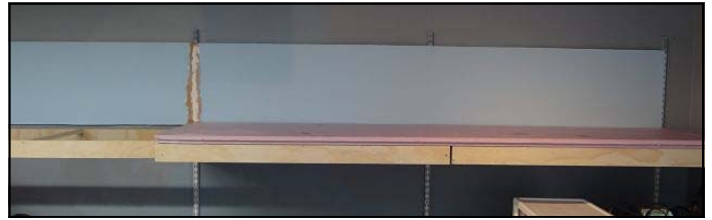
**PHOTO 9 BELOW:** The peninsula frame: construction detail.



**PHOTO 10 BELOW:** peninsula frame overall view.



**PHOTO 12 RIGHT:** Keith Martell painting the Styrofoam base



**PHOTO 8 ABOVE:** The fascia is attached with “No More Nails” adhesive.



**PHOTO 11 BELOW:** Christiane painting the frames and fascia. Shelves were installed below the layout





multiple legs and provides unencumbered space for storage underneath. Adjustable shelf 48" steel upright supports were screwed to the concrete walls at 48" intervals and backdrops built from 1/8 inch thick medium density fiberboard (MDF) panels were screwed to the steel adjustable uprights (**see photo 3**).

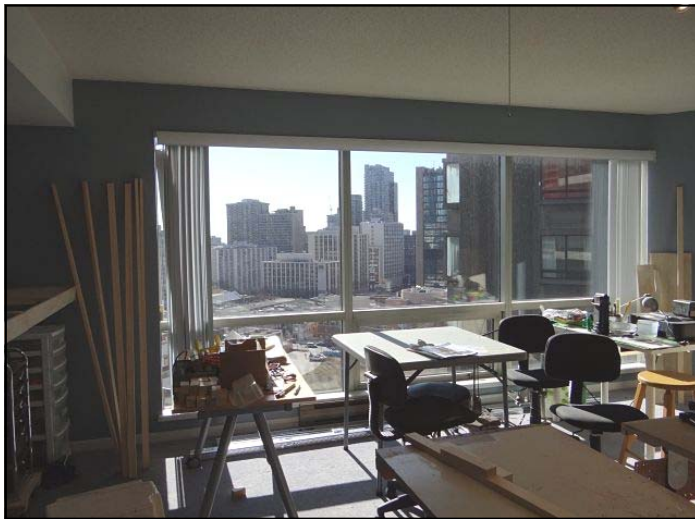
Steel shelf brackets (11 1/2" or 14 1/2" Rubbermaid twin track brackets depending on the shelf depth) were attached at the desired height (**see photo 4**).

Before installing the layout box frames, backdrop joints were sealed and sanded and the backdrops were primed and then painted a light blue-grey sky color (**see photo 5**). Shelves for storage below the layout were also built and were supported on the same uprights.

The layout shelf structure consists of 48" box frames made with 3" wide strips of 1/2"plywood and 1 X



**PHOTO 15 ABOVE:** The wooden structure which will support the rails on the bridge (inverted). The steel girder will fit into the central channel (black clamp)



**PHOTO 13 ABOVE:** The window area to be spanned

**PHOTO 14 BELOW:** Bill O'Shea and Keith Martell assembling the 4m steel box girder



**PHOTO 16 ABOVE:** Detail showing the bridge in place. Note the position of the steel girder. The railway support structure is on the top.

**PHOTO 17 BELOW:** Legs of the bridged braced to the wooden sill.



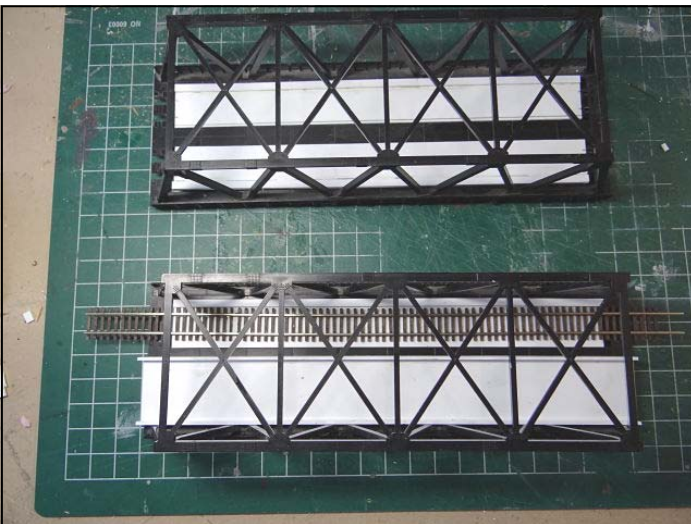




**PHOTO 18 ABOVE:** The finished 4m bridge.



**PHOTO 19 ABOVE:** Jane street overpass. The slope of the embankments and the placing of road markings of the overpasses are to scale and are taken from published roadway specifications (cf. text).



**PHOTO 20 LEFT:** Bridges for the railway overpasses: the bridges were salvaged from the old layout and the code 80 rails replaced with code 55 rails. The upper bridge is for two railway tracks (Jane Street), the lower for one railway track and a roadway (Kipling Avenue).

**PHOTO 21 RIGHT:** James Razor laying tracks.



**PHOTO 22 BELOW:** Storage shelves and workbenches under the layout



2"dimensional pine crosspieces spaced at 24" intervals. The use of plywood for the frames instead of dimensional lumber provides a light, stable structure less liable to shrinkage or warping. The box frames were assembled and then screwed to steel shelf brackets which were fixed at the appropriate height on the steel uprights. Adjacent frames were then screwed together (**see photo 6**). The whole structure can be easily removed to free the condo for other (future) use.

The 3m (10ft) long peninsula is built on a frame of 3" wide ½"plywood strips and is supported by 2"X2" adjustable legs (**see photos 9 & 10**). After the frames were completed the layout frame was covered with 2" thick Styrofoam, attached to the plywood box frames with the adhesive "No More Nails" (**see photo 7**). The fascia was made from 1/8" MDF cut into 13cm (5") high strips and was attached to the box frame with "no More Nails" adhesive (**see photo 8**). The frames and fascia and the Styrofoam base were painted a light brown earth color (**see photos 11 & 12**).

One challenge in the construction was to build a 4m (13ft.) bridge span across a floor to ceiling window (**see photo 13**). We wanted this structure to be sturdy, stable, unobtrusive and fit in visually with the existing window frame. We accomplished this by using two 4m long steel 1"x 2" framing beams screwed together to make a rigid box girder. A wooden frame and support surface for the rails was built and attached to the top of the box girder. The bridge is supported by 2 X 2" wood legs, spaced to coincide visually with the window frame and braced to the baseboard (**see photos 14 to 18** ).

The final layout height is 118 cm (46 ½"). Shelf depth ranges from 34 to 61cm (13 ½"-24"), allowing for an easy reach. The free-standing peninsula is 112cm (44 ") at its widest point (accessible from both sides). Aisles are a generous 122 cm (4ft) wide and a 2m X 3 m (7ft X 10ft) area is available to serve as a work and lounge area. The

layout height provides ample clearance for storage and workbenches underneath (**see photo 22**).

### **Bridges and Tracks:**

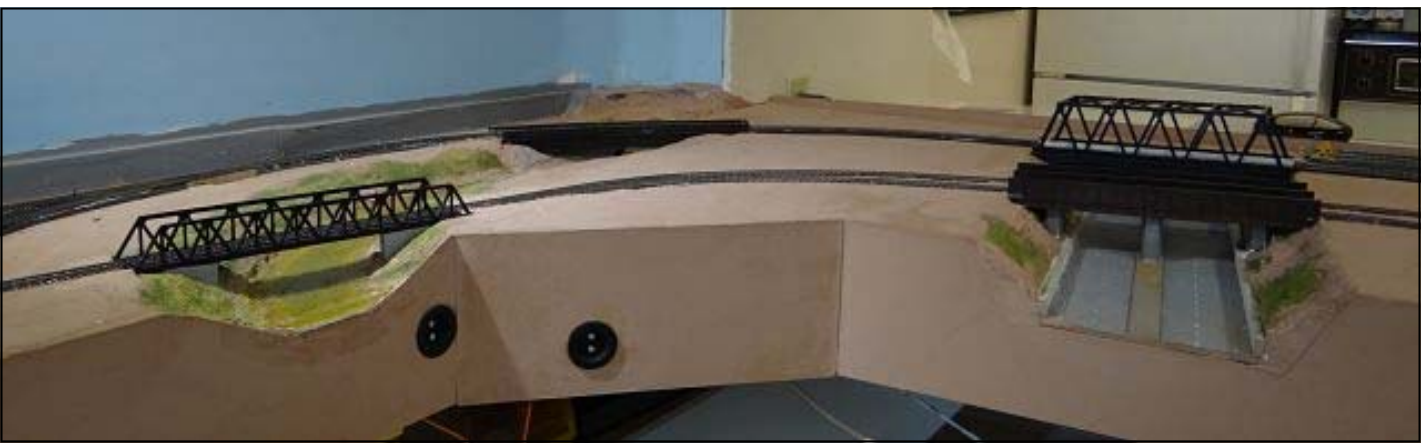
Prior to laying track, planned overpasses were constructed. To replicate the appearance of the prototype overpasses, photographs of the particular roadways to be modelled were obtained from Google maps. Roadway dimensions, lane widths and roadway shoulder and embankment angle dimensions were obtained on the internet from published Toronto roadway specifications and were used to provide the appropriate N scale dimensions. Bridges over the roadways were built and installed (**see photos 19 & 20**). After assuring that the joints of the foam surface segments were even and smooth, Woodland Scenics N scale roadbed for the main track was cemented on the Styrofoam surface with latex (DAP) caulking. Yard tracks and industrial sidings were cemented directly onto the Styrofoam surface. The flextrack and turnouts were attached with a thin layer of latex caulking (**see photo 21**).

### **To Come:**

This is the extent of our progress from March 2015 to mid-July 2016. In subsequent installments, I will describe the installation of programmable servo-controlled turnouts using the Berritt Hill system with touch toggles, programming of servos, layout wiring and track laying. In addition to thorough testing of track and turnouts before ballasting, there remains a lot to be done and to be described, including signal installation and control, landscaping, buildings, planning of industries, modification of the car-forwarding system (Ship It), new freight car weighing and coupler conversion from truck to body-mounted to name a few items.

**"I thank my wife, Christiane Dauphinais for encouraging me to buy the train condominium and for her contribution of painting the layout frames and backdrop."**

**PHOTO 23 BELOW: The Kipling Avenue overpass (right) and the Humber river bridge (left). The Humber river bridge was built by James Rasor from spare parts.**





# PUBLICATION SCHEDULE FOR *THE CANADIAN*

*The Canadian* is published four times per year.  
Submission by authors or Chapters should be submitted  
by the following dates.

Spring Issue: February 1      Summer Issue: May 1  
Fall Issue: August 1      Winter Issue: November 1

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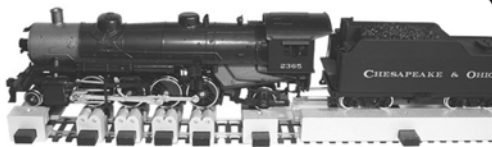
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# PROTOTYPE AND MODEL BALLAST

## PART 1: THE PROTOTYPE

ARTICLE AND PHOTOS BY GERALD HARPER

Ballast is the term given by railroads to the material placed beneath the cross-ties and track to support, stabilise and provide drainage away from the track. This material is almost always some form of rock. Whether model railroaders lay flex-track or hand lay track with spikes on glued down ties it still needs to be enveloped in something looking like ballast to give the track a completed, realistic appearance. In this article I shall first give a more extensive description of the history of and types of ballast used or in use today and then discuss what makes effective ballast for railway modellers.

The only two major exceptions to ballast being rock that I am aware of are for (1) street car, subway and other urban tracks where modern practise is to embed the track in concrete, rubber or wood or some combination thereof. (2) Slag was very popular for use by railways and slag is technically not rock but a manmade substance made by melting rock in a furnace, removing some component of the rock and then letting the balance cool and shatter into fragments.

Before we start to describe railroads we need to define a few terms related to types of rock and soil. The earth is made of rock but at its surface the atmosphere weathers it such that the rock becomes crumbly (gravel) and eventually breaks down into soil. Soil supports plants which in turn add organic matter to the top soil. Erosion washes soil and gravel into depressions and ultimately the oceans where it accumulates as layers. Accumulation of these layers adds weight to compress the lower layers such that they become fresh rock again but this time a banded rock called a sediment. The original rocks beneath are igneous meaning they crystallized from a hot liquid magma. So an ideal column down into the earth would reveal:

- Organic soil
- Inorganic soil
- Gravel
- Weathered rock (likely sediments)
- Fresh rock (likely sediments)
- Igneous rocks

In Canada the above simple geology is complicated by the occurrence of several ice ages during the last million years which created large ice sheets which expanded south and eroded all the irregular rock surfaces in their path. When the glaciers retreated they generated large rivers which further transported the broken rock and rounded it so that a layer of material called till covered much of the land. The till was completely unsorted and ranged in size from sand and grit to large boulders up to



**PHOTO ABOVE: Example of track laid directly on ground with only minor heaping of inorganic soil to provide drainage. Photo by the writer of the Russian gauge, Dornod branchline in Mongolia.**

metres across. This till provided ballast in vast quantities. Early railroads and, even now narrow gauge and light-weight railroads, lay their tracks on the nearest available gravelly material. Pictures in the histories of the building of the Canadian Pacific railway across the prairies show horse drawn scrapers dragging away the organic top soil and then heaping up into a slight ridge the underlying inorganic soil, gravel and till. The ties and track are then laid directly thereon.

As locomotives and trains got heavier and longer they put more pressure on the track. It wasn't just downward pressure but also lateral pressure with a harmonic frequency developed depending on the speed of the train. So railroads upgraded their track with more and better quality ballast. This required studying the nature of the ballast. It was obvious early on that rounded glacial till material was about the worst choice as the vibrations of the trains transmitted down into the balls which immediately started sliding around between each other. For those familiar with the IKEA children's' ball rooms they demonstrate the problems with till, the kids go right through!

By the time this ballast upgrading was underway in Canada and much of the USA the mining camps were being built all over the north and many of them had smelters. The smelter waste product, slag, if poured into water in its molten state, solidifies rapidly and shatters into angular sharp sided fragments. These were ideal for ballast, hard, durable, angular and inclined to interlock into an immovable mat. Therefore anywhere within hundreds of miles of a smelter had its track rebuilt with slag ballast.





**PHOTO 2 ABOVE:** Same Dornod branchline as in photo 1, showing lack of track camber at siding and natural gravel beside switch ties. There are only three trains a week so the track worker can take her time.



**PHOTO 3 ABOVE:** ONR track at Tomiko with rounded till boulders clearly visible.

Slag has a very characteristic brown colour. Sadly the era of slag came to an end when the Federal Government Ministry of the Environment declared all slags to be toxic and therefore illegal substances for use by railroads. The railroads have therefore been replacing slag with other rock ballast but almost anywhere you examine CN or CP track in the north you will find remnants of slag in the ballast mix (Figure 4).

Smelters in Canada that were sources of slag included: Bathurst New Brunswick, Gaspé Quebec, Rouyn Quebec, Sudbury Ontario, Flin Flon Manitoba, Thompson Manitoba, Trail BC and Phoenix BC. So any modeller featuring an area within hundreds of kilometres of any of those smelters and modelling the 20s to the 80s can use slag as their ballast.

With slag no longer available to them the railways turned to commercial quarries for ballast material. As concrete specifications for sophisticated structures have evolved the aggregate specifications have become more rigorous. Therefore quarried fresh rock has taken over from screened gravel. Most quarries supplying major markets quarry sedimentary rock – mostly limestone or dolostone. The railroads therefore started buying the same materials, just screened to a larger size fraction. Limestone and dolostone crush to nice angular fragments and therefore would seem to be good for ballast so many thousands of miles of track have and still are being relaid with this material See Figure 5. While it works well for medium traffic track it has not been able to withstand extremely heavy usage.

The failure was demonstrated by BNSF and UP when they triple tracked their Orin Subdivision in the Powder River Basin of Wyoming. These tracks handle trains with more than half a billion tons of coal per year. The design specified that the ballast used (limestone) would have a 25 year lifespan but it only managed ten years before it



**PHOTO 4 LEFT:** CP mainline and passing siding. There is still an abundance of slag visible on the left hand side of the left hand track.





**PHOTO 5 ABOVE: CN mainline double tracks at Port Hope with north track ballast replaced and south track still with older ballast.**

was collapsing and had to be replaced. The problems with limestone and dolostone are twofold. They are relatively soft rocks and under heavy loads the angularity wears away so they compact and also allow underlying wet soil to squeeze upwards.

Sedimentary rocks were laid down in layers and therefore have planes of incipient weakness through them such that they will break into slabs along those layers which accelerates the breakdown of the ideal ballast size and shape.

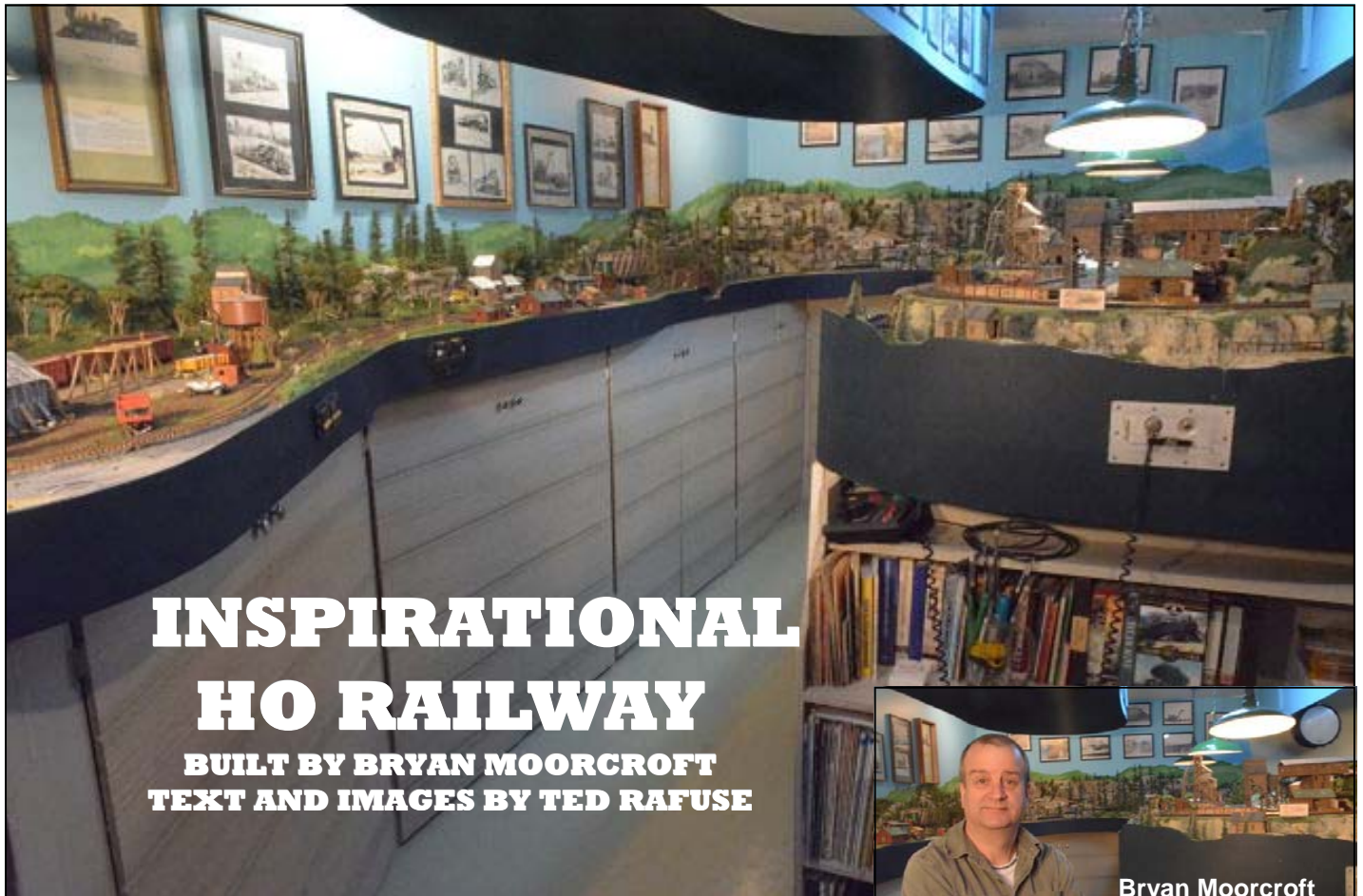
The colour of dolostone/limestone ballast varies from cream to grey to pale blue. The latest ballast choice is “trap” rock which geologically is a dark volcanic rock selected for its physical and chemical characteristics. Unfortunately it occurs infrequently so requires longer transport distances and is also much harder and therefore more expensive to blast and crush. It looks black, dark blue or dark grey in colour. Keep in mind that when railroads lay new track the ballast colour will be consistent but where existing track is being topped up then the ballast will acquire a “salt and pepper” appearance as is the case in Fig 5. Fig 6 shows brand new track being ballasted and the colour is more consistent.

So now we understand a bit more about where and when different types of ballast are likely to occur on your layout under second track we can look at how to make it most realistic.

**PHOTO 6 BELOW: New track being laid along the Union Pearson Airport line route. Eventually there will be four tracks in addition to the CP line on the right. Note: consistent colour of dolostone ballast under second track plus stockpiles.**







# INSPIRATIONAL HO RAILWAY

**BUILT BY BRYAN MOORCROFT  
TEXT AND IMAGES BY TED RAFUSE**



**Bryan Moorcroft**

The HO scale railway which is the focus of this article is one born of inspiration. Family inspiration arose through his great grandfather who spent a career as a section foreman for the CNR in central Ontario. Community inspiration arose through the absence of the railway that once was an important contributor to the social and economic life of his home community, Madoc Ontario. Model rail inspiration arose from a desire to combine these various facets of inspiration. The result is Bryan's model railway set in his great grandfather's time frame of the 1920s between Gilmour and Coe Hill Ontario.

Gilmour and Coe Hill are tiny hamlets in north central Ontario and a short rail history will assist in understanding their location. The origin of the rail line lay with the Prince Edward County Railway which opened between Picton and Trenton in 1879. The line struggled financially and in 1882 was reorganized as the Central Ontario Railway with an aim of building from Trenton north into the mineral and forest region to transport the products of the earth south. The line passed through Gilmour, the site of a large lumbering company and ended in Coe Hill the site of a mining concern. The ore proved to be low grade and almost immediately the COR determined that it had to build further north to connect with the Ottawa, Arnprior and Parry Sound Railway and act as a bridge route from north to south. By 1907 the line reached Maynooth and finally terminated in what is the ghost town of Wallace, never reaching the OA&PS. The COR about 1910 was purchased by the Canadian Northern Railway and the COR and CNoR were soon merged into the Canadian

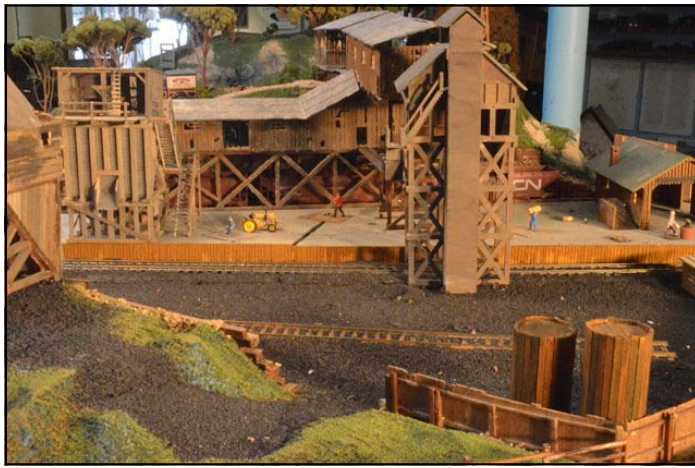
National Railways System in 1923. After that the former COR line was operated as the Maynooth Subdivision of the CNR. The entire line was abandoned in 1985 with various spurs, sidings and sections abandoned before that date.

Bryan's introduction to model railroading occurred one Christmas when his son received a train set and operated the oval track on the dining room floor. This was eventually moved to the basement, set up on a sheet of plywood, and enhanced with additional track and trains when a nephew joined him in the development of the rail empire.

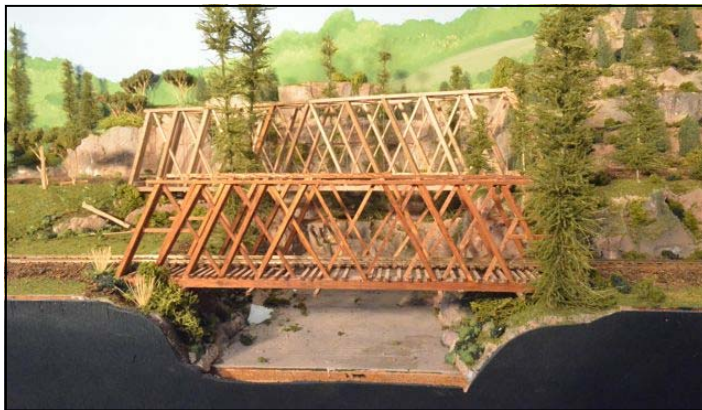
As an adult in his own basement Bryan has built three layouts prior to his current display. Layout one was constructed on the ubiquitous 4 by 8 foot plywood sheet and the rails and modelling followed no particular plan. Layout two was larger and more designed as a model railway but eventually succumbed to disinterest. Layout three, occupied a space 28 by 26 feet, but its ultimate fate led to being stored in a barn for several years.

Bryan's current layout occupies a space about 18 by 12 feet and is U shaped. Commenced four years ago, and having learned from his previous experiences, the track plan is simple, primarily an extended loop with a few sidings. As mentioned earlier the theme of the railway is based upon the Gilmour to Coe Hill section of the CNR in





**PHOTO ABOVE:** The inside of one of the loops is dominated by a large mining complex. The large structure in the centre is a plastic model, modestly altered and deftly painted to represent more accurately a weather wooden structure. One side of the layout is open to the rest of the basement area. On the walls are examples of Bryan's other interests, drum music and antique sign collecting. The mine site from this angle illustrates two principal structures, both scratch built, both indicators of Bryan's structure scratch building. The distant truck, the man on the platform near the yellow tractor, all provide an aura of life to the scene.



**PHOTO ABOVE:** Along one arm of the U are these two scratch built wooden truss bridges that Bryan constructed using engineering principles for such gap spanning structures. Also in the scene is part of the fascia that surrounds the layout and provides a finished appearance to the layout. Beneath the fascia are many doors that hide from distracting view the messy array of necessities that many modellers possess. The fact that such clutter is hidden from view makes the layout viewing more focused and enjoyable.

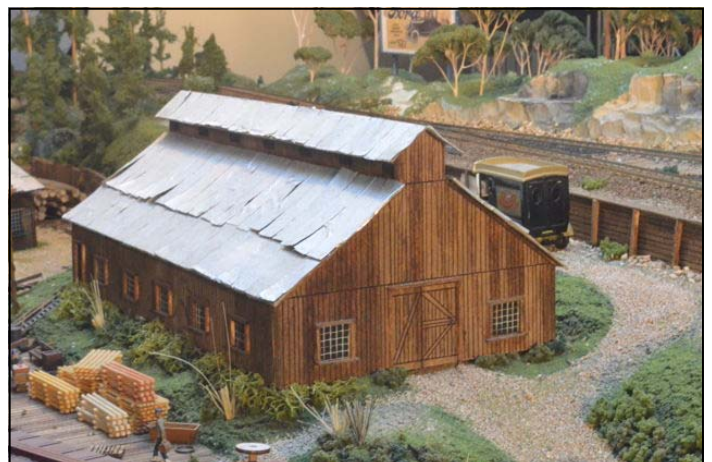
**PHOTO RIGHT:** This structure was built following the method described in the article. It is a typical example of Bryan's creative and artistic skill that enhances the appearance of his layout.

the 1920s but the track plan is free lanced. Some recycling occurred as some track and structures were saved from layout three and appear on the current layout.

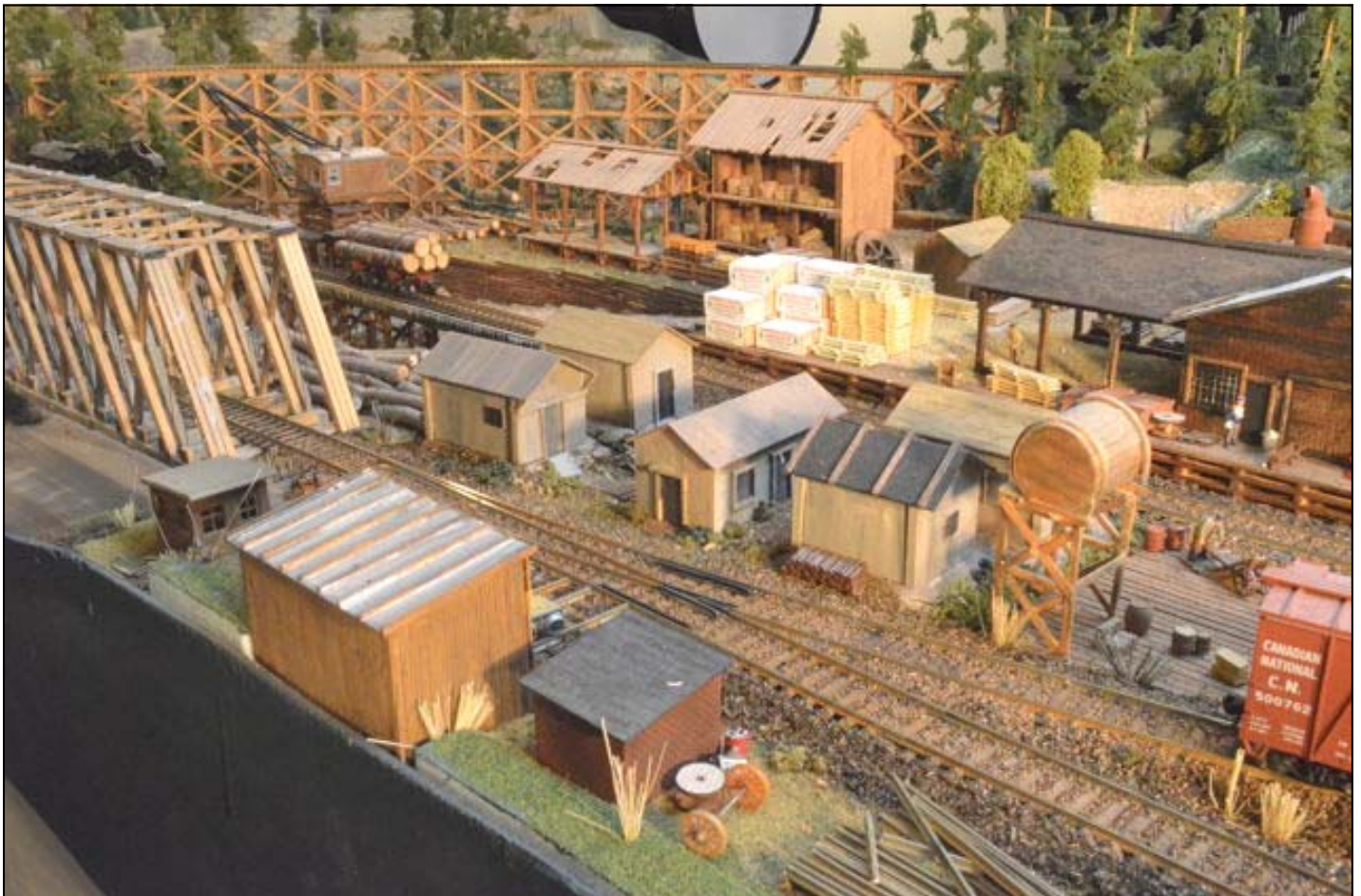
Rails are nickel steel, turnouts are Atlas, locomotives are Atlas, President's Choice and the occasional stray dog. Rolling stock is primarily Atlas, Athearn with newer Accurail, preferred due to their detail and price. The layout is a series of cab control blocks that allow for the simultaneous operation of two trains. A personal car forwarding system was developed from commercial examples and consists of a simple delivery/pick-up by car number. This system has entertained Bryan and his modelling buddies during operating sessions.

Bryan enjoys scratch building structures. Where possible he has taken photos and/or measured foundations to create in miniature many of the structures that were present in the 1920s along the Maynooth Subdivision. Walls of 1/8 inch plywood were first cut to size on a band saw. Using a straight edge and a pen, scribed lines simulate board and batten sides. These were then stained to represent aged wood. Windows and doors were cut out and trim added to provide depth. Windows made of black plastic had mullions made of dry wall tape to provide a representation of small individual panes that often were found in homes and industries of the era. Dull aluminium yogurt container lids provided the base material for metal roofing. The aluminium was carefully pressed on a homemade template and cut to sheet size. Of late Bryan has become partial to erecting craftsman kits such as those produced by Campbell Scale Models. These are often modified in some way so that the completed model looks familiar but is not a clone from the box of parts.

Blue Styrofoam provides a scenery base for rock faces made from moulds. Drywall compound is used as the medium. Natural sand and used green tea provide varied ground cover as does Woodland Scenics products. A mix of methods make the trees. Some are made from sedum to which ground foam is added. Others are made from floor cleaning discs. The disc is cut into triangles and the corners cut until rounded and then planted. The trimmed pieces are kept to make cedar trees, the trunks being made of wooden dowel.







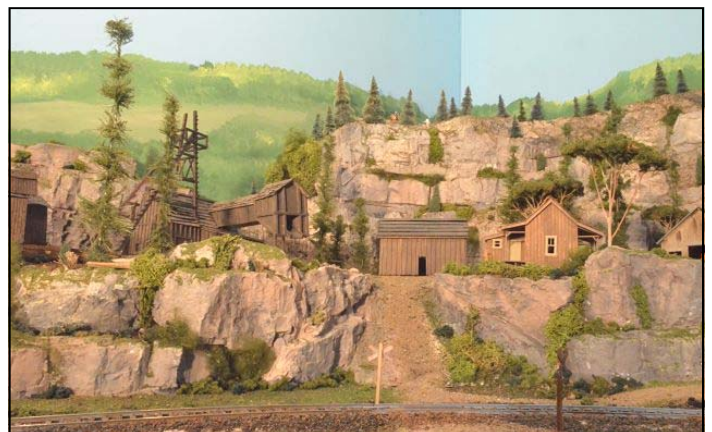
One source of 'junk' to accent structures starts with an empty cash register tape roll to which individual staves are added and thread used as wire to hold the staves together, and presto, a wooden tank can adorn the layout either on a roof top, on stilts, or even on the ground.

Various pieces of railroadiana adorn the interior and exterior of Bryan's property. Outside near where his driveway connects to the road is a stunted railway crossing duo red warning light, perhaps mercifully not operating. In the basement, prominently displayed, are cross bucks, yard and flanger signs, mileage indicators, an original switch stand from the Madoc train yard, cabooses and switch stand lanterns. These indicators along with the model railway are signs that a rail fan lives here.

Bryan, along with several other men, have given back to their community as well. To celebrate Madoc's 125<sup>th</sup> anniversary several years ago, this group of modellers built a 12 by 4 foot display model of the railway as it appeared

**PHOTO ABOVE:** A cluster of lumber camp buildings predominate in this scene. Note the large curved trestle in the background, all scratch built. In front of the trestle are various examples of storing cut lumber, either in the open or in a covered structure. In the 'ventilated' roof building is a saw for cutting the logs contained on the flat car and on the ground into lumber. Small lumber camp buildings are in the foreground, all scratch built. The horizontal wooden tank was constructed as described in the article. To the left is a portion of a Juneco kit wooden Howe truss bridge. While not scratch built it is a craftsman kit requiring dexterity and patience to erect.

**PHOTO RIGHT:** Bryan has recreated a portion of the rocky Canadian Shield. Trees struggle to exist in the crags. The tall thin cedars are fashioned from dowel and teased floor cleaning pads and enhanced with ground foam. The darker fir trees in the background are constructed from triangular segments of floor cleaning pads as well. Both methods of tree construction are described in the article.





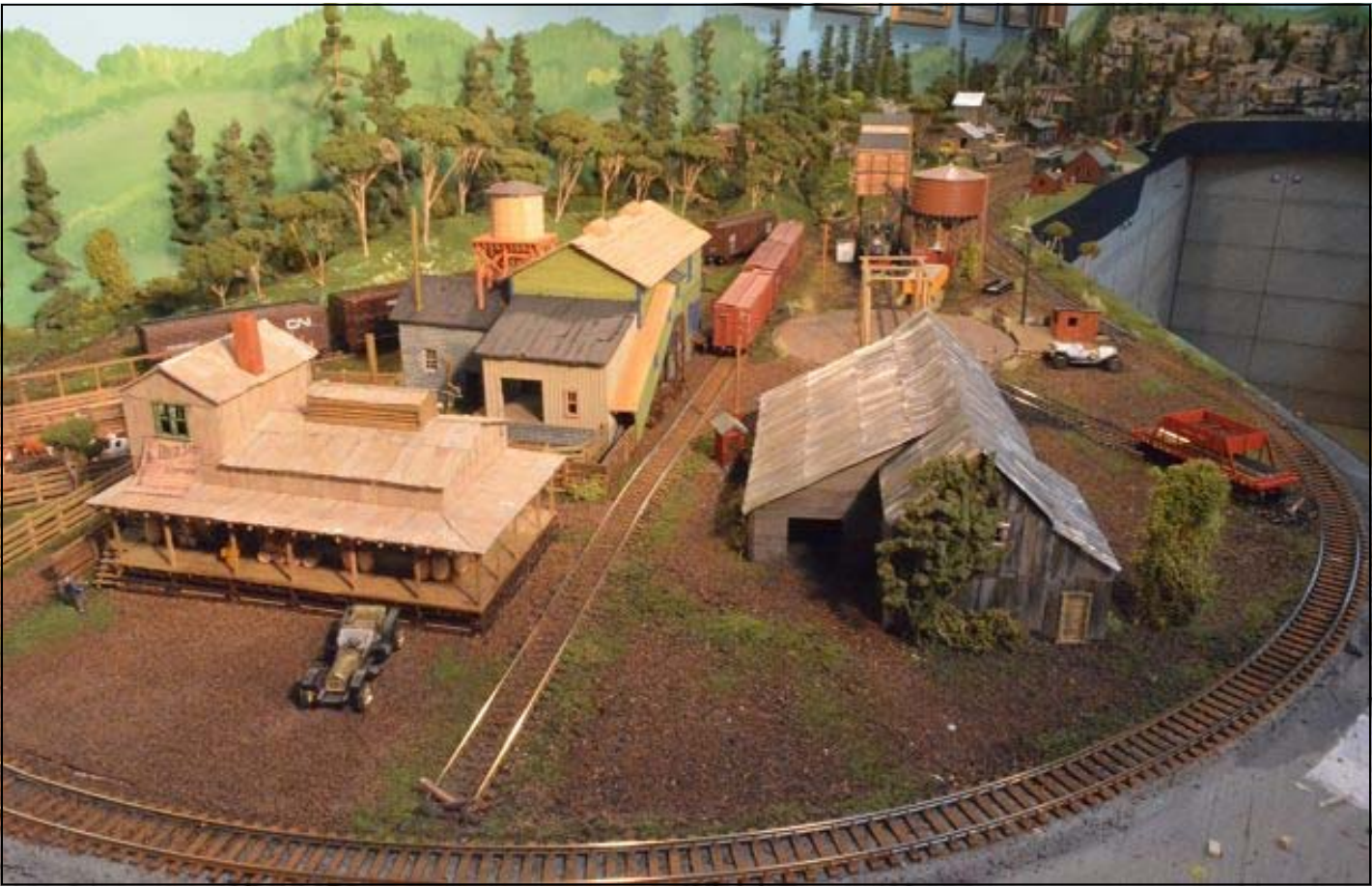
in its heyday. This portable layout included all the appropriate rail and related structures, mostly to scale, and included text and image panels outlining the community's rail history. It was on display in local store fronts, at fairs, and at the renowned Havelock Hobo Rendezvous Days. Unfortunately today it is stored in the loft of Bryan's garage as all the other builders have since died. (Madoc's railway was originally the Grand Junction Railway between Belleville and Peterboro. It became part of the Midland Railway of Canada, the Grand Trunk Railway and ultimately the Canadian National Railway.)

Bryan is a multi-faceted railway fan. He has enjoyed collecting paraphernalia, building model layouts, constructing model structures, and educating his local community with regards to their rail history. He enjoys ensconcing himself in the basement, an ear and occasional eye tuned to the tv, but mostly content when he is in the midst of a current modelling project.



**PHOTO ABOVE:** Bryan is particularly proud of this scratch built curved trestle that spans an enormous gorge on the Canadian Shield. It is near the bottom of the U shaped layout and the photo was taken from the sound stage where Bryan and his son and their friends practice when he is not operating the railway.

**PHOTO BELOW:** At the top of the U and in the centre of one end of the loop of track is the vestige of the layout remaining to be completed. To the right is the local engine facility comprising a scratch built engine house, a turntable built upon an Atlas body, and in the distance a scratch built water tank and cooling tower. To the left are two Campbell craftsman kits, a new experience in model structures for Bryan. In the foreground is a barrel manufacturing concern and in the background is an abattoir/meat packing plant complete with stock yard. Visible in the background are the under the layout door panels that hide from view much of the clutter associated with model railroading.







## EVENTS AND TRAIN SHOWS

19th Brampton Model Railway Show: Saturday, October 1 10 am to 4 pm. Sunday, October 2, 10 am to 4 pm. Brampton Fairgrounds, 12942 Heart Lake Road, Caledon, Ontario. North of Mayfield Road/South of King Side Road at Old School Road. Operating layouts in different scales. Food service. Free parking. Handicap accessible. Adults \$7, NMRA members \$6, Seniors and students \$5, Children 6- 12 \$3, under 6 free. Free re-admission Sunday. [www.bramptonmodelrailwayshow.com](http://www.bramptonmodelrailwayshow.com) GPS co-ord Lat: 43.77124 Long: 79.82852 Sponsored by the Credit Valley Free-Mo Group

30th Annual Model Railroad Show, Soper Valley Model Railroad Association. Saturday, October 15, 10am to 4pm. Sunday, October 16, 10am to 4pm. Clarington Central Secondary School, 200 Clarington Blvd., Bowmanville, Ontario. Adults: \$6, Seniors: \$5, Family: \$12. Sponsored by the Soper Valley Model Railroad Association, Newcastle, Website [www.svmra.ca](http://www.svmra.ca) Contact email: [sopervalley@gmail.com](mailto:sopervalley@gmail.com)

Sunday, October 16th, 2016: Woodstock Model Train Show And Sale. Featuring vendors selling Model Trains and Railroad Memorabilia: plus several Operating Layouts Oxford Auditorium and the Mutual/Market Building, on the Woodstock Fairgrounds, 875 Nellis Street. Hours: 10 a.m. to 3 p.m. Admission: \$5.00 per person. For more information call Ian at 519-426-8875 or email:

[toyshow@kwic.com](mailto:toyshow@kwic.com)  
Show Website:

[www.woodstocktrainshow.blogspot.com](http://www.woodstocktrainshow.blogspot.com)

October 29, 2016: Annual "BOOMERS" Auction of model railroad equipment and materials at the Harriston Community Centre, Harriston, ON. Admission \$5.00 (includes door prize draws). Tables available at 8:00am. Auction starts at 10:00 am. For additional information contact Harold G. Jones, 16 Conroy Cres, Guelph, ON N1G 2V6, Canada. 519-821-2454. Email: [hgjones@execulink.com](mailto:hgjones@execulink.com)

The 16th Annual Hamilton & District Layout Tour, Saturday, November 5, 2016, from 9 am to 5 pm. 24 home and club layouts in N, HO, and O scales,

standard and narrow gauge, from Burlington to Beamsville, plus Hamilton itself. Six of these layouts have never been in the tour before, and three others haven't been on for a while. A special addition will be the Burlington Junction Station (Freeman Station), which is undergoing renovations and building a G-scale historical diorama as part of its display. Guide books will be available at local model railway shops from early October, so you can plan your day in advance: Dundas Valley Hobbies - Modellers' Choice - Just Train Crazy - Burlington Junction-Credit Valley Railway Co - Paris Junction - Broughdale Hobby.

Sunday, November 6th, 2016: Kitchener Model Train Show And Sale. Featuring vendors selling Model Trains and Railroad Memorabilia: plus several Operating Layouts. Bingemans Conference Centre (Marshall Hall), 425 Bingemans Centre Drive Hours: 10 a.m. to 3 p.m. Admission: \$5.00 per person. For more information call Ian at 519-426-8875 or email: [toyshow@kwic.com](mailto:toyshow@kwic.com) Show Website: [www.kitchenertrainshow.blogspot.com](http://www.kitchenertrainshow.blogspot.com)

Whitby Model Train Show, Pine Ridge Railroaders, Saturday, November 19, 10 am to 4:30 pm Sunday, November 20, 10 am to 4 pm. Father Leo J. Austin School, 1020 Dryden Boulevard, Whitby, Ontario. Adults \$7, under 14 \$3, under 5 free. Sponsored by the Pine Ridge Railroaders, Inc. More info at <http://pineridgemodelrailroaders.club>

Sunday, November 27th, 2016: Brantford Model Train Show. Featuring vendors selling Model Trains and Railroad Memorabilia; plus an operating Layout. Best Western Brant Park Inn, 19 Holiday Drive, Hours: 10:00 a.m. to 3:00 p.m. Admission \$5.00. For more information call Ian at 519-426-8875 or email [toyshow@kwic.com](mailto:toyshow@kwic.com) Show Website: [www.brantfordtrainshow.blogspot.com](http://www.brantfordtrainshow.blogspot.com)

# Maintenance of Way Equipment Gerald Harper Photos

