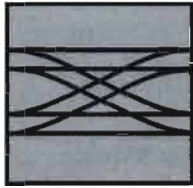


# Model Railroad Engineer — Civil Certificate

article by Miles Hale, MMR, and Marty Vaughn, MMR



**M**iles Hale, MMR 90, and Marty Vaughn, MMR 194, are both long-time active members of the NMRA. Both have served in every

position at the Division level in different Regions and Divisions. Marty served as MCR President for four years, the NMRA Contest Manager for six years, and is now serving as the MCoR AP Chairman. Miles is currently the Western Representative on the NMRA Board of Directors. Both are recipients for the President's Award for service to the NMRA. It is Marty's contention that the only reason Miles got his MMR first is because he older...

While it may sound redundant, if you are going to build a model railroad, one of the things you'll need to learn is how to lay track. What better time to be working on your Civil Engineering AP certificate than while you're building your layout?

Civil Engineering is one of the 11 certificates you can earn for your MMR. This certificate, along with Electrical Engineering and Dispatcher, is in the operations and engineering group of certificates, and to earn your MMR, you must earn at least one of

these three certificates. The first thing to keep in mind with this, or any AP certificate, is to not read more into the requirement than it says. It is our experience that many modelers over think the requirements and turn a challenge into an impossibility. Keep it simple!

To earn the Civil Engineering Certificate there are three basic requirements. First, you must prepare an original scale drawing of a model railroad track plan that includes the size, scale, track elevations, curve radii, and turnout sizes. If you are building or preparing to build a model railroad, and you're anything like us, you probably already have several hundred draft layout drawings to work with! Your drawing must include "adequate" terminal facilities for handling freight and/or passenger cars. Note the quotation marks around adequate. On a model railroad, it is our opinion that there is no such thing as "adequate" facilities. You'll always need more than you plan for, but for this certificate almost anything is "adequate."

Your plan must also include "adequate" facilities for storage and service of motive power. (Please note our opinion of "adequate" above). For the drawing, you could include something as complex as a round-

house and turntable or as simple as a stub track with fueling facilities appropriate to the era you model.

The drawing must include a minimum of one mainline passing siding (one won't be enough on your layout, trust us), four switching locations not counting yards, interchange tracks, wyes, and reverse loops. That means you need four stub or double-ended tracks in your drawing for the location of some sort of industry or facility that requires cars to be switched in and out. On your layout — if you have the space — you'll probably want more switching locations, especially if you are into operations.

You must include a place to turn motive power in your plan. This can either be a reverse loop, wye, or turntable. If you included a roundhouse as part of your service facility mentioned above, you already have the requirement in your drawing.

And finally, your plan must include provisions to operate two mainline trains in either direction. You probably already accomplished that requirement if you drew the mainline passing siding required above long enough to hold a mainline train so that it can be passed in either direction by the second train. And remember, you only have



to draw this track plan, you don't actually have to build it.

Once you draw the plan, the second thing is to lay the track. You have to lay 25 feet in N, 50 feet in HO, and 70 feet in O. In that track you need a minimum of six of the following types of track:

- Passing Siding
- Spur
- Crossing
- Reversing loop
- Wye
- Simple ladder
- Compound ladder
- Turntable
- Transfer table
- Super elevation
- Simple overhead wire (for traction)
- Compound overhead wire (for traction)
- Scale track
- Cog railway track
- Coal dump track
- Ash pit track
- Service pit track
- Grade elevation

Other – We're not sure what else there is, but if you can think of it, then you can use it as one of your six.

Remember, you have to build a minimum of six, but you don't have to build them all. Also, you don't have to scratch-build these items: Using commercial components, where available, for these six items and flex track for your 25–70 feet of track is perfectly acceptable.

The third and final requirement does require you to scratchbuild three track components from the following track list.

- Turnout (stub or point)
- Crossover
- Double crossover
- Single slip switch
- Double slip switch
- Crossing
- Gantlet
- Gantlet turnout
- Dual gauge turnout
- Gauge separation turnout
- Double junction turnout
- Three way turnout
- Spring switch
- Overhead spring switch

Other – Again, we're not sure what else there is, but if you can think of it, then you can use it as one of your three.

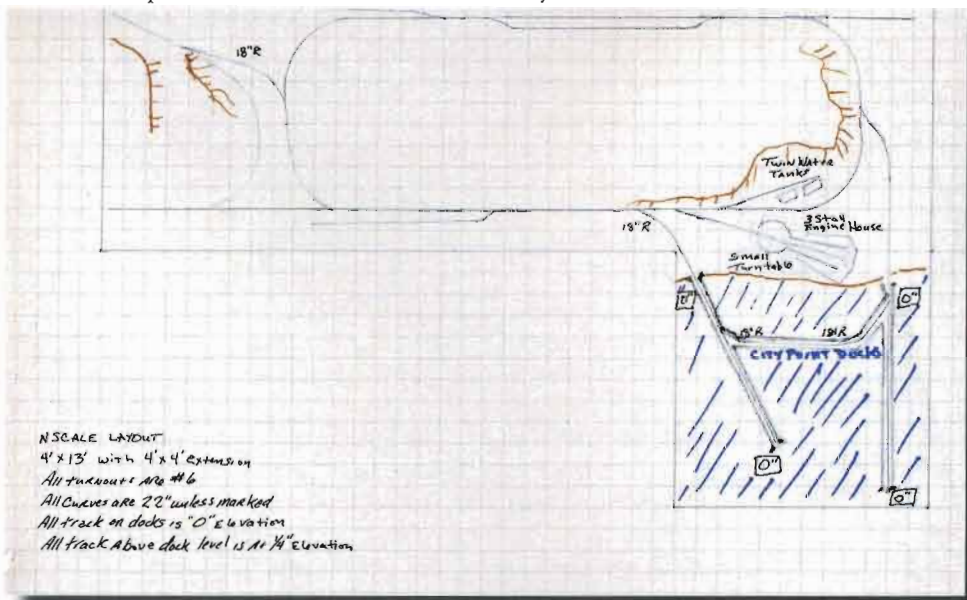
No, you don't have to pull your own rail, you don't even have to make your own ties, but you do have to build your own frogs

because no commercial frogs are acceptable. These three pieces of track work must be merit judged and earn a merit award for each (a minimum of 87.5 points).

That's what you have to do, but how do you do it?

## Track Plans

Miles draws and sells commercial track plans. Marty's plans are just above the sketch level (or so he thinks anyway!), either is acceptable as long as the plan includes the required elements and is legible. The plan shown on page 9 is for an N scale Civil War layout of City Point, Virginia, that Marty is planning to build. As you can see, it's pretty simple, but Marty's drawing includes all the items required – and remember, a pencil drawing for this purpose is sufficient and meets the requirement.



## Laying the Track

Miles and Marty have collectively built layouts in N, HO, S and O scale. While quality is important and your track work has to be good enough to run the trains, quantity is also a factor. It really doesn't take much track to meet the requirement. The N scale 25-stall engine house and turntable shown in the photos have nearly the entire 25 feet of track work required. While it doesn't have all the required types of track work, it does have the quantity. The photos of the California layout they built also demonstrate that while the track must be scenicked and ballasted, the rest of the scenery on the layout is not required for this certificate. Another point to keep in mind is that all your track work counts. If you are into module layouts in differ-

ent scales, you could have 12½ feet of N scale track combined with 25 feet of HO track on different modules and still meet the requirement. The work can be done in different scales and even on different layouts and modules.

## Scratchbuilding Track

What do you do when your friend Miles tells you at lunch one day that he's signed you both up to write the article on the Civil Engineering AP for SCALE RAILS Year of the MMR series? Well, in Marty's case the first thing you do is tell Miles that there are 11 AP certificates available...and you have earned ten...and the one you don't have is Civil. Of course, Miles' response is "You'd better get busy!" Nothing like a little pressure!

It's not that I haven't laid track; Over the years I've laid over a thousand feet in dif-

ferent scales in different layouts. It's just that (I hate to admit it) I'm solder challenged. Yes, I can solder a wire to a piece of rail without melting too many ties, but that's about my limit, and I am thankful every day for suitcase connectors! I was sure that to build track components in N scale would require circuit board ties and a lot of soldering.

I decided that the first thing to do was build track components with as few moving parts as possible. Because some of the track components you can build aren't in use in modern railroads, I would suggest looking at the Track Work section of the NMRA Info Pak. Page three of the Track Work section includes line drawings of most of the different types of track. I decided that a turnout, crossing, and gantlet track were the three I could build. If you are look-



*Above:* The first photo of the wagon with the pasture in the background: The supply wagon has just dropped off supplies to the section crew to keep the line in service.

ing for scale track component diagrams for turnouts and crossings, these are available on the Fast Track web site: <http://www.handlaidtrack.com/index.php>

I think it is a safe bet that if I get the bug to start scratchbuilding all my turnouts in N scale, I will be looking to purchase one of these assembly jigs.

Did I say N scale? Yeah, that's the scale I model in primarily, and while my friends told me to build in a larger scale, I had to take the challenge and do it in N. I have been told that using circuit board ties every fourth or fifth tie and soldering the rail to

the circuit board was the way to go. Having laid some straight stretches of track in N scale, I knew I wouldn't be spiking the rails, and I thought I could overcome my soldering deficit.

My first surprise was that the commercial wood ties, and even my own homemade wood ties (you can get a piece of strip wood free at Starbucks if you buy a cup of coffee) were all about twice the thickness of the circuit board ties. That meant I either had to sand off nearly half the thickness of the wood ties or add a shim piece under the circuit board to raise the height. In the end, I tried both methods and they both worked, but both were a pain and don't pass the keep-it-simple standard. I also needed

a glue to attach the rail to the wood ties to keep it in gauge. ACC was my first thought, but because these were my first efforts at building track components, I wanted a little more flexibility. In other words, if I screwed it up I wanted more than 10 seconds to fix my error before my track gauges became permanently glued to the rails...no, don't ask how I know. I decided to try a craft glue called Crafters Pick. This is a white glue similar to Aleene's white glue except it's even tackier, and once dry, it is no longer water soluble. You can use diluted white glue or matte medium to apply your ballast without the worry of dissolving the glue holding your rails to the ties.

I built the turnout and gantlet track first. I used the fast track turnout diagram for the former and two frog diagrams from a turnout for the latter. These diagrams even indicate where to use circuit board ties for the construction. While both my turnout and gantlet needed tweaking and some re-gauging, they both went pretty well with one exception. My soldering deficit kicked in several times. I would correct a gauge problem at one point only to cause

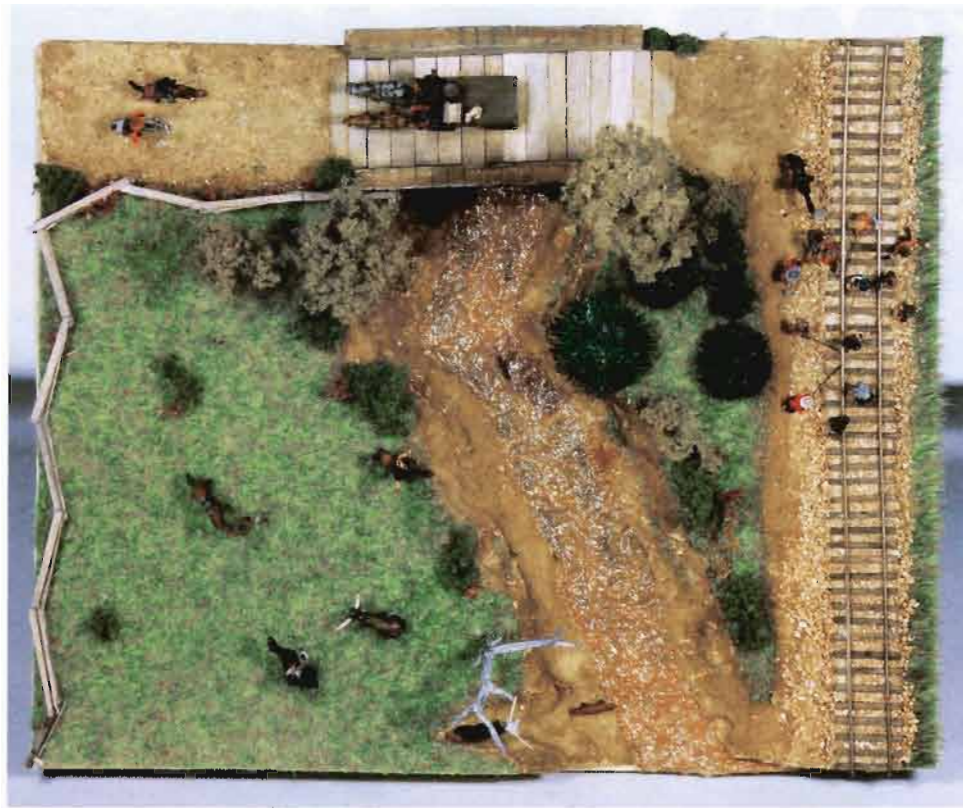


*Left:* The second photo of the wagon on the bridge: Scale is in the viewer's eye. The bridge is an HO Morse Productions culvert and the wagon is an HO Preiser baggage cart converted to N scale horse drawn wagon.

**Right:** The third photo of the bird's eye view of the scene: This little diorama was a test bed for several methods of modeling water, tall grass, ballast and tree material.

the rail to unsolder at another point causing me to have to re-solder another point which caused something else to unsolder. Eventually, I got both to work and went on to the crossing.

Because my standard was to keep it simple, I decided a 90-degree crossing would be the easiest to build. Again, I used the Fast Track diagram for the crossing. But then I had a melt down, literally. There are circuit board ties and solder points everywhere! Yes, I know what a heat sink is, and I use them liberally, but I also discovered that you could reach the point where you could have so many alligator clips, forceps, and wads of wet tissue on an N scale crossing that it is no longer possible to get the iron on the point to be soldered! I even went out and bought a brand-new adjustable temperature soldering iron...a waste of money. For a month, I dinked and worked on the crossing in all my spare time, getting nowhere. While I watched the deadline for this article getting closer, I realized just why I hadn't done the Civil Engineering AP certificate earlier – *I'm solder challenged!*



rail. The bond between the wood ties and metal rail with the Crafter's Pick glue was very strong. I decided that was the way to go about building this crossing. In 30

minutes! In a moment of euphoria, I began soldering the lead wires to the crossing. Okay, I admit soldering all the lead wires took about three times as long as assembling the entire crossing, but the engine ran through the crossing in all directions with no problem.

The next day, I used Blacken It on all the circuit board ties and shiny rail and wire leads. I then ballasted the track pieces with Woodland Scenics Talus that I sifted to get a uniform size and glued it in with diluted matt medium. When it dried, I cleaned the rail to remove any matte medium, crossed my fingers, and ran the engine through all the track work again. To my relief, they all worked! Two days later, my track work was judged, and all three pieces earned the required merit awards. I was finally able to get started on this article.

Was it worth it? Yes, because now I know I *can* build track! Yeah, I still can't solder worth a darn, but if I just use wood ties (except for frogs and throw bars) I can keep the soldering to a minimum. I also found that building your own turn out and crossings really gave me an even greater appreciation for the NMRAs Standards Gauge. That little tool is really a jewel. Beyond that, if I have a commercial track component that doesn't work right, I know just where to start looking for problems — probably the same places I had problems on the ones I scratchbuilt. 🛠️



**Above:** The fourth photo of the section gang: The section gang, a collection of hand made and converted commercial figures. If only it was this easy to get track laid for those of use who are solder challenged!

In desperation, I tore the entire crossing out, determined to start over. One good thing came from this: When I pulled on the rails to tear it out, the wood ties glued to the metal rails pulled up with the

minutes, I had glued and laid out all the ties and let them dry overnight. The next night, I had cut and fit all the rails and guard rails and glued them in place in 30 minutes and let everything dry overnight. The following night, I ran a truck through the crossing all four directions. There were no glitches or hitches — it worked well! Getting brave, I ran an engine through the crossing using a battery to test it. No prob-