

NMRA Achievement Program

Model Railroad Engineer – Civil

Section 1

Prepare one original scale drawing of a model railroad track plan, identifying overall size, scale, track elevations, curve radii, and turnout sizes.

I have attached the Track plan of my HO scale Perch Lake & Superior. This layout has three major levels, there is a sheet showing the overall space and there is a sheet for each level. Each sheet has scale marking, track elevations, curve radii and turnout size information:

Sheet 1 is an overall plan of the layout

Sheet 2 is the lower level all turnouts are #6 and all track is Code 100

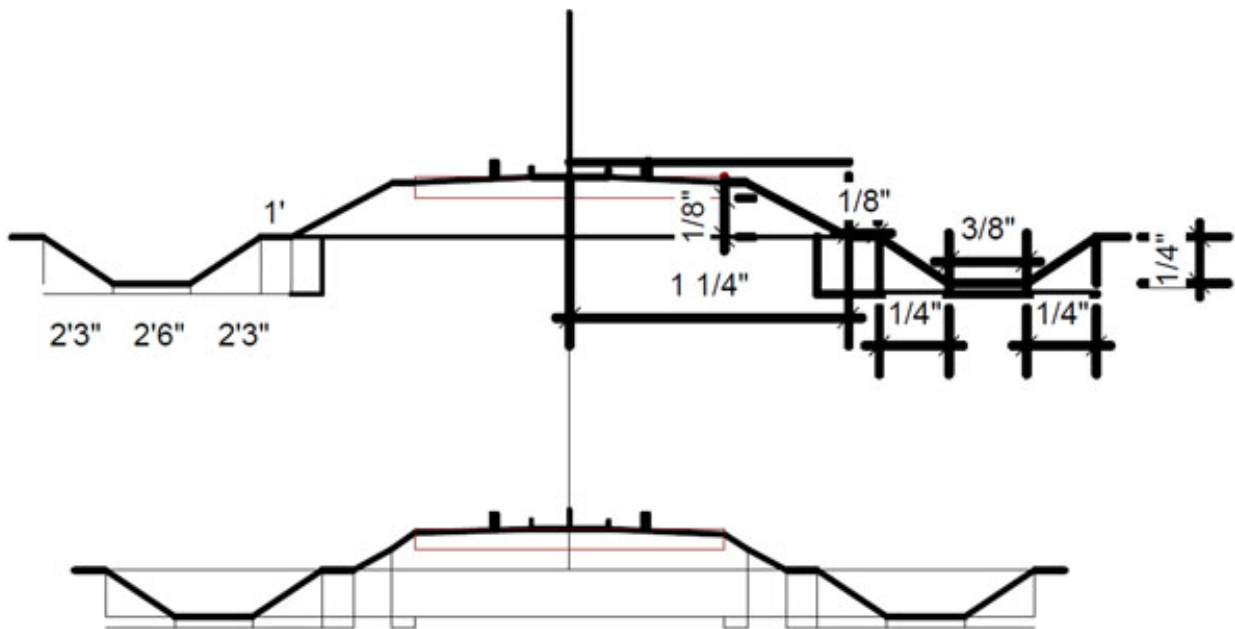
Sheet 3 is the mid level this level connects the upper and lower levels It contains Bradley Yards and Pembine stations. All trackage is code 83 and the turnouts vary from #8 down to #5 and are indicated on the drawing by color notation. Elevations are noted as this layer uses up to a 2% grade to rise over 10 inches.

Sheet 4 is the upper level which contains Rhinelander yards and Thunder Lake as well as other sidings. Again turnouts vary from #8 down to #5 and are indicated on the drawing by color notation.

Sheet 5 Is the Perch Lake Lumber Company at thunder Lake on the upper level

- A) Terminal space for Perch Lake and for Superior is provided on the lower level in two storage yards and a holding area used for staging. On the middle level Bradley has a small yard and a complete model of the Bradley Junction located on the former modern WC north of Tomahawk WI. The upper level has Rhinelander which is the major industrial town on the layout the yard, which is a model of the once SOO line then WC yard, and passenger station at Rhinelander WI are designed from surveyors drawings housed at the Rhinelander Railroad Association. Freight yards at Rhinelander and Bradley along with interchange tracks at Pembine, Rhinelander, Thunder Lake and Bradley provide locations for the transfer of cars to and from the PL&S mainline freight as well as interchange with other railroads.
- B) Locomotive service is handled at the Rhinelander Roundhouse for the PL&S and at Thunder Lake for the Perch Lake Lumber Co.(PLL)

- C) Passing sidings are located in the lower level between the staging yards, in the mid level at Bradley Junction, and on the upper level at Rhinelander and Thunder Lake.
- D) Switching locations include the Rhinelander Paper, Lake's Locker, Woods Potatoes, Pembine Coal and Oil, and Pembine Power among others.
- E) A turntable at Rhinelander or the lower loop provides the ability to turn power. The upper loop may be used in conjunction with the double crossover at Rhinelander crossing to turn entire trains if needed and the Perch Lake Lumber Co. has a wye at Thunder Lake.
- F) The layout is wired with ten power districts powered by two boosters using the NCE DCC system and operations of six mainline trains and a few yard jobs are not uncommon. Electrical operation of this RR and Dispatcher operations have been described and evaluated and awarded AP Electrical Engineer and Chief Dispatcher certificates. The design allows for point to point operation as described in the time table or continuous running of up to 6 trains for family rail fan events.



This is an illustration of the ballast and drainage as set by the SOO Line Standards Vol.1

The left dimensions are full the right are for HO scale. The top is Main Line and the bottom is for Branch Lines. This was used on the crossover in section 3.

Taking a ride on the Perch Lake & Superior

We start out in the Staging yards on the north end of the layout at Superior, Interchange for northbound traffic. As we head out of the yards we pass Long Lake tower and start a climb out of the Lake Superior area towards Pembine. As we pass the Soo Line interchange track we come out into the Pembine area with its power plant and Lumber industries. After a brief stop at Pembine our train travels up grade past the Milwaukee Road switch towards the Potato growing area of Starks WI and on to Windy Pines and Windy Pines Junction. Passing the Junction we near the highest point on the route at the Lumber mill town of Thunder Lake, base for the Perch Lake Lumber Company. Here we pass a northbound train on the long passing siding and we can observe the operations of the lumber camp with its steam locomotives. As we are cleared to continue on we head for the Rhinelander district, the largest town and group of industries on the line. The railroad is taking on a major renovation of the facilities at Rhinelander but continues to service the local paper company, the scrap Iron works and Lakes Locker, a produce supplier to the area food stores. Rhinelander is also the interchange with the CNW and a location that freight is transferred on and off the railroad to the Thomasville branch of the CNW. Coal is one of the major parts of this transfer as there are a number of users of coal on the PL&S and they rely on the mines in the Thomasville region. The Rhinelander turn has been working the industries that we have passed and after finishing their work in town will head back north to Superior. We continue heading south from Rhinelander passing Woods Junction, once a major interchange for the Woods Lumber Company and seasonal potato loading, now is just a flag stop on the line with truck to RR loading of small quantities of pulp wood. Descending south our train pulls into Bradley Junction here we take the siding to allow The Laker, our first class passenger train, to use the main for access to the station and pass on its way north. Industrial switching and classification is taking place to our right as the local switcher is sorting cars for the north and southbound freights. If we were here at night we would see a meeting of three trains, a local out of Tomahawk and a north and south bound main line freights. Here at Bradley the crews will switch cars and crews with the local and the crews will return home while the trains continue on to their destinations. The Signal has cleared us to continue south and as we leave Bradley our engineer is instructed to contact the Moen Lake Tower for instructions on entering the yard at Perch Lake.

This is almost all, like radio, theatre of the mind except there is track and trains with sidings and cars to be set out and picked up by the crews of the trains that are moving over the line. All the action takes place in fast time allowing a 12 or 24 hour day to pass while the engineers, tower operators and dispatcher keep them running safely. New operators and guests may be running the commuter RDC car which will make two round trips and visit all the stations running on a time table and requiring access to the stations. This gives the newest operators a chance to learn the route and give the switching jobs something to stay out of the way when the train is due in the town they are working.

The whole layout may be set to operate in rail fan mode with 6 trains moving around the layout continuously.

Station Listing

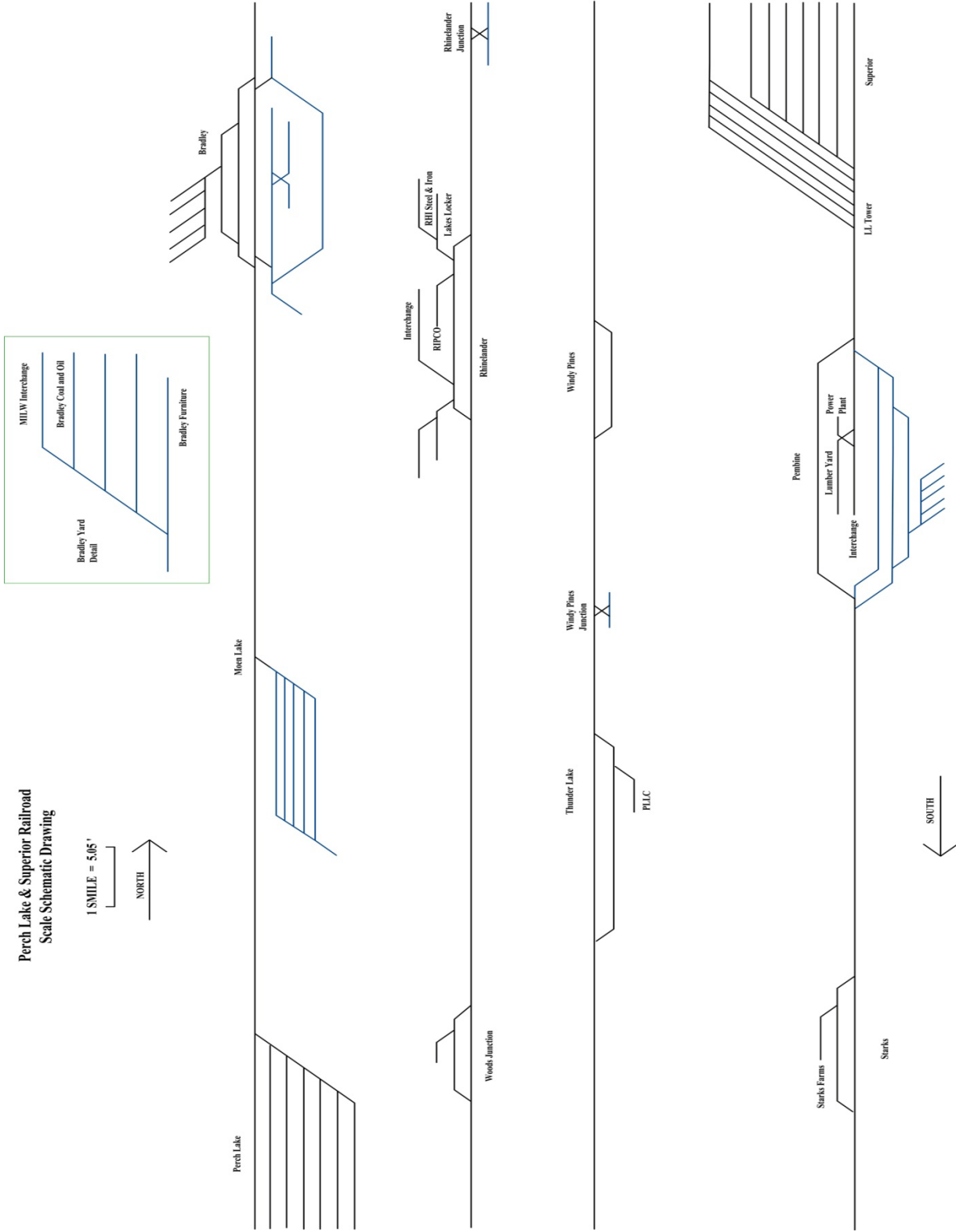
Station Listing North to South

| Smiles | Station | Elevation | Markings |
|---------------|-----------------------------|------------------|-----------------|
| 0 | Superior | 883' | SPR |
| 3.4 | Long Lake | 883' | LL |
| 5.2 | SOO Line Phone | 1058' | SP |
| 8.9 | Pembin | 1145' | PMB |
| 9.5 | CMStP&P Switch | 1145' | MR |
| 16.3 | Starks | 1449' | STK |
| 23.7 | Windy Pines | 1623' | WDP |
| 26.3 | Windy Pines Junction | 1645' | WJ |
| 28.2 | Thunder Lake | 1645' | TLK |
| 36.5 | RHI Junction | 1623' | RJ |
| 38.6 | Rhineland | 1623' | RHI |
| 48.5 | Woods Junction | 1406' | WDJ |
| 50.4 | Bradley | 1145' | BDJ |
| 56.2 | Moen Lake | 883' | ML |
| 70.7 | Perch Lake | 883' | PLK |

Diagram

Perch Lake & Superior Railroad
Scale Schematic Drawing

1 SMILE = 5,65'
 NORTH →



NMRA Achievement Program

Model Railroad Engineer – Civil

Section 2

Construct and demonstrate the satisfactory operation of a completed section of the model railroad and track work described in #1. Containing at least 50 linear feet in HO scale, with appropriate ballast, drainage facilities, and roadbed profile, which may contain spurs, yards, etc.

The track work has examples of the following features:

Passing Siding

Passing sidings are located on the lower level between the staging yards 5 tracks to the north allow for passing or holding. The right most are passing sidings for the North bound trains. There is also a passing siding to the right of the South Yard with access to the North and South mains. In the Mid level Passing takes place in the Bradley Junction section of the layout. This section of the layout is a model of the Bradley Junction as operated by the Wisconsin Central Ltd. A typical day may have 3 trains meet there and exchange cars and crews from the north and south exchange motive power after switching and return home. The third train returns to Rhinelander with traffic from both north and southbound trains. There is the main and two passing sidings in the junction. On the Upper level passing takes place at Rhinelander and at Thunder Lake.

Spur

There are no Spurs on the lower level. In the mid level Sidings for the Pembine Power Company, along with Pembine lumber. A team track is also available at the Pembine station. At Bradley the first track leading to the yard ladder is the Bradley Furniture Company and the Last track serves Bradley Coal and Oil. Half way to Rhinelander is Woods Junction where there is a spur for seasonal use in Lumber and Potatoes. On the upper level at the present time Rhinelander has Lakes Locker, Rhinelander Paper Company, with coal, chemical and Shipping of paper. The iron and steel company also has a siding. From Rhinelander to Thunder Lake another siding is located north of Rhinelander Junction for logging. Thunder Lake interchanges with the Perch Lake Lumber Company.

Crossover

There are numerous crossovers on the lower, mid, and upper levels. They service the lower reverse loop with crossovers in each direction and the ends of the yards. In the mid level #8 crossovers are part of each end of the Bradley Junction area. In Rhinelander and at Rhinelander Junction where there is a double crossover. A #6 crossover is formed at the south end of the Thunder Lake passing siding providing access to the interchange trackage.

Reversing Loop

There are 2 Reverse loops on the layout, one on the lower level and the other at Thunder Lake.

Wye

#5 Wye is built in the Perch Lake Lumber area at Thunder Lake for turning logging equipment.

Simple Ladder

Simple Ladders are in the North and South Staging Yards of Superior (North) and Perch Lake (South). There is a Ladder track at Bradley and also at Rhinelander.

Turntable

Rhinelander has a turntable for use with the service facilities

Super Elevation

The main line at Thunder Lake has super elevation the passing siding does not.

Scale Track

Rhinelander Yard contains a Scale track

Coal Dump Track

Engine Service facilities at Rhinelander and Thunder Lake have coal dumps

Ash Pit

An Ash pit is located in the service facility at Rhinelander

Service Pit Track

A service pit is planned for the engine house in Thunder Lake

Grade Elevation

Grade Elevation covers the layout and is shown by station elevation and % grade on the layout plans

Other

Double Crossover at RJ/WPJ

The scale track, Turntable and the ash pit are under construction during the upgrade to Rhinelander yards.

NMRA Achievement Program

Model Railroad Engineer – Civil

Section 3

Construct for Merit Evaluation, scratch built scale models of any three and demonstrate their satisfactory operation.

All turnouts are 100% Scratch Built according to the NMRA standards using code 83 Micro Engineering rail.

- 1) Turnout (point) Wye is a #6 Wye built with code 83 rails I picked a Wye because it is a little more complex than a simple turnout. My tools were rail nippers and files as well as a belt sander. For cutting the gaps around the frogs I used a jeweler's saw blade which I mount in a Delta 24" jig saw. This gives me more control and a cleaner gap than the hand saw or a Dremel cut-off wheel. The ties were hand cut according to the NMRA template and glued to the roadbed. (For this demonstration a layer of Homasote) I stained the ties to be close to the prototype of the ties found in the Rhinelander area which I model. The turnouts are fully DCC friendly with adjacent rails having the same polarity in the area of the points to avoid shorting and are wired to avoid problems with dirty point contact. In addition to this #6 I also built a #5 wye for my logging layout using only the NMRA Template but used Quick Sticks ties for they match my other track on the layout. (I have it on hand for pre finish viewing of construction) The frogs are wired for operation by a turnout control system be it Switch machine or hand operated throw. This turnout was evaluated at the WISE division April 15th and received 91 points for a merit award.
- 2) The S Curved Gauntlet track, which I called, Running the Gauntlet at Twisted Gulch, was built for in response to a question as to whether one could build a gauntlet on a curve and if so, would I teach a clinic on doing so. After thinking about over night I decided to make an S Curve as a more complex gauntlet. The model is to represent a track passing between rock outcroppings in a narrow dry riverbed. A second railroad comes in and exits from one side thus, again for complexity, I made the entry points left and right handed with #6 frogs rather than the normal Wye. This involved making offset right and left pointless turnouts by creating my own templates from the standard #6 templates. The Curve structure started with one outside rail and adding the second rail using a set of feeler gauges to locate the proper spacing while setting the curve drawing. After that it was a matter of using three point track gauges to set the other 2 rails. As stated above, entry points use a modification of pointless turnouts with offset rails and #6 Frogs. The

frogs are designed with gaps which allow them to be wired with power for the path that is in use. This could be a DPDT switch connected to the frogs and the signal system; on the layout I would use a DCC auto reverser. Signals may be connected to the frogs to indicate the polarity if running DC. Like the Wye the rail was painted and the ties were hand cut because to fit the size needed for the wider gauntlet track and hand stained after being glued to the same Homasote demonstration roadbed as the Wye. This was evaluated at the Du Page Division meeting May 6th and received a merit award score of 97 points.

- 3) The Crossover is a #6 crossover built on its own plywood roadbed cut and contoured to build roadbed which matches the roadbed on my layout. All parts were scratch built with the ties cut to size using the NMRA template, then attached and hand stained matching the others on the homasote. Two #6 turnouts were built with additional rail on the diverging route to allow for proper spacing in the configuration of a crossover which may be different depending on track spacing of the main lines. Rails were hand painted after the wires were soldered to the bottom of rails. This was built as a demonstration platform according to the SOO Line grading and drainage specifications in the Soo Line Standards Vol. 1. The crossover is mounted on a sub roadbed with the contour and drainage as well as additional roadbed and flex track for running space during the operational demonstration. This Crossover was evaluated at the Du Page Division on May 6th and received a merit award score of 95 points.
- 4) A 30 deg. Code 83 crossing built for evaluation as a crossing at grade. Making this a 30 deg. was more complex than a 90 deg. crossing. The entire crossing is scratch built with Micro Engineering code 83 rail painted and weathered then secured to hand cut, stained and weathered ties using Micro Engineering spikes on a Homasote demonstration roadbed. This Crossing was evaluated at the May 6th meeting of the Du Page Division and received a merit award score of 92 points
- 5) A normal Gauntlet track with wye entry and exit points which I built as an example using one-piece stock rails on the outside track and built the rest around that, thus having continuous rail. All other construction is the same as the above track examples. Like the Wye the rail was painted and the ties were hand cut to fit the size needed for the wider gauntlet track and hand stained after being glued to the same Homasote demonstration roadbed as the Wye. This was evaluated at the WISE Division and received only 79 points, not enough for a merit award.

NMRA Achievement Program

Model Railroad Engineer – Civil

Section 4

Attach Merit Awards for the items in section 3.

30 deg. crossing 92 Points

#6 Crossover 95 Points

Gauntlet Track 97 Points

#6 Wye 91 Points

Forms attached

NMRA Achievement Program

Model Railroad Engineer – Civil

Section 5

Attach Please find: SOQ

A. 1) Scratch Built Features, code 70 turnouts in the trackage on the Perch Lake Lumber Co. is hand built. This is connected to code 70 Micro Engineering. Turnouts and Crossovers connecting the passing siding in the Thunder Lake area are scratch built. Turnouts in the Rhinelander yard area are being replaced with code 83 scratch built #6 and #5 turnouts.

2) Track work features are listed above in the description of section 2. Trackage above the lower level other than Thunder Lake, Bradley Junction and Rhinelander Yard are Micro Engineering trackage. Thunder Lake is code 70 built with Micro Engineering flex track and scratch built turnouts. Bradley junction is 90% Walthers code 83 track and turnouts.

Rhinelander Yard is being rebuilt from Micro Engineering turnouts and flex track to scratch built turnouts and code 83 and 70 track from Micro Engineering. All the construction on the layout is built with furniture grade lumber cut to size in my own shop. Sub-Roadbed is ½ inch plywood and the roadbed is cut from 4X8 foot 1/4inch Luan Plywood. Curved sections are cut with slots at 1 inch intervals to allow flexing. Turnouts are mounted on Luan switch plates. The area under the lower level of the Rhinelander is built as storage areas with draws to hold the rolling stock and locomotives. Below the 4 draws in each of the 4 foot sections is a shelf for plastic cases for projects. The lower level is built on the same roadbed and sub-roadbed but uses Atlas code 100 track and #6 turnouts. Atlas and Walthers turntables are customized for the use in each location.

All turnouts are operated by Tortuous switch machines and were evaluated during my AP Electrical Engineering evaluation and documented in the application.

3) Materials are code 100, 83, and 70 rails, furniture grade lumber, 12 gauge wire for main feeds and 18 to 22 gauge for feeder wires. Basswood was used for making ties in the scratch building sections. The early upper level was done in extruded foam but has been replaced with plywood.

B A full description is in section 3. Rail and spikes were Micro Engineering.

C Signed Judging forms are attached.

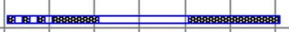
D SOQ attached.

Perch Lake & Superior Railroad HO Scale Multilevel Layout

Overall View

Track color indicates DCC Power Districts

Each Square = 6"



6' 6"

18"

2' 6"

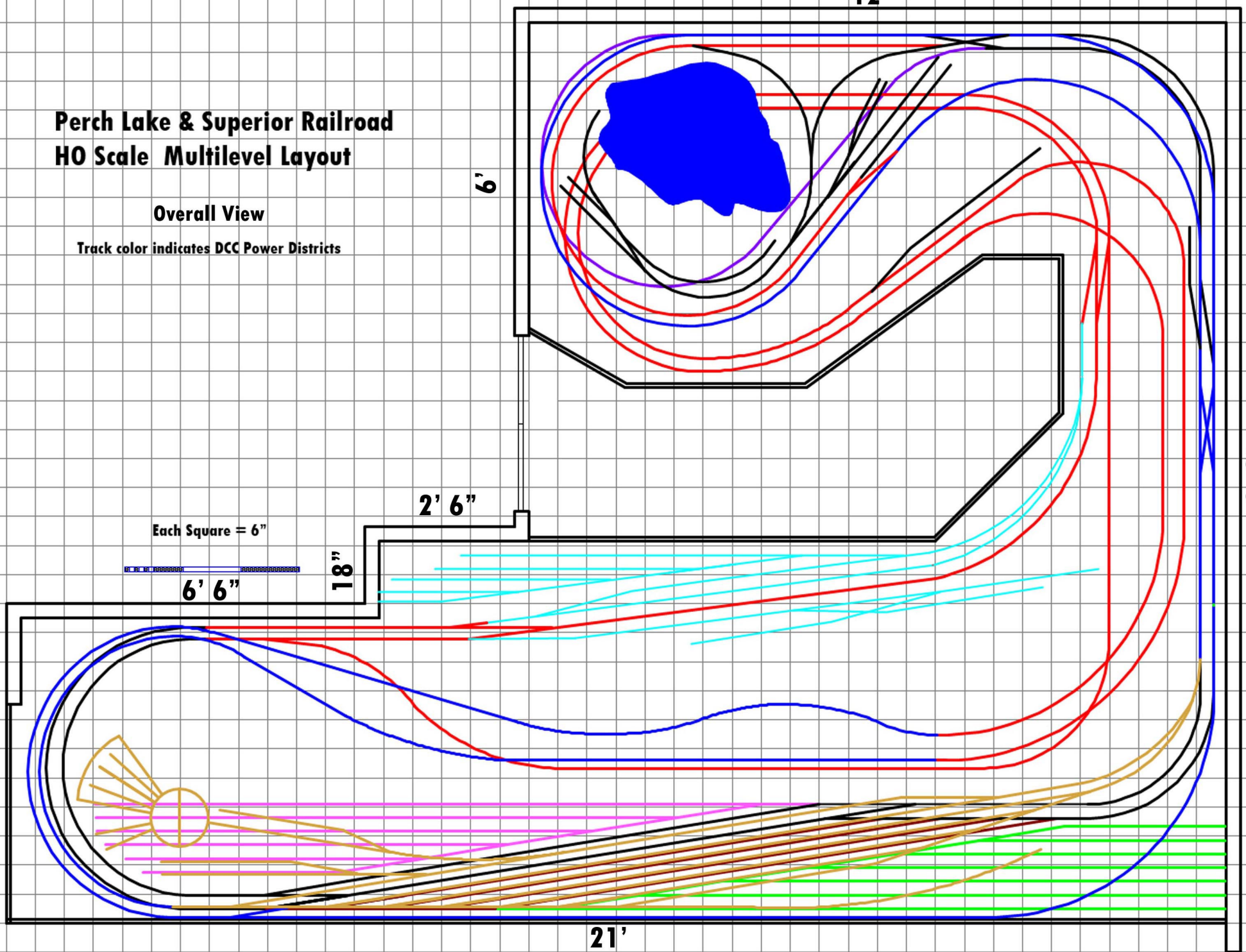
6'

12'

15' 6"

21'

5' 3"



Perch Lake & Superior Railroad HO Scale Multilevel Layout

Lower level

All Turnouts are #6 All Track is Code 100 to Point A

Starting at Point A Trackage is Code 83

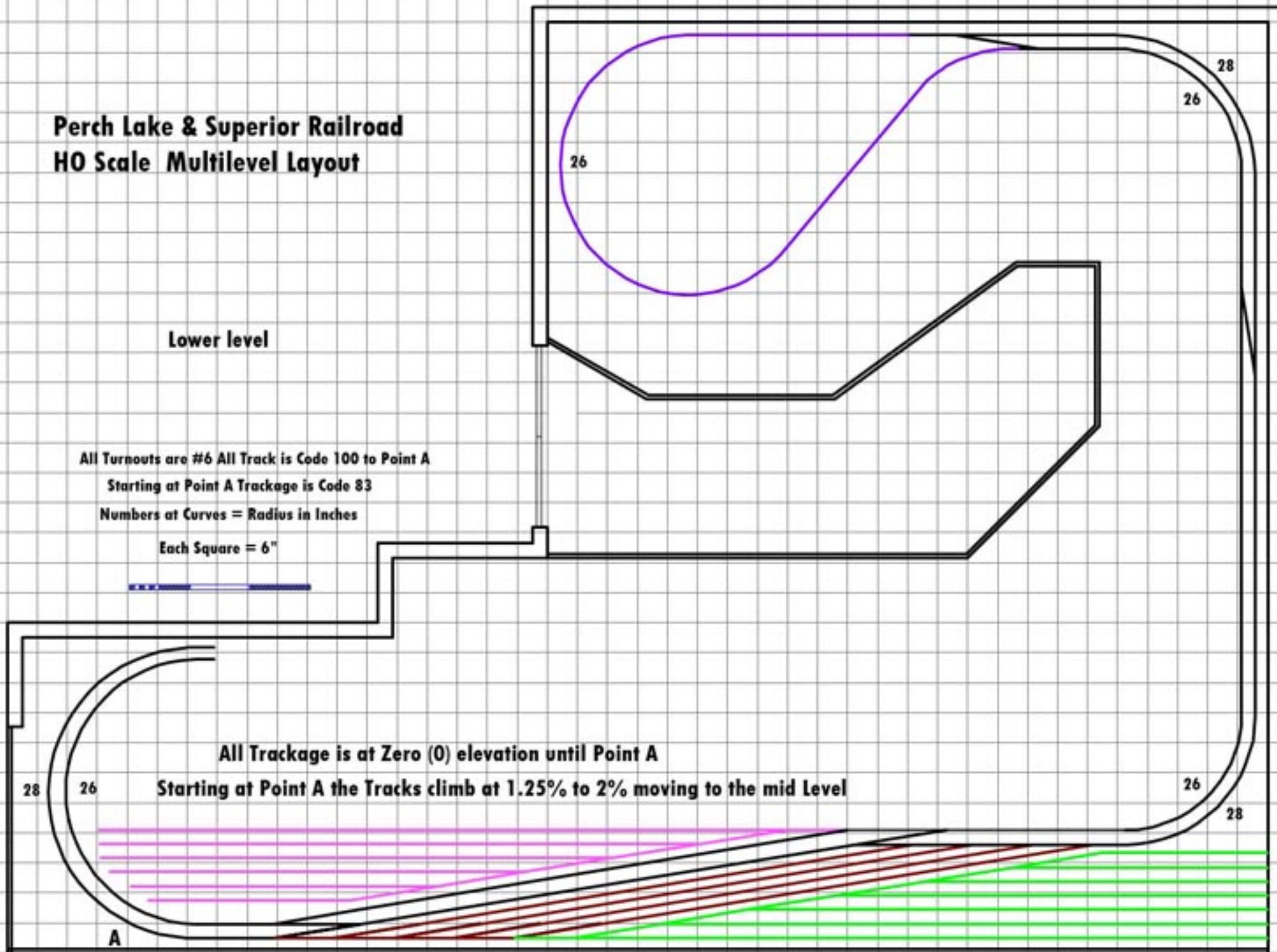
Numbers at Curves = Radius in Inches

Each Square = 6"



All Trackage is at Zero (0) elevation until Point A

Starting at Point A the Tracks climb at 1.25% to 2% moving to the mid Level



Perch Lake & Superior Railroad HO Scale Multilevel Layout

Mid Level

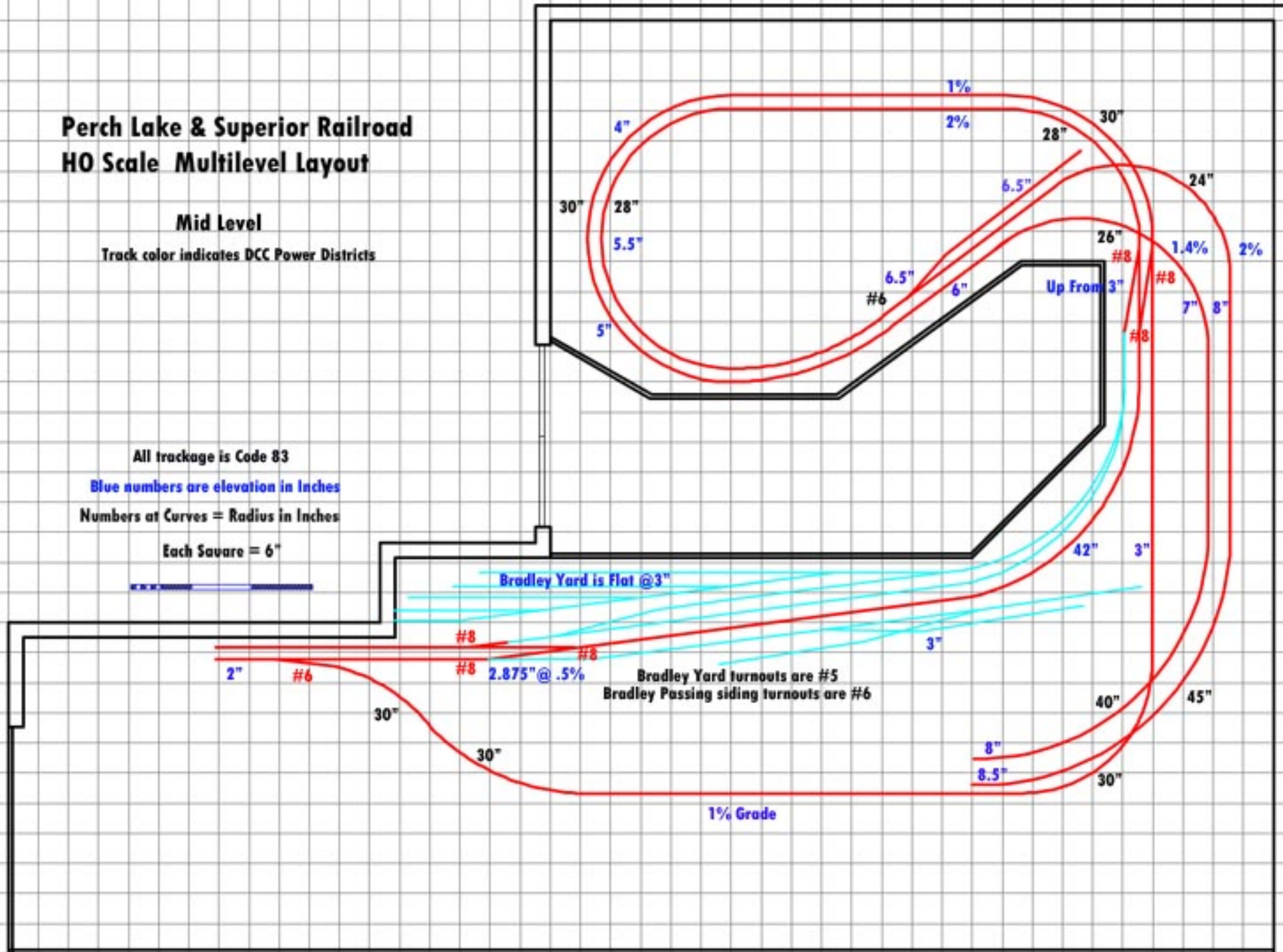
Track color indicates DCC Power Districts

All trackage is Code 83

Blue numbers are elevation in inches

Numbers at Curves = Radius in Inches

Each Square = 6"



Perch Lake & Superior Railroad HO Scale Multilevel Layout

Upper Level

Track color indicates DCC Power Districts

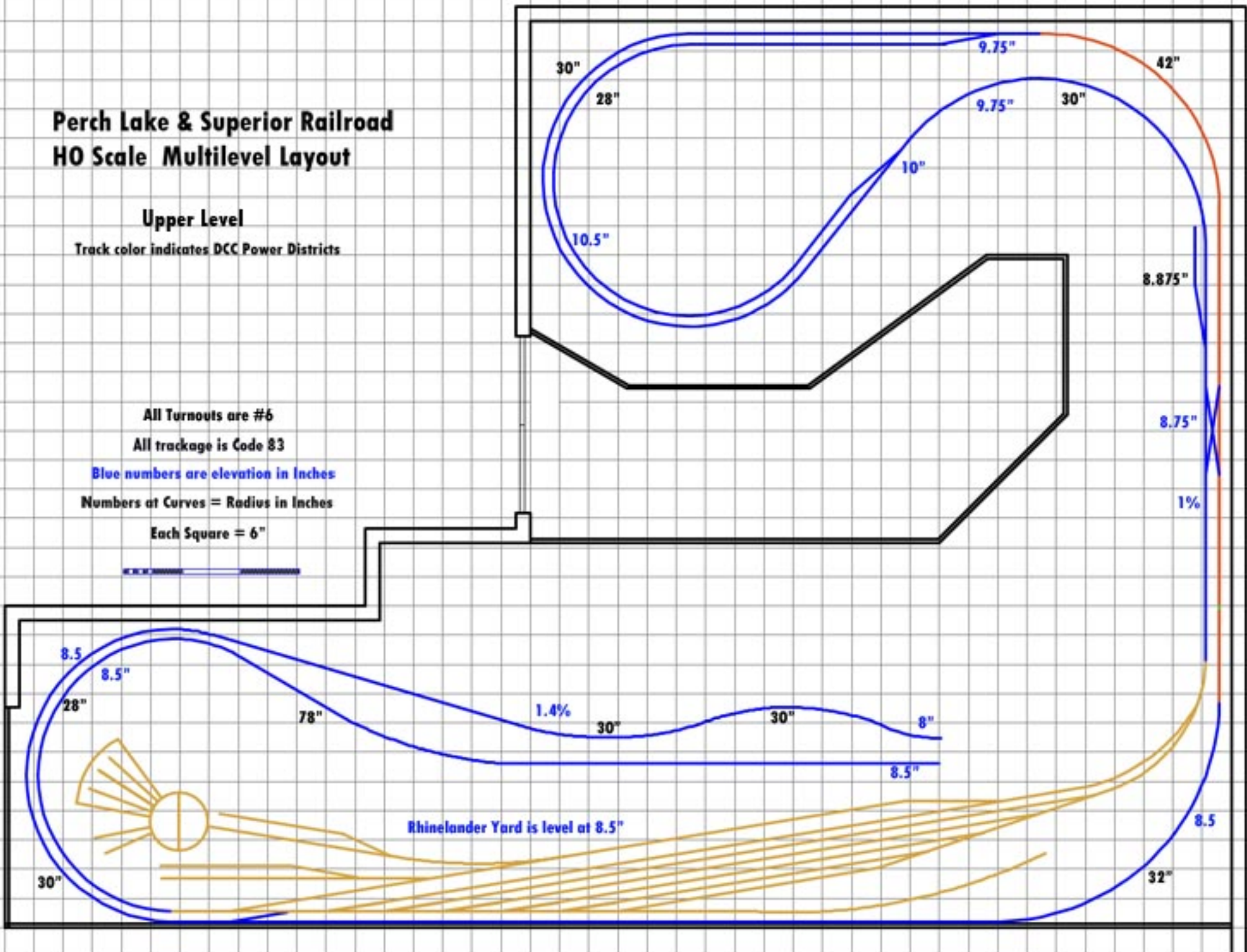
All Turnouts are #6

All trackage is Code 83

Blue numbers are elevation in Inches

Numbers at Curves = Radius in Inches

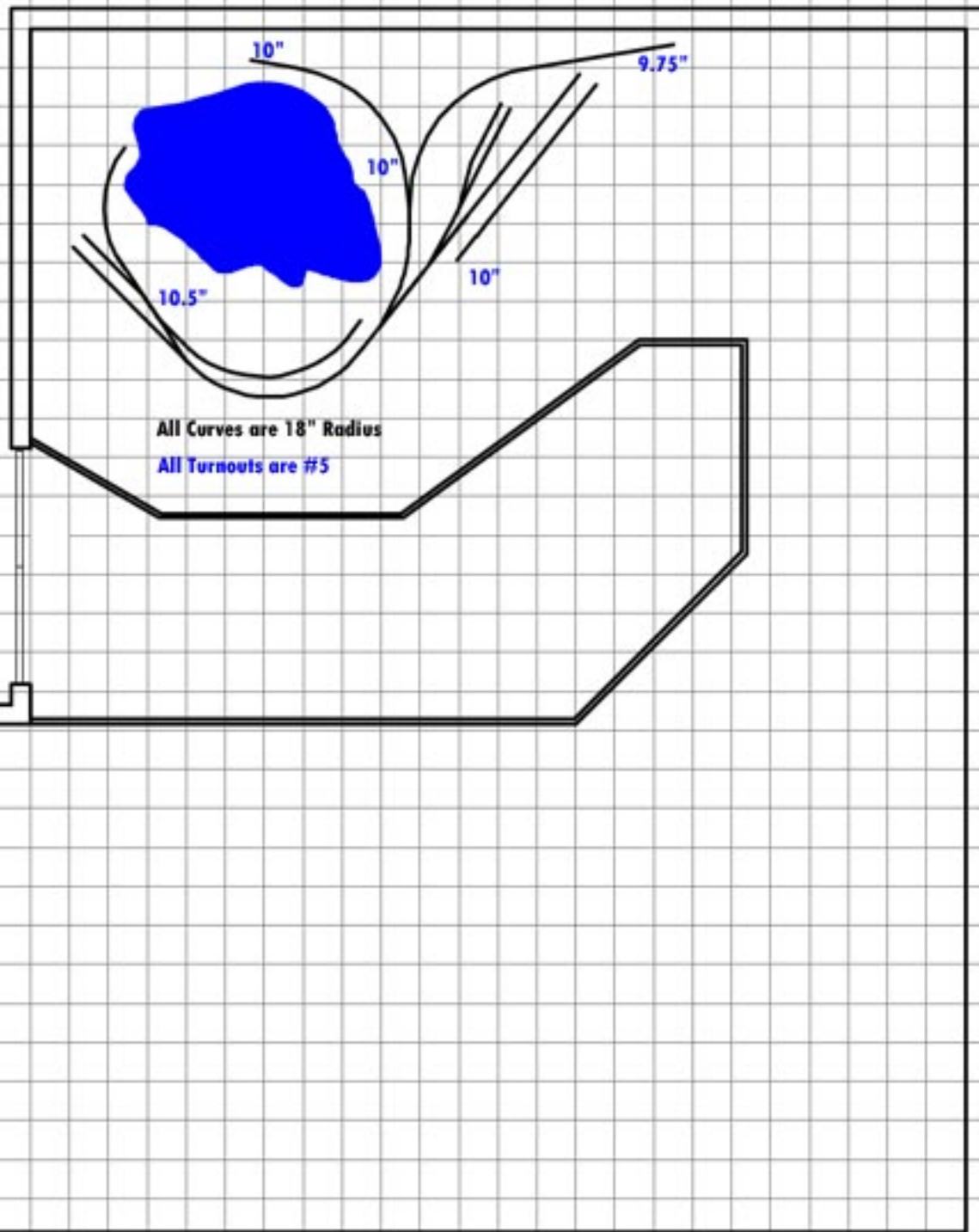
Each Square = 6"



Perch Lake & Superior Railroad HO Scale Multilevel Layout

Perch Lake Lumber Co.

Track color indicates DCC Power Districts



All trackage is Code 70

Blue numbers are elevation in Inches

Numbers at Curves = Radius in Inches

Each Square = 6"

