Creating a Railroad Schematic Diagram Map Using Trace Network Tools and Network Diagram Layout Tools

These steps may not be airtight for all kinds of datasets and situations. Feel free to contact Jim Barry at Esri (jbarry@esri.com) if you run into any snags, or have questions or comments.

1. Start with a File Geodatabase containing tracks (edges), and switches (junctions).

2. Inside the File Geodatabase, create a Feature Dataset, copy the tracks and switches feature classes into it.

3. Use "*Create Trace Network*" tool to create a trace network

Parameters:

Input Feature Dataset: your feature dataset that contains the tracks and switches feature classes

Track Network Name: [give this new trace network a name]

Input Junctions: your switches feature class

Input Edges: your tracks feature class

Connectivity Policy: "Simple edge"

Then click "Run"

4. In catalog, go to your Feature Dataset and you should see your new trace network. Click and drag it onto the map. You will get a popup message asking, "*Do you also want to add all classes that participate in 'your trace network' to the map?*" Click "*Yes*".

5. Go to your contents pane and expand the trace network group layer. You will notice that the entire map area is purple, because when the trace network is first created, it is all a "*dirty*" area.

6. Use the "*Enable Network Topology*" tool to enable network topology.

Parameters:

Input Trace Network: [choose your new trace network]

Advanced Options: [take the defaults]

Then click "Run"

7. If you have any topology errors, they will appear in the map. There could be Point errors, Line errors, Junction errors, or Dirty areas. Use the editing tools on the Edit ribbon to fix those. Here are some examples of errors you may have:

a. You may have missing or duplicate junctions. Edit the switches layer so that everywhere 3 or more track polylines touch at their end nodes that there is one switch feature snapped to it.

b. You may have polylines that are not split at junctions. Use the "*Line Intersection*" editing tool to split the polyline at the point where it should be split by the intersecting line.

c. You may have "pseudonodes". That is, two polylines that are connected at the end points. These two polylines should be merged into one. Use the "*Merge*" editing tool for this.

d. There may be other issues. Simply examine the contents of all 4 of the topology errors layers in the Trace Network group layer, and use the edit tools for fix all of those.

8. Be sure to save all of your edits before continuing further.

9. Run the "*Disable Network Topology*" tool, using your trace network as the parameter.

10. Run the "*Enable Network Topology*" tool, using your trace network as the parameter. When this tool completes running, you should have no more error features in any of the Trace Network group layer's error layers. If you still have errors, go back *(to Step 7)* and edit those, and don't continue *(to Step 11)* until your run "*Enable Network Topology*" and there are no more errors.

11. Run the "*Validate Network Topology*" tool, using your trace network as the parameter, and using the "*Default*" extent. If it runs successfully, you should get a message saying that the "*Validate Network Topology completed with warnings*", and if you View Details, you should see "*WARNING 001804: A dirty area is not present within the specified extent*". This is ok.

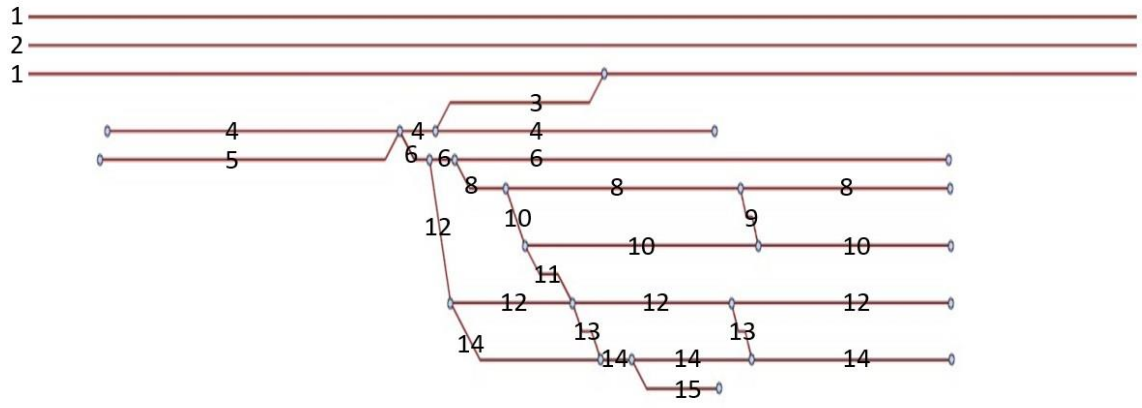
12. In the map, use the "*Select - Rectangle*" tool to drag a box to select all of the features you want to build a schematic map for.

13. Go to the "*Trace Network*" ribbon and its "*Data*" tab. In the "*Diagram*" button group, click "*New*" then "*Basic*". This will create a new diagram. It will not look like a schematic yet. In fact, it would look very similar to the original rail data. This is just a test to ensure that you can completely create trace network topology without errors.

14. Close the Diagram. We do not need it anymore.

15. Open the attribute table for the switches layer and add a new column called "NetAttribs". Give it a data type of Integer, and allow nullable values.

16. Add values to this column in order to establish a track hierarchy. Where you just have one track or two tracks side by side, you can give the tracks a value of 1. Where there are crossovers between two tracks side by side, you can give those crossovers a value of 2. The first spur or loop extending outward from the main tracks, give a value of 3. New spurs beyond 3, you can give odd values successively, like 5, then 7, then 9 and so on. Crossovers between spurs you can give even numbers between them. For example a spur with a value of 9 and the next spur with a value of 11, if there is a crossover between them give a value of 10. Take a look at the diagram below for guidance on how to add values to the NetAttribs field. When you are done adding NetAttribs values, save all of your edits.



17. Run the "Disable Network Topology" tool, using your trace network as the parameter.

18 Run the "Add Network Attribute" tool.

Parameters:

Input Trace Network: [your trace network]

Attribute name: give it a name. I usually use "Track Hierarchy"

Attribute Type: choose "Long (large integer)"

Nullable: check this ON

Then click "Run"

19. Run the "Set Network Attribute" tool.

Parameters:

Input Trace Network: [your trace network]

Network Attribute: choose "Track Hierarchy"

Feature Class: select your tracks layer

Field: choose the "NetAttribs" field

Then click "Run"

20. Run the "Enable Network Topology" tool, using your trace network as the parameter.

21. Run the "Validate Network Topology" tool, using your trace network as the parameter. The only warning you should get, again, is "001804" about how there are no dirty areas. That's ok.

22. In the map, use the "Select - Rectangle" tool to drag a box to select all of the features you want to build a schematic map for.

23. Go to the "Trace Network" ribbon and its "Data" tab. In the "Diagram" button group, click "New" then "Basic". This will create a new diagram. It will not look like a schematic yet. In fact, it would look very similar to the original rail data.

24. With the new Diagram open, run the "Apply Relative Mainline Layout" tool.

Parameters:

Input Network Diagram Layer: select "Temporary Diagram"

Line Attribute: select "Track Hierarchy"

Direction: select "From left to right"

Offset between branches: enter "20 Meters"

Break Point Angle (in degrees): enter 45

Under "Line Classification":

Type Attribute: "Track Hierarchy"

Accept all other default parameters

Then click "Run"

Your result should look something like this: