



Schematics in ArcMap Tutorial



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Introducing Schematics in ArcMap Tutorial


ESRI ArcGIS Schematics is an extension to the ArcGIS Desktop products (ArcView, ArcEditor, and ArcInfo). It allows the user to get simplified representations of networks, intended to explain their structure and make the way they operate understandable. It can be used to manage physical and logical networks, including social and economic networks, and may view and represent any kind of network such as electric power, traffic light, delivery route, computer, and so forth. It enables users to automatically generate, visualize, and manipulate diagrams from network data or data that has attributes for connectivity.

Complexity:	Beginner
Data Requirement:	ArcGIS Tutorial Data Setup
Data Path:	C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap
Goal:	Getting acquainted with Schematics tools and commands available on the Schematics toolbars in ArcMap
	Learning about generating and updating diagrams
	Learning about how to lay out schematic diagrams using the Schematics refinement tools and layout algorithms

In this tutorial

This tutorial is dedicated to Schematics in ArcMap. The easiest way to find out what you can do with Schematics in ArcMap is to complete the exercises in this tutorial.

- [Exercise 1: Getting familiar with Schematics tools](#)—Explains the ArcGIS Schematics graphical user interface by using a variety of its tools.
- [Exercise 2: Generating schematic diagrams](#)—Shows how to generate schematic diagrams from different situations.
- [Exercise 3: Editing and layout of schematic diagrams](#)—Concerns the management of editing sessions on schematic diagrams and how to refine their content and lay them out.
- [Exercise 4: Updating schematic diagrams](#)—Explains how to update schematic diagrams.

 **Note:** To use this tutorial, you need to have the Schematics extension and ArcGIS installed and have the tutorial data installed on a local or shared network drive on your system.

Exercise 1: Getting familiar with Schematics tools

Loading the Tutorial .mxd file

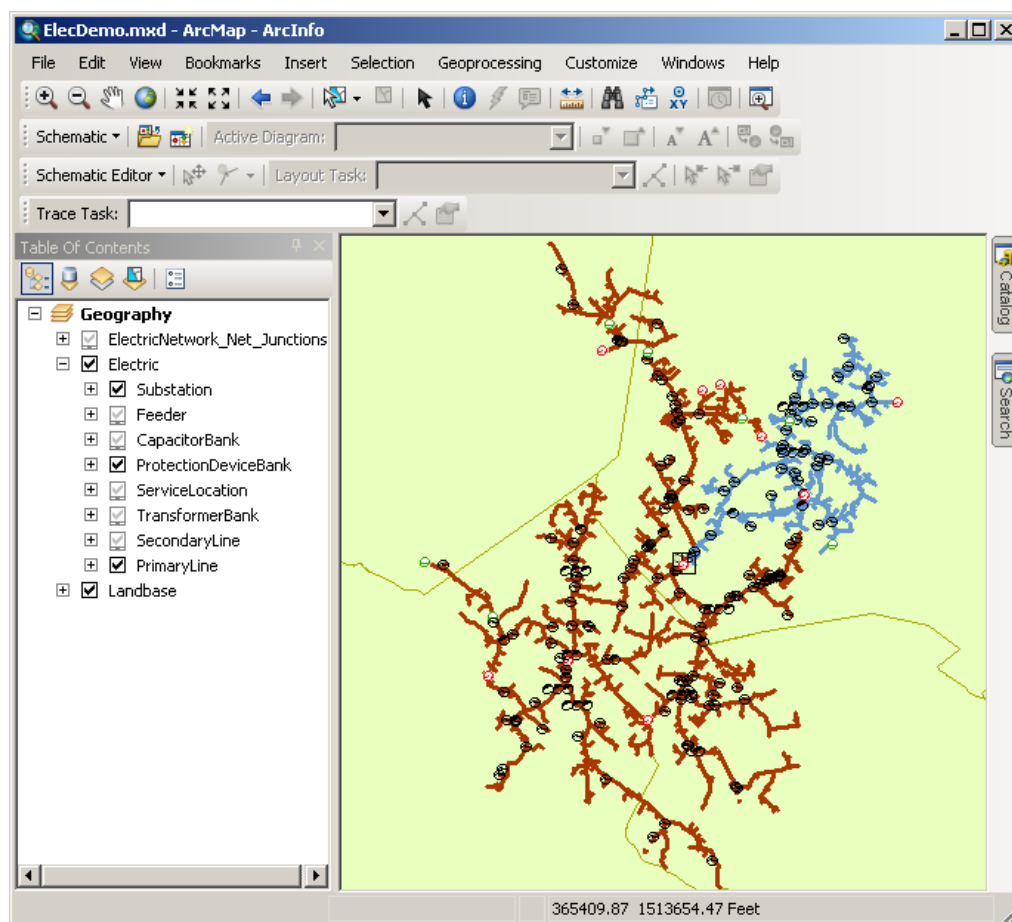
Steps:

1. In ArcCatalog, navigate to the

C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap folder in the **Catalog** tree.
This is the default installation location for this data.

2. Double-click the ElecDemo.mxd file.

It opens an ArcMap window that appears as follows:



3. If the Schematics extension is not enabled, on the **Customize** menu, click **Extensions**, then click **Schematics** in the **Extensions** dialog box and close the **Extensions** dialog box.

Loading the Schematics extension toolbars

Steps:

Complexity:
Beginner

Data Requirement:
ArcGIS Tutorial Data Setup


Data Path:
C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap

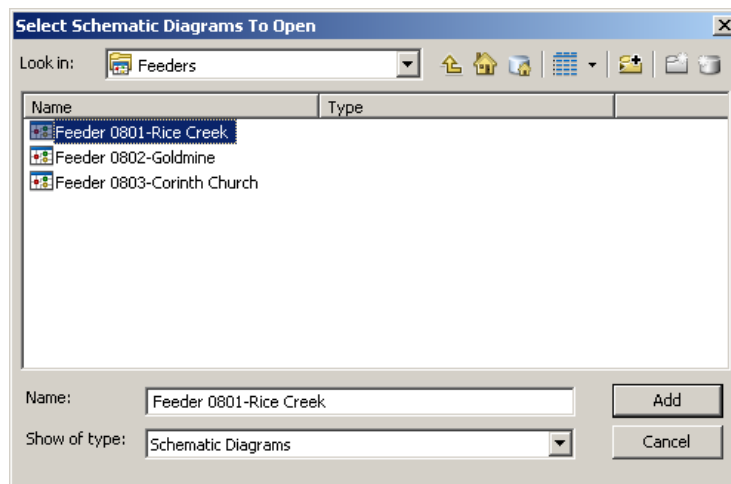
Goal:
Becoming familiar with the ArcGIS Schematics graphical user interface by using a variety of its tools

1. Click **Customize** on the main menu and click **Customize Mode**.
2. Check the **Schematic**, **Schematic Editor**, and **Schematic Network Analyst** check boxes and click **Close**.
3. Arrange the toolbars under the toolbar main menu.

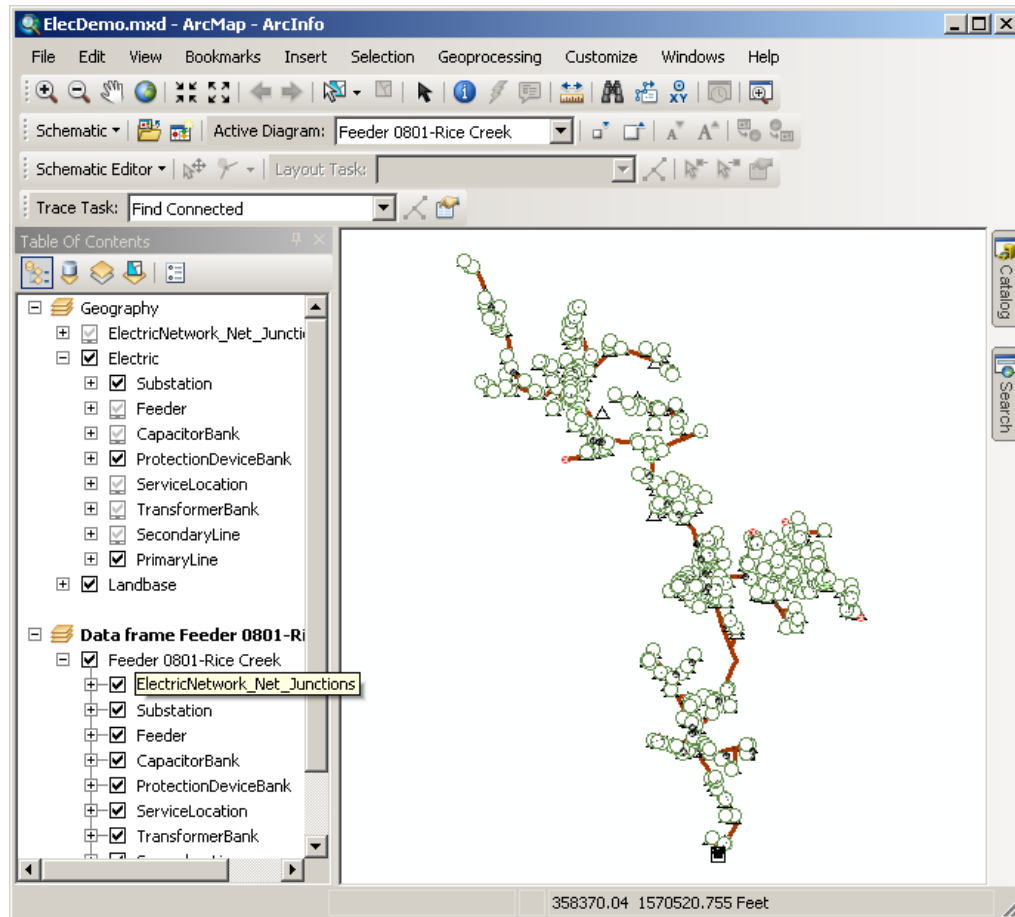
Opening a saved diagram

Steps:

1. Click the **Open Schematic Diagrams** button .
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the
`C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo.gdb`
geodatabase.
3. Double-click the `ElecDemo` schematic dataset, then double-click the `Feeders` schematic subfolder.
4. Click `Feeder 0801-Rice Creek` in the diagram list.




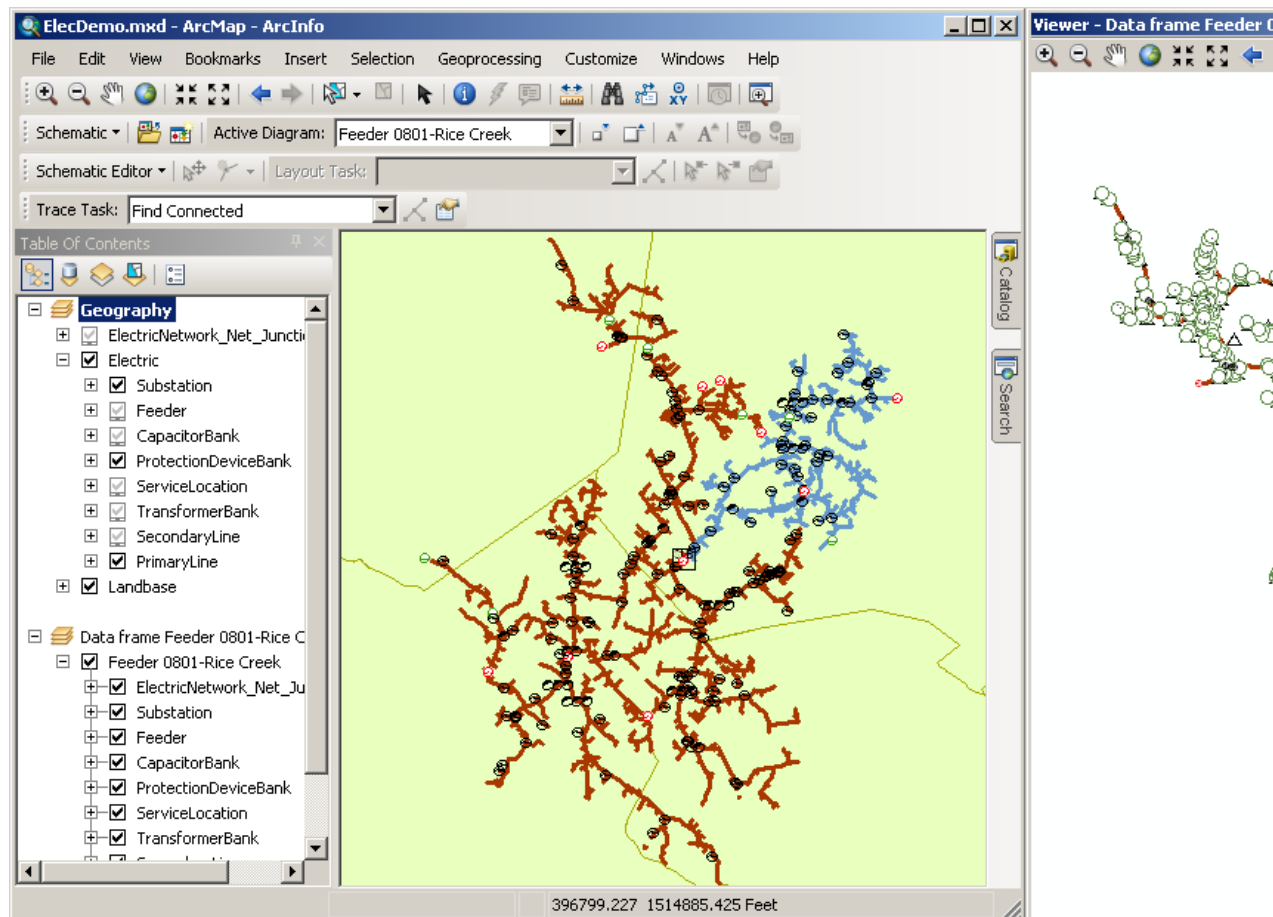
5. Click **Add**.
The diagram opens in a new data frame under the Geography data frame. You can collapse the Geography data frame for a better view of the table of contents.



Displaying diagrams in a viewer window

Steps:

1. Click **Windows** on the main menu and click **Viewer**.
The open diagram is displayed in a viewer window.
2. Right-click the **Geography** entry in the Table Of Contents and point to **Activate** to visualize the geographic features. Resize the viewer window and use the **Pan** tool  to arrange all data and enable working with the schematic diagram and geographic features side by side on-screen.

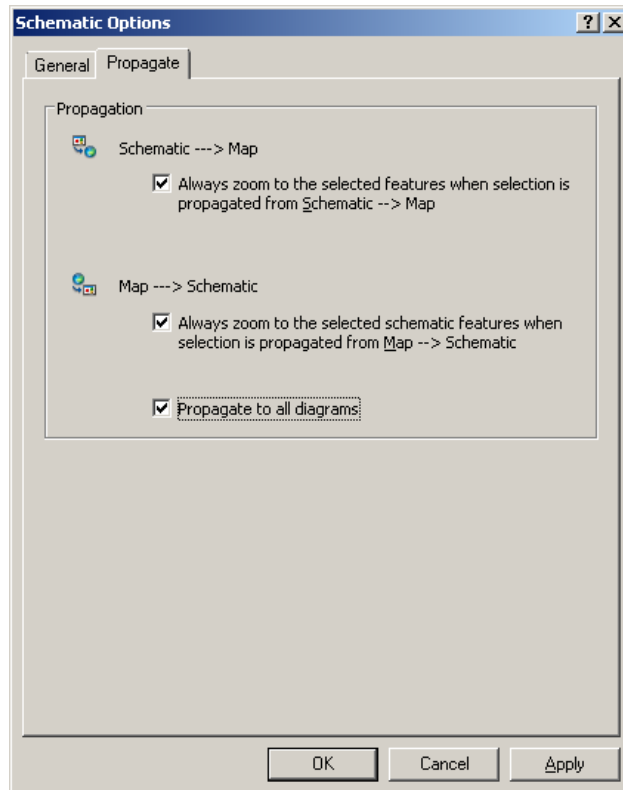



Note: Any schematic layout algorithm execution, schematic command triggering, or manipulation using any schematic tool (such as Schematics editing or refinement tools) can be done inside a viewer window.

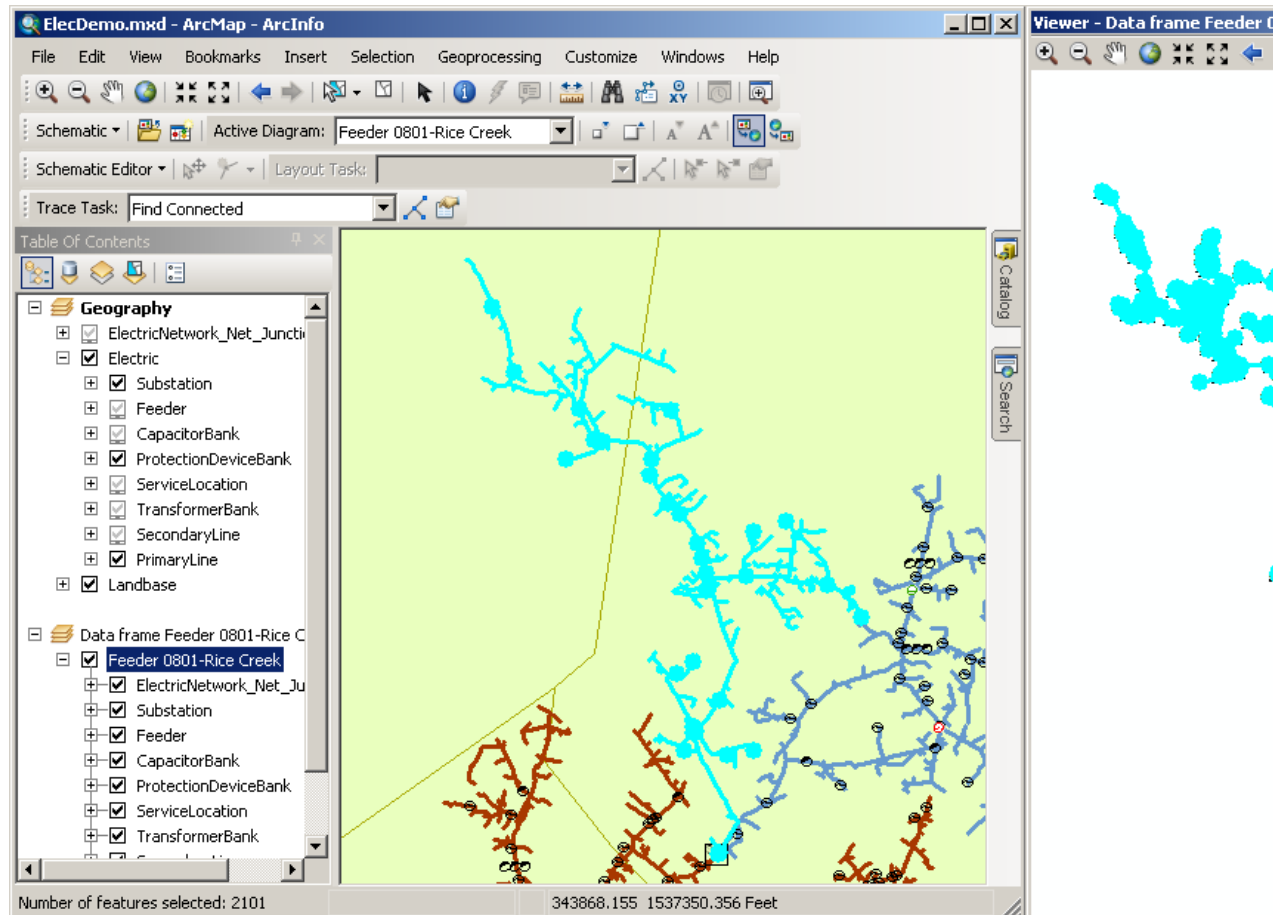
Locating selected features

Steps:

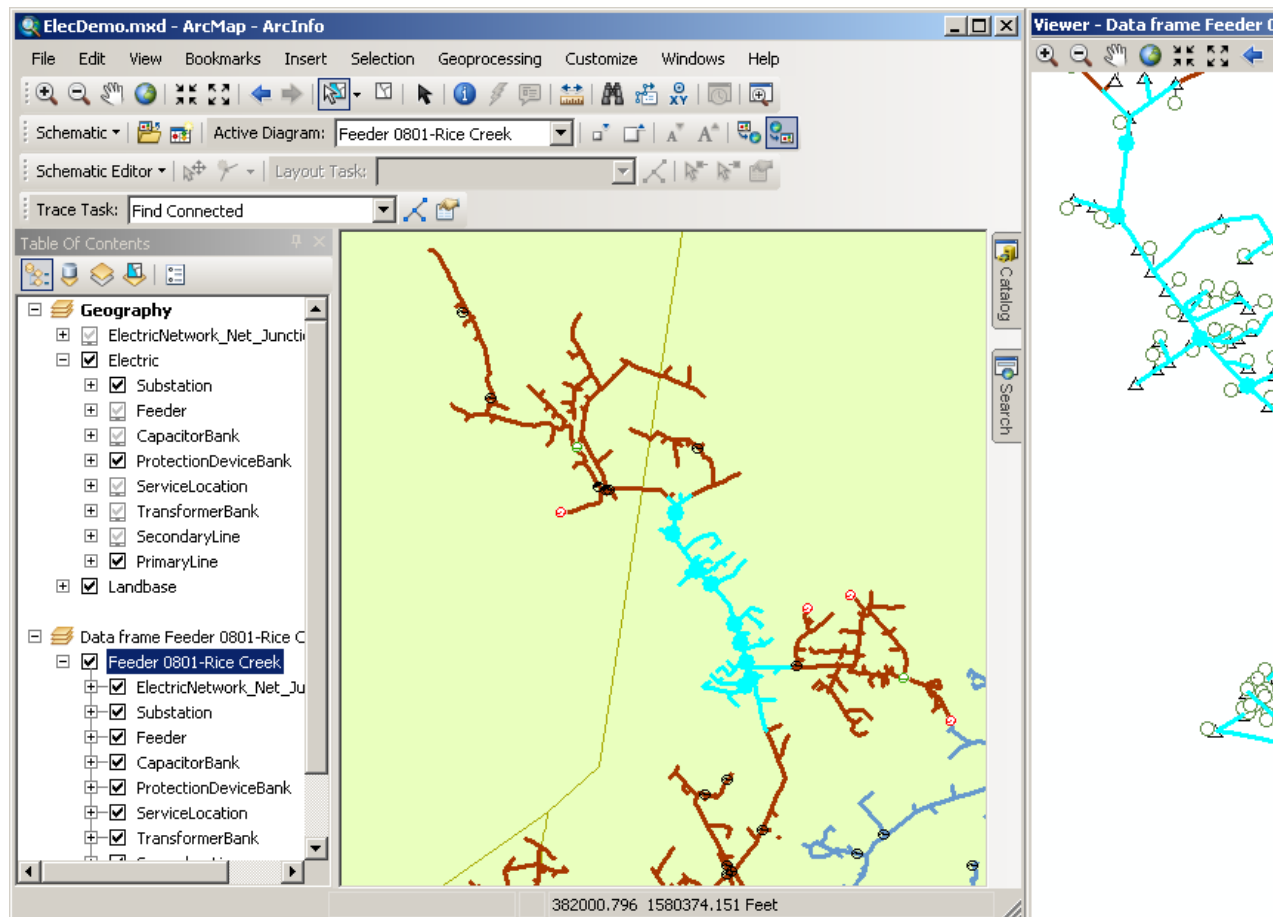
1. Click the **Schematic** drop-down menu on the Schematic toolbar and click **Schematic Options**.
2. Click the **Propagate** tab.
 - a. Check **Always zoom to the selected features when selection is propagated from Schematic > Map**.
 - b. Check **Always zoom to the selected schematic features when selection is propagated from Map > Schematic**.
 - c. Check **Propagate to all diagrams**.





3. Click **OK**.
4. In the Table Of Contents, right-click the schematic layer related to **Feeder 0801-Rice Creek** schematic diagram, click **Schematic Selection**, then click **Select All Schematic Features**.
5. Click the **Propagate Schematic Selection To Map** button  to locate the associated geographic features on the map.
The propagate operation might take a few seconds, as the selection contains a large amount of features.
The selection set is automatically zoomed in on the map.



6. Right-click the **Feeder 0801-Rice Creek** schematic layer in the Table Of Contents.
7. Point to **Schematic Selection** and click **Clear Selected**.
The schematic features in the diagram are no longer selected.
8. Click **Selection** and click **Clear Selected Features** on the main menu to clear selected features from the map.
9. Use the **Zoom In** tool to zoom in on the Geography map and use the **Select Features** tool to select a part of the network by drawing a box.
Ensure that the features you select are part of the network used to generate the schematic diagram.
10. Click the **Propagate Map Selection To Schematic** button .
The selection set is automatically zoomed in on the diagram.



11. Click the **Select Features** tool  on the standard **Tools** toolbar and click the background of the map to cancel the feature selections.
12. Right-click the **Feeder 0801-Rice Creek** schematic layer in the Table Of Contents, click **Schematic Selection**, then click  **Clear Selected** to cancel the schematic feature selections on the diagram.

Removing a diagram data frame

Steps:

1. Right-click the diagram data frame in the Table Of Contents.
2. Click **Remove**.
3. Click **File** and click **Exit**.
4. Click **No** when the following message appears: Save changes to ElecDemo.mxd?

Exercise 2: Generating schematic diagrams

In this exercise, you will generate your first schematic diagrams from the result of a manual selection, from a selection by attributes, and from a tracing result. You will also generate an inside plant diagram from an opened diagram.

Complexity:
Beginner

Data Requirement:
ArcGIS Tutorial Data Setup

Data Path:
C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap

Goal:
Learn about generating schematic diagrams from the result of a manual selection, from a selection by attributes, and from a tracing result.

Steps:

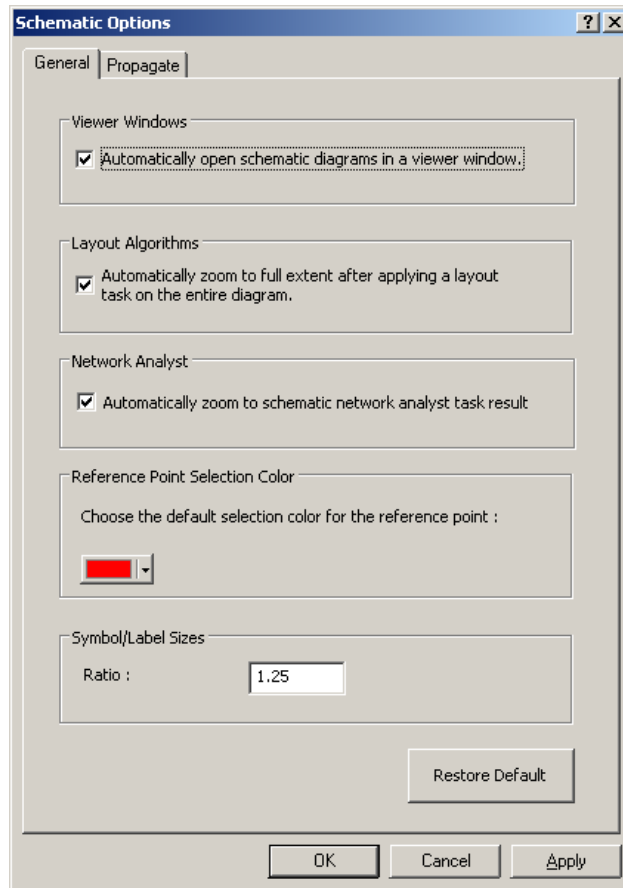
1. Start ArcMap.
2. Open the `ElecDemo.mxd` file stored in
C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap.

Enabling the Viewer Windows running mode

A schematic diagram can be opened in a viewer window. A viewer window can be opened by clicking Windows and clicking Viewer on the ArcMap menu. You can also work with the Viewer Windows running mode as the default mode so that each time a diagram is opened or generated, it is automatically displayed in a viewer window without changing the active data frame. Here are the detailed steps to activate the Viewer Windows running mode.

Steps:

1. Click the **Schematic** menu on the Schematic toolbar and click **Schematic Options**. The **Schematic Options** dialog box opens.
2. Click the **General** tab.
3. Check **Automatically open schematic diagrams in a viewer window** in the Viewer Windows section.



4. Click **OK**.


The **Schematic Options** dialog box closes.

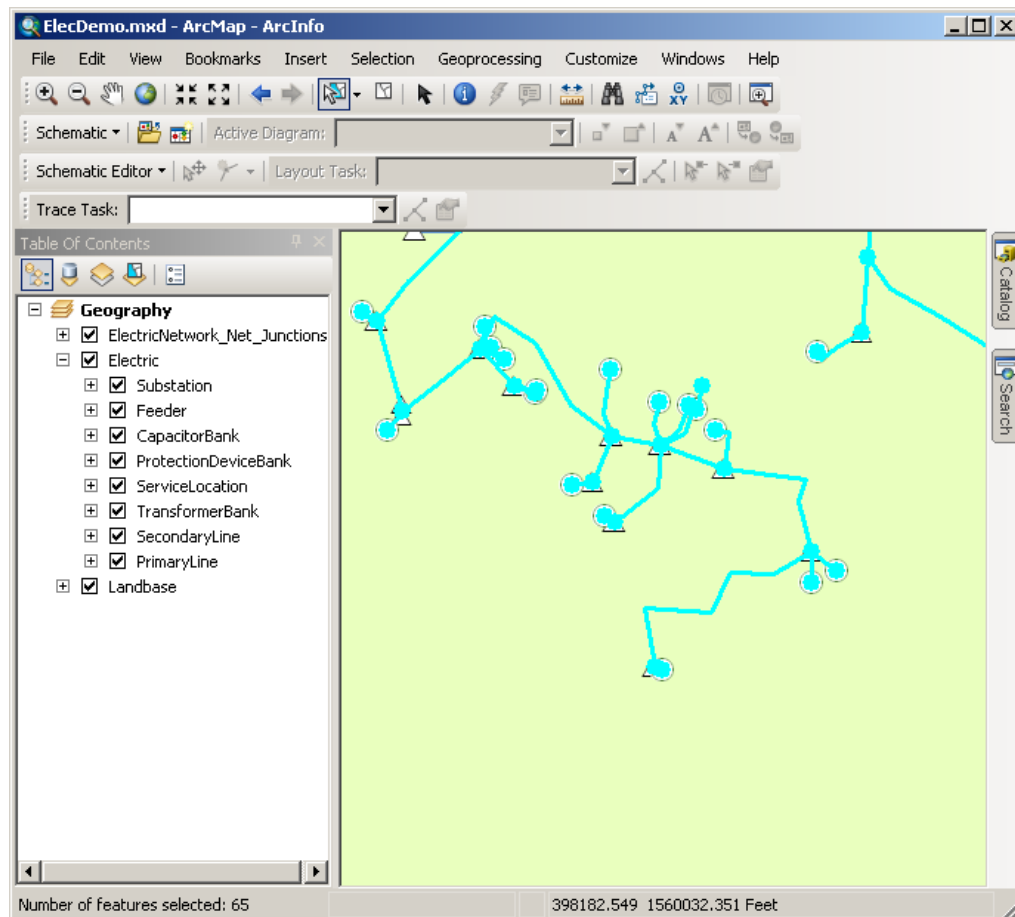
From now on, each time a schematic diagram is opened or generated, it is displayed in a viewer window, and the active data frame is preserved.


 **Note:** To deactivate this mode, uncheck the check box on the General tab.


Generating a diagram from features manually selected

Steps:

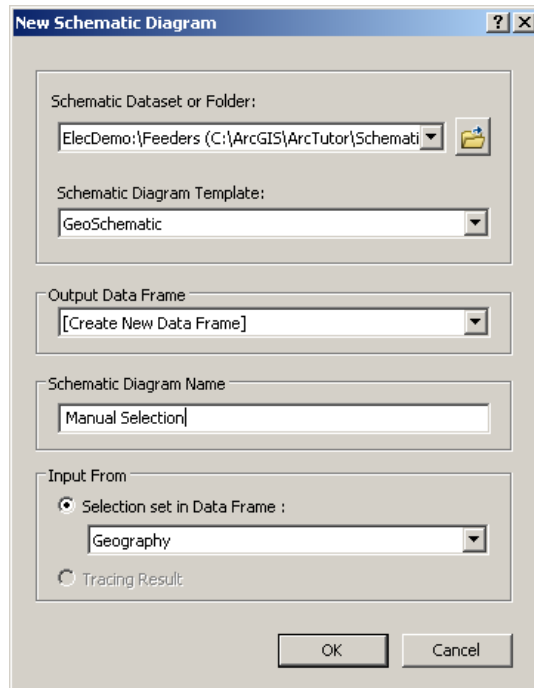
1. Click **Bookmarks** on the main menu and click **Manual Selection**.
2. Click the **Select Features** tool  and draw a box in the map to select everything in the current view .



3. Click the **Generate New Schematic Diagram** button .
The **New Schematic Diagram** dialog box opens.
4. Click the browse button next to the **Schematic Dataset or Folder** text box to specify in which schematic dataset the schematic diagram is going to be stored.
5. Browse to the ElecDemo geodatabase available in the C:\ArcGIS\ArcTutor\Schematics\Schematics\ folder and double-click the **ElecDemo** schematic dataset.
6. Click the **Feeders** schematic folder and click **Add** so the schematic diagram to be generated is stored in this specific Feeders schematic folder in the ElecDemo schematic dataset.
7. Click the **Schematic Diagram Template** drop-down arrow and choose **GeoSchematic** from the list.
8. Keep the default **[Create New Data Frame]** option selected in the **Output Data Frame** drop-down list.

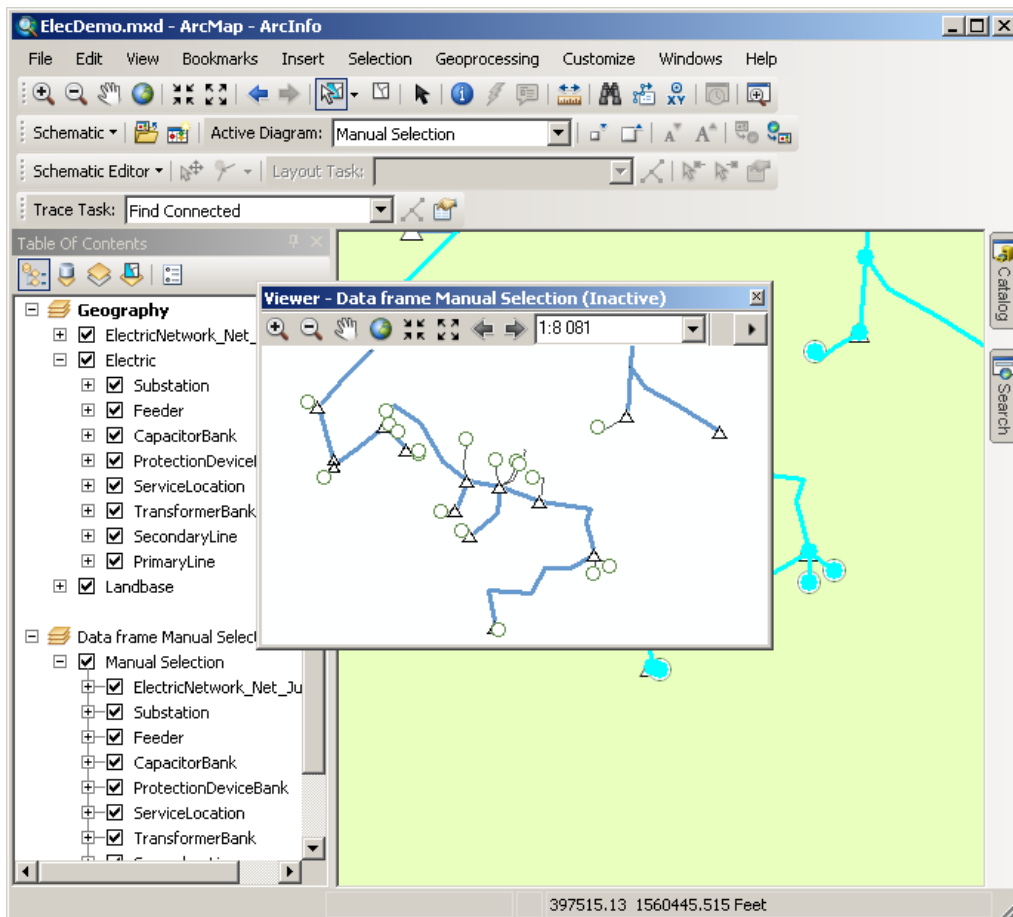
 **Note:** If you choose **Geography** from the list, the diagram will be displayed in the Geography data frame on top of the map.




9. Type `Manual Selection` in the Schematic Diagram Name text box for the diagram to be generated.
10. In the **Input From** area, keep the **Selection Set In Data Frame** option selected and make sure that the Geography data frame containing the selection set you have just created is selected in the drop-down list.



11. Click **OK**.

The diagram generation starts, and the resulting schematic diagram displays. As the Viewer Windows mode is activated, the newly created schematic diagram is displayed in a viewer window, and the active data frame containing the geographic features are preserved. A new data frame related to this diagram has been created in the Table Of Contents but is not active.




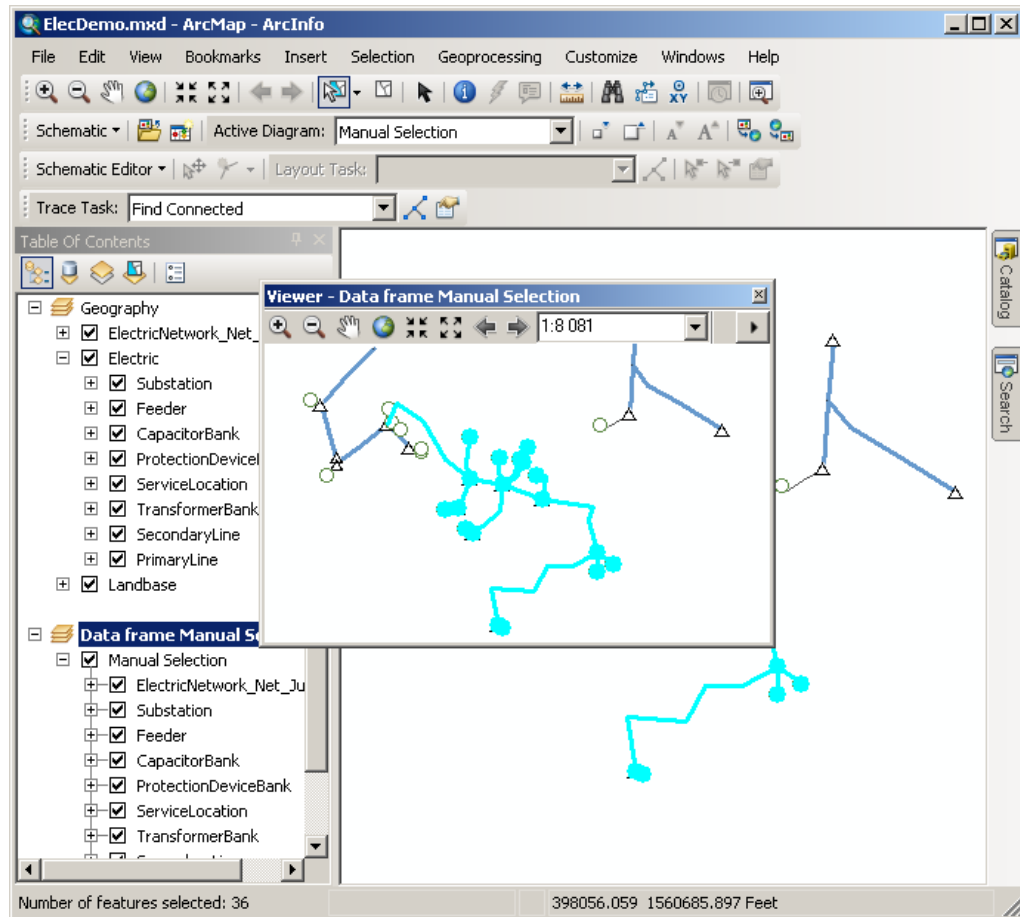
 **Note:** You can adjust the size of the symbols in the diagram using the **Decrease Symbol Sizes**  and **Increase Symbol Sizes**  buttons if needed.

Generating a diagram based on a schematic selection

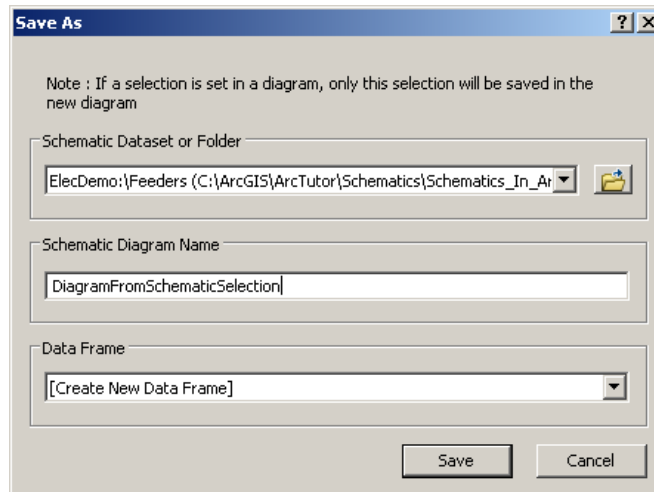
The **Save Diagram As** command can also be used to generate a new diagram based on the current selection set. When no schematic feature is selected in the active diagram, it copies the entire diagram, but when schematic features are selected, only that selection set is saved in the new diagram.

Steps:

1. Activate the `Manual Selection` data frame.
2. Click the **Select Features** tool  and, by drawing a box with the tool, select a few schematic features on the active `Manual Selection` schematic diagram you have just generated.

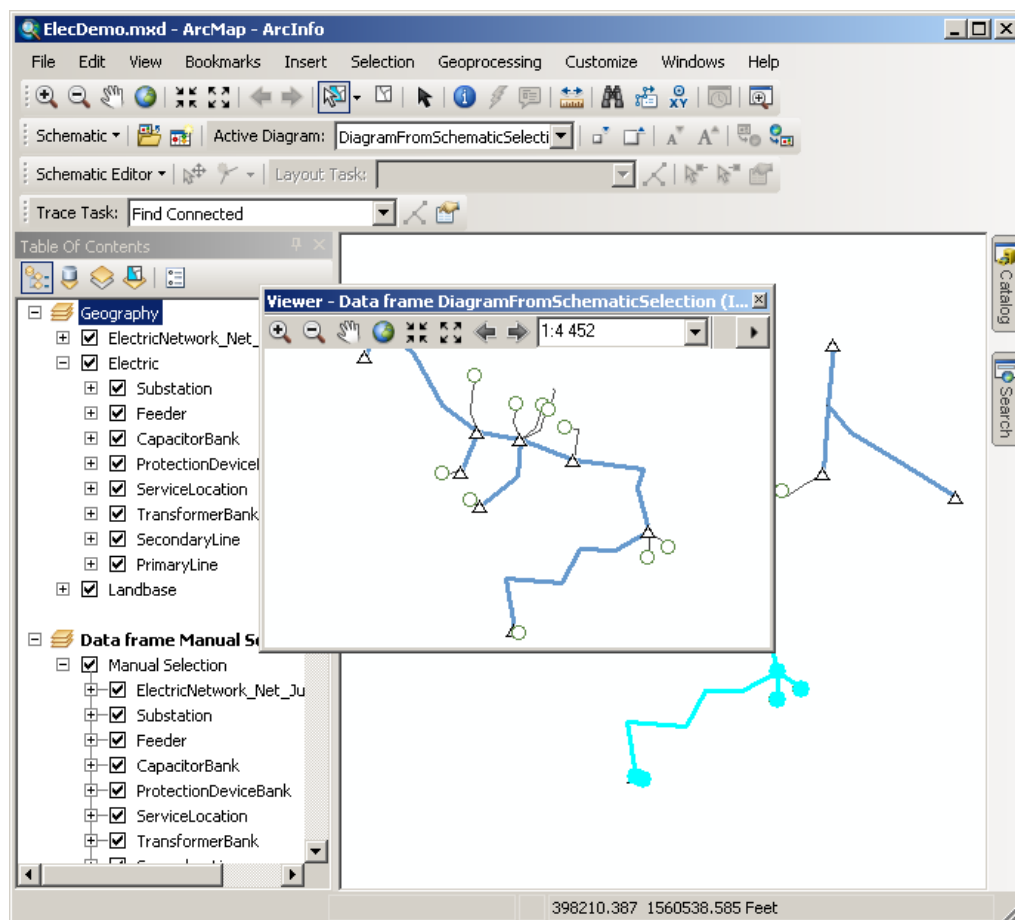


3. Click the **Schematic** drop-down menu on the Schematic toolbar and click **Save Diagram As**.
4. Pick up the ElecDemo:\Feeders (C:\ArcGIS\ArcTutor\Schematics\Schematics\ElecDemo.gdb) location in the **Schematic dataset or Folder** drop-down list.
5. Type DiagramFromSchematicSelection in the **Schematic Diagram Name** text box.
6. Keep the default [Create New Data Frame] option.




7. Click **Save**.

A new data frame is added to the Table Of Contents. As the Viewer Windows mode is activated, the new diagram is displayed in a viewer window.





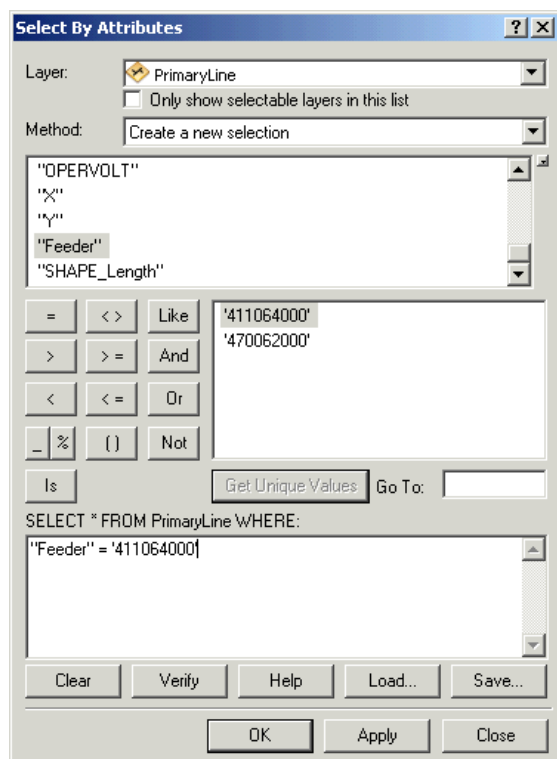
8. Right-click the new `DiagramFromSchematicSelection` diagram data frame in the Table Of Contents and click **Remove**.



9. Remove the `Manual Selection` data frame.
10. Remove the `DiagramFromSchematicSelection` data frame.
11. Click **Selection** on the ArcMap menu and click  **Clear selected features**.
12. Click **Bookmarks** on the ArcMap menu and click **Overview**.

Generating a diagram from a selection by attributes

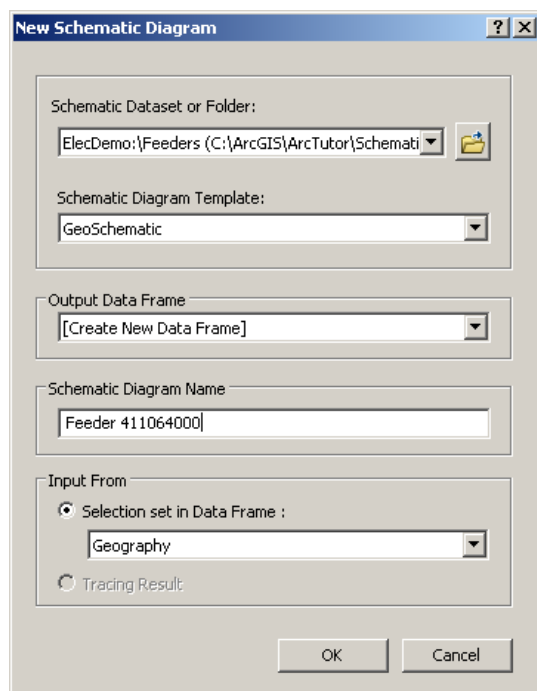
Steps:




1. Click **Selection** on the main menu and click  **Select By Attributes**.
The **Select By Attributes** dialog box opens.
2. Click the **Layer** drop-down arrow and click `PrimaryLine`.
3. Double-click `Feeder` from the fields list.
4. Click the equal sign button .
5. Click **Get Unique Values**.
6. Double-click `'411064000'` from the unique values list.
The **Select By Attributes** dialog box appears with the following query information:

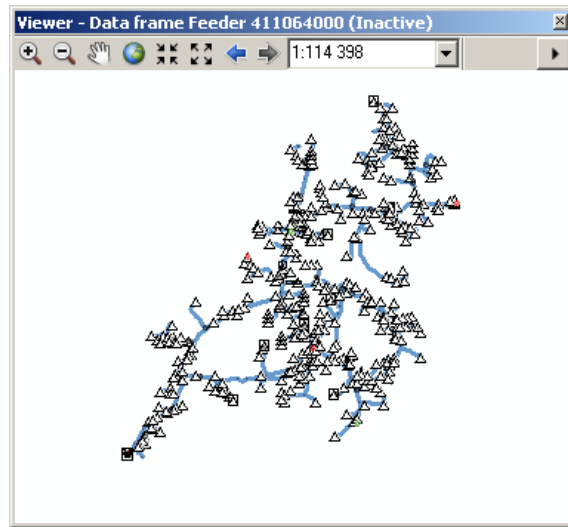


7. Click **Apply** and click **Close**.
8. Click **Selection** on the main menu and click  **Zoom To Selected Features**.
9. Click the **Generate New Schematic Diagram** button .
The **New Schematic Diagram** dialog box opens.

10. Click `ElecDemo:\Feeders` in the **Schematic Dataset or Folder** text box so the generated diagram will be stored in the Feeders schematic folder.
11. Click the **Schematic Diagram Template** drop-down arrow and choose `GeoSchematic` in the list.
12. Keep the default `[Create New Data Frame]` option selected in the **Output Data Frame** drop-down list.
13. Type `Feeder 411064000` in the **Schematic Diagram Name** text box for the diagram to be generated.
14. Make sure the **Selection Set In Data Frame** option is checked and the `Geography` data frame is currently selected in the drop-down list.




15. Click **OK**.
The generated schematic diagram displays in a new data frame. As the Viewer Windows mode is activated, it opens in a viewer window.
16. Resize the diagram viewer window. Use the **Zoom In** tool  for a better view of the diagram if needed.
17. Click the **Decrease Symbol Sizes**  and **Increase Symbol Sizes**  buttons to change the size of the symbols if needed.

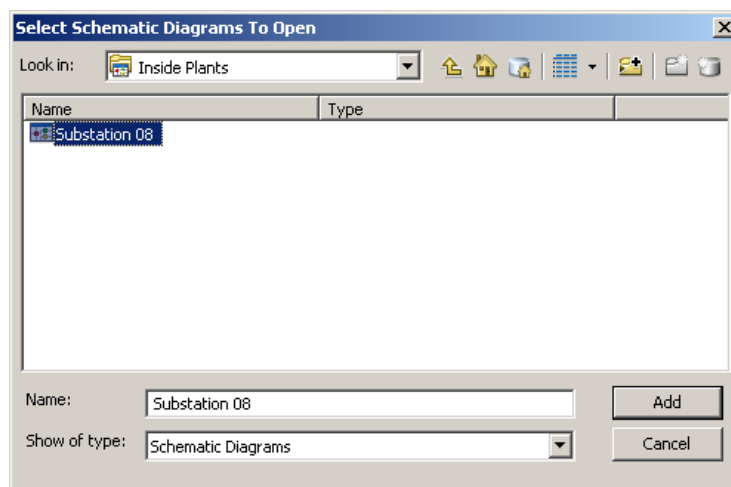


18. Close the `Feeder 411064000` viewer window.

Generating an inside plant diagram

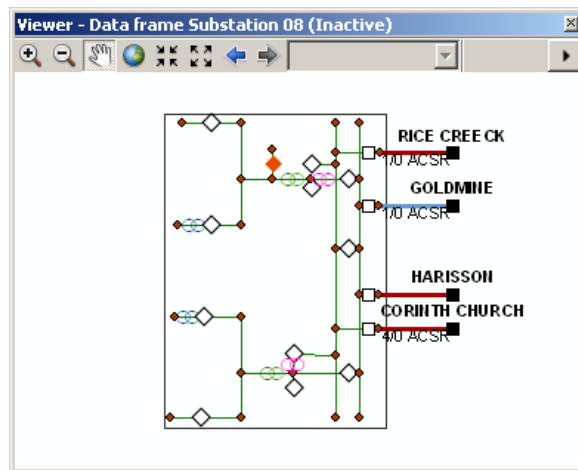
Steps:

1. Click the **Open Schematic Diagrams** command .
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the
`C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo.gdb`
geodatabase.
3. Double-click the `ElecDemo` schematic dataset, then double-click the `Inside Plants` schematic subfolder.
4. Click `Substation 08` in the diagram list.




5. Click **Add**.

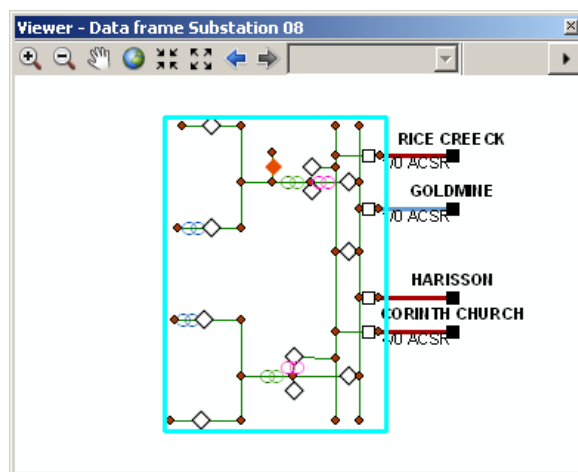
The Substation 08 diagram opens in a viewer window. This diagram details the equipment inside a substation.




The schematic features in this diagram come from a set of object tables that detail inside plant contents. They are also dynamically linked to some GIS data contained in the Geography map, for example, to the Substation in this map. The next steps highlight these relations:

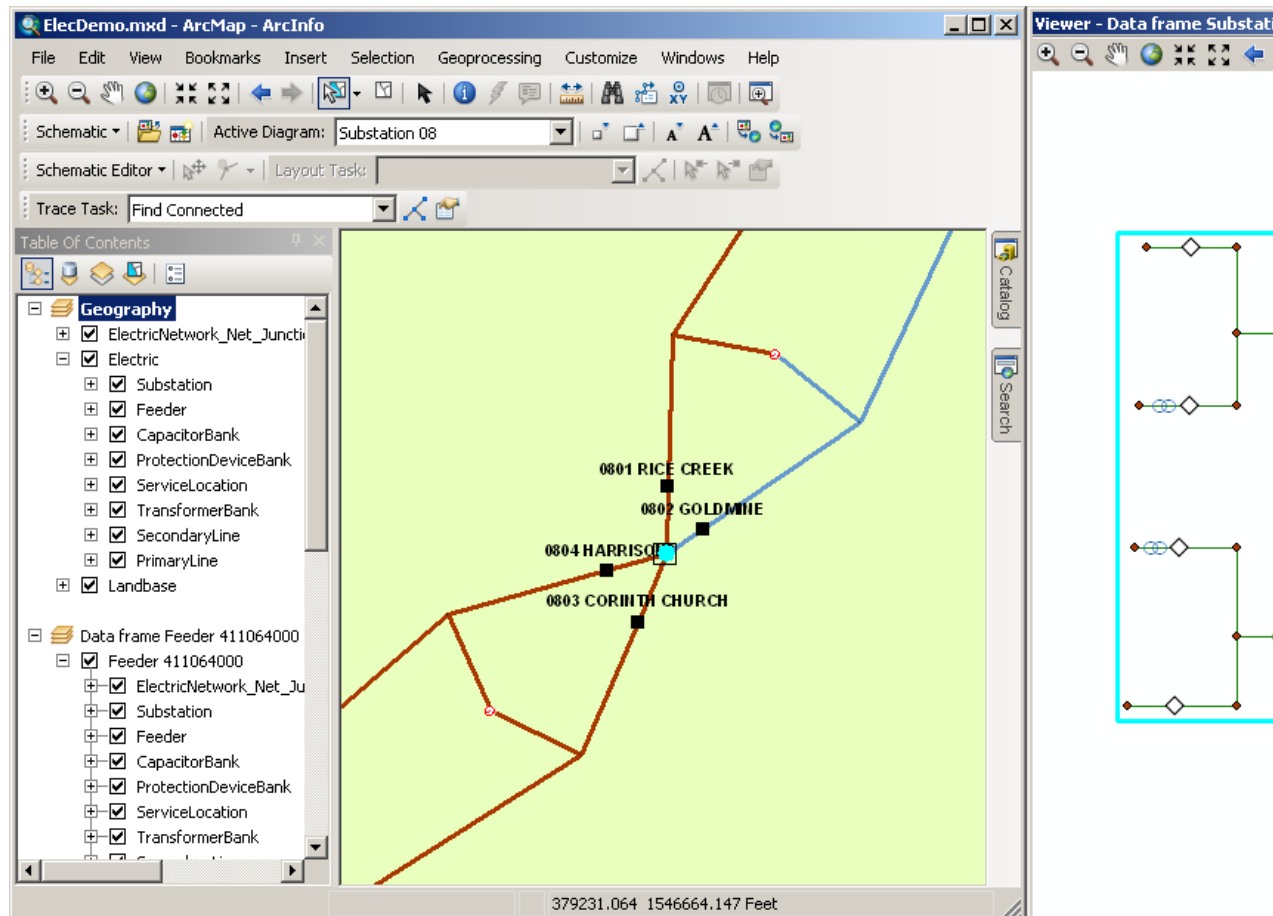
Steps:


1. Click the **Schematic** drop-down menu on the Schematic toolbar and click **Schematic Options**.
2. Click the **Selection** tab, then check the three check boxes on this tab and click **OK**.
3. Activate the `Substation 08` data frame.
4. Click the **Select Features** tool  and click the polygon that displays around all the Substation 08 equipment.

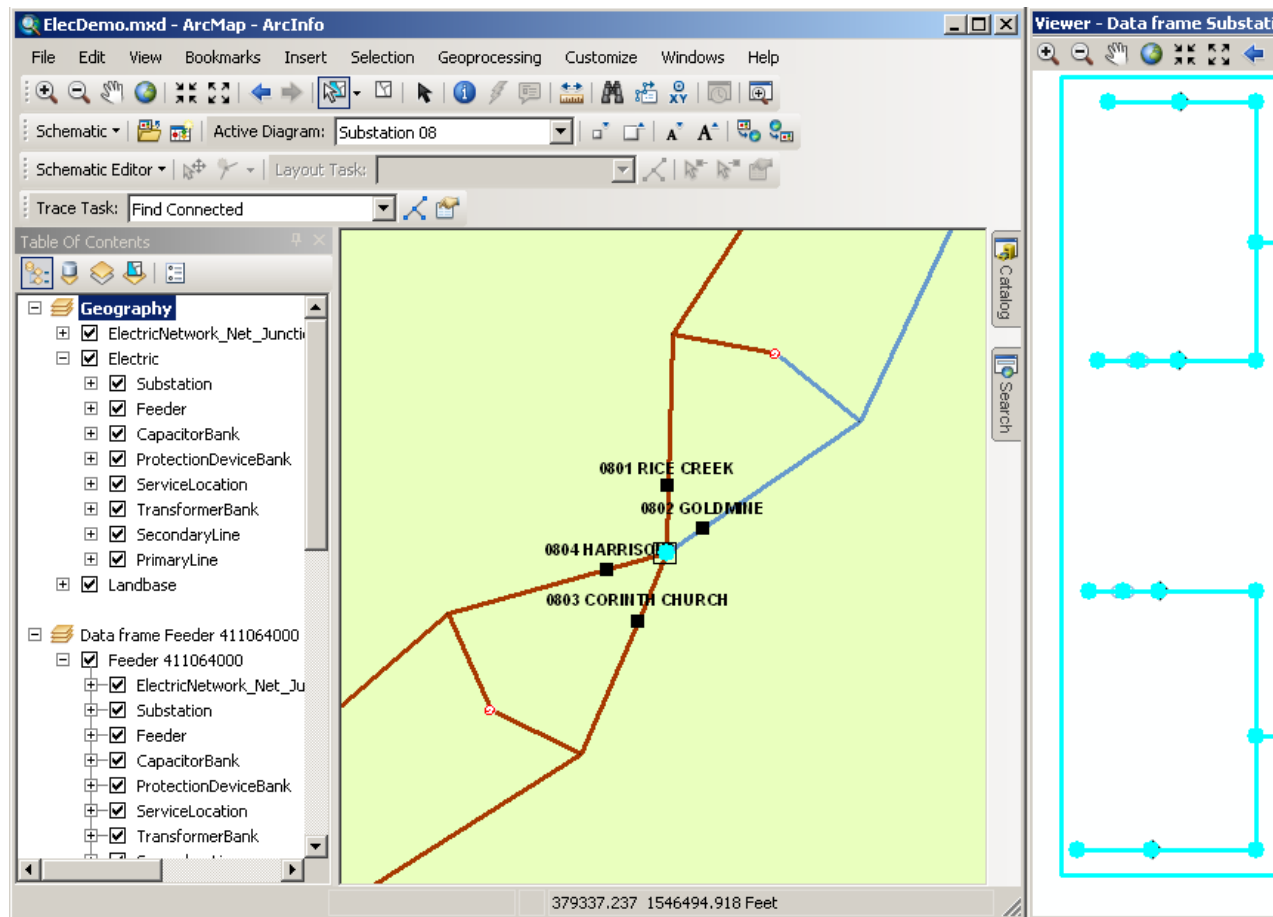


5. Activate the `Geography` data frame.
6. Click  **Propagate Schematic Selection To Map**.
The related Substation is selected in the Geography data frame.

7. Click **Bookmarks** on the main menu and click `Substation 08` to locate the selected Substation feature.
8. Arrange the Substation viewer window to get a clear view of the selected features in both the Geography and Substation 08 views.



9. Click  **Propagate Map Selection To Schematic**.
All the schematic features inside the polygon are automatically selected in the Substation 08 diagram.



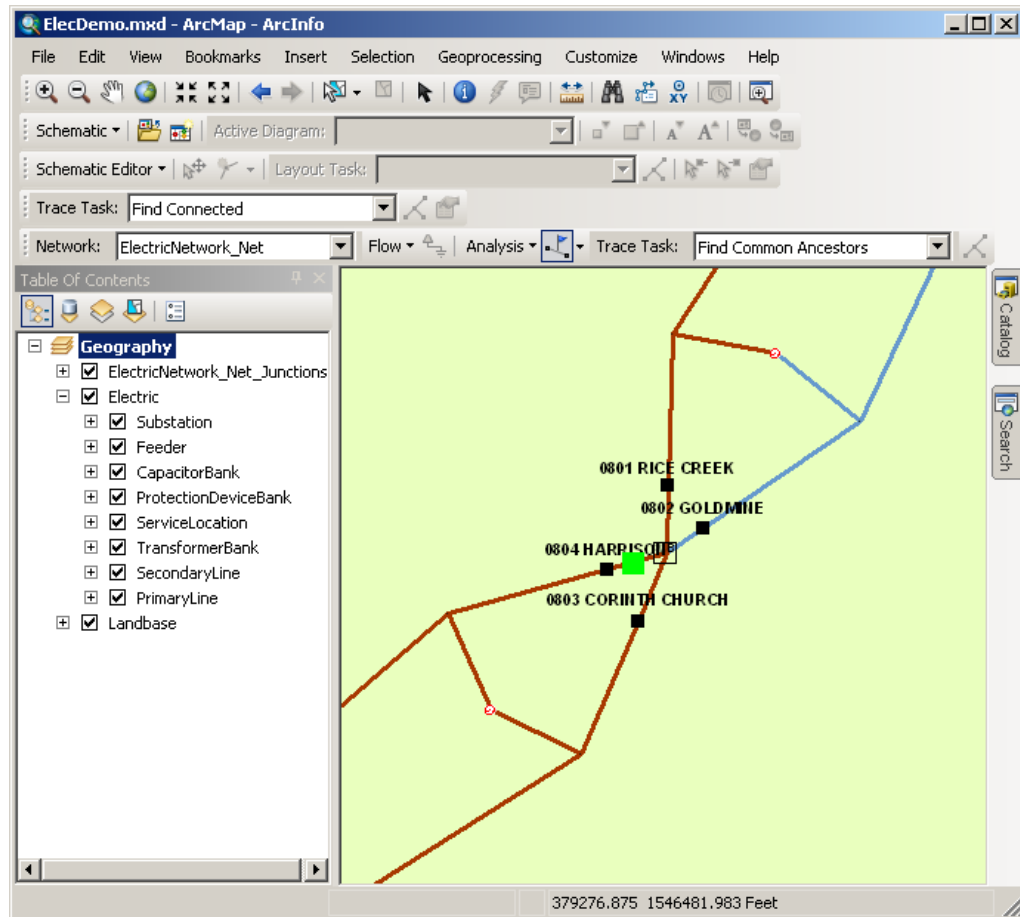
Note: Note that the Substation schematic feature in the Feeder 411064000 diagram has been also automatically selected.

10. Clear the selected features on the map.
11. Remove the Feeder 411064000 data frame.
12. Remove the Substation 08 data frame.

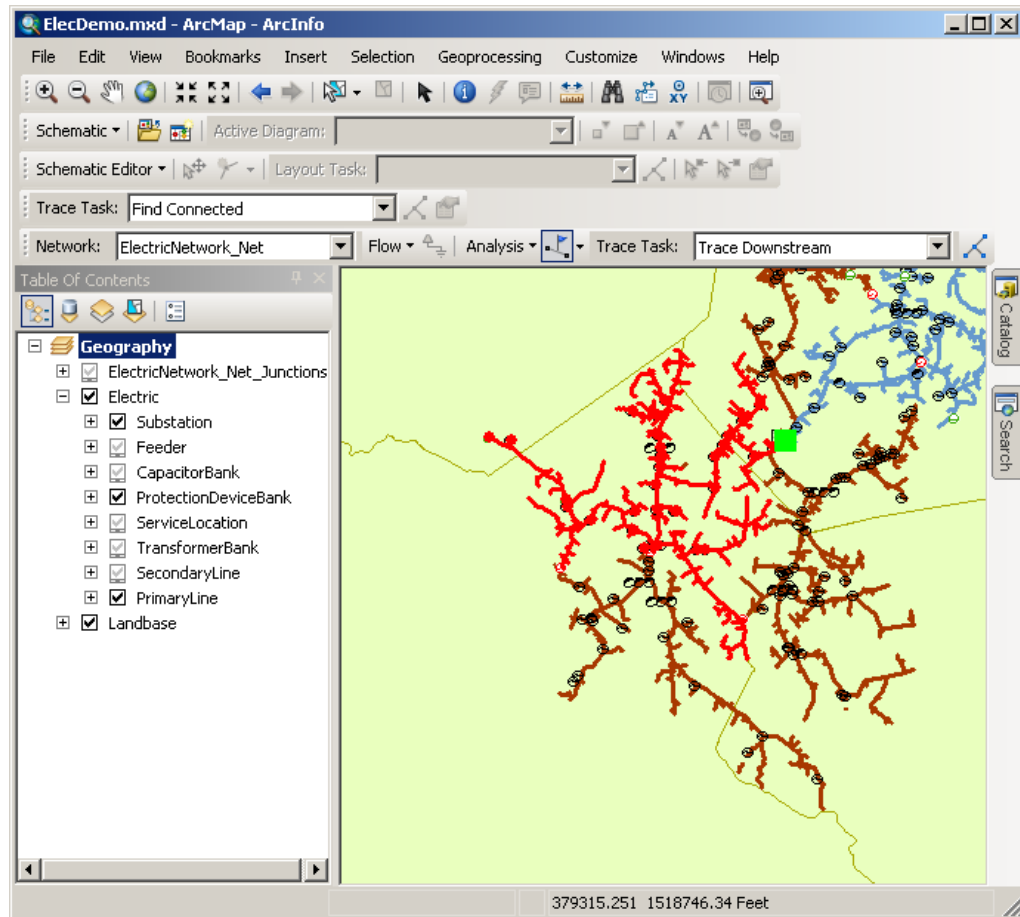
Generating a diagram from a trace


Steps:

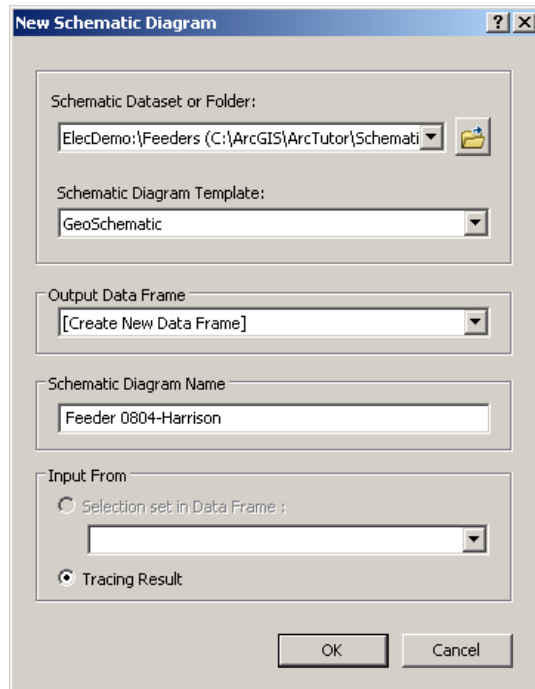
1. Load the **Utility Network Analyst** toolbar (if it is not already displayed).
2. Click the arrow button next to the Add Junction Flag tool and click the **Add Edge Flag** tool.
3. Click the primary line between Feeder 0804 Harrison and the substation to add an edge flag.



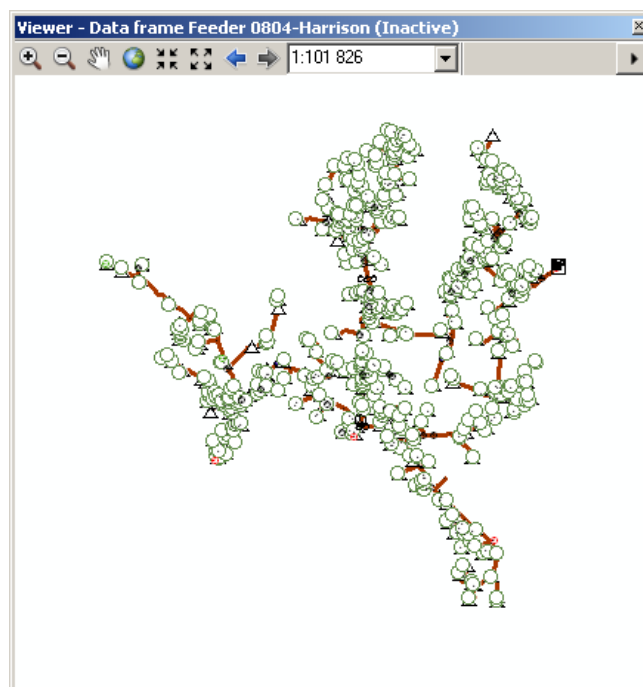
4. Click the **Trace Task** drop-down arrow on the Utility Network Analyst toolbar and click **Trace Downstream**, then click **Solve**.
5. Click **Bookmarks** on the main menu and click *Feeder 0804-Harrison*.
The tracing result appears as follows:



6. Click the **Generate New Schematic Diagram** button .
The **New Schematic Diagram** dialog box opens.
7. Click ElecDemo:\Feeders in the **Schematic Dataset or Folder** text box.
8. Click the **Schematic Diagram Template** drop-down arrow and choose **GeoSchematic** from the list.
9. Keep the default [Create New Data Frame] option selected in the **Output Data Frame** drop-down list.
10. Type **Feeder 0804-Harrison** in the **Schematic Diagram Name** text box for the diagram to be generated.
11. Make sure the **Tracing Result** option is checked.



12. Click **OK**.
The new diagram generation starts. It displays in a viewer window.
13. Click the **Analysis** drop-down menu in the Utility Network Analysis toolbar and click **Clear Results**, then click **Clear Flags**.
14. Resize the viewer window related to the newly created Feeder 0804-Harrison schematic diagram.



15. Remove the `Feeder 0804-Harrison` data frame.
16. Click **File** and click **Exit**.
17. Click **No** when the following message appears: Save changes to ElecDemo.mxd?

Exercise 3: Editing and layout of schematic diagrams

In this exercise, you will learn about managing the editing session on schematic diagrams, refining their content, and laying them out. The majority of the tools that are going to be used in this exercise are grouped on the Schematic Editor toolbar.

Prerequisite:

During this exercise, you will have to work on some schematic diagrams that were generated in exercise 2.

Steps:

1. Start ArcMap.
2. Open the `ElecDemo.mxd` file stored in `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap`.

Complexity:
Beginner


Data Requirement:
ArcGIS Tutorial Data Setup

Data Path:
`C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap`

Goal:
Learning about managing the editing sessions on schematic diagrams, refining their contents, and laying them out


Adding new Schematics commands on toolbars


There are some Schematics commands and tools that are not available in the standard Schematics toolbars by default, such as the Restore Initial Layout and the Open Diagram by Diagram Template commands.

- The Open Diagram by Diagram Template allows you to browse and select the schematic diagram you want to open, diagram template per diagram template, from any specified schematic dataset (or schematic folder).
- The Restore Initial Layout command  deletes the saved geometries for all schematic feature nodes and links contained in the active schematic diagram. After the command execution, the active schematic diagram's content is restored to its initial layout.

Since you are going to use these particular commands in the next sections, the following steps explain how to add the commands on the toolbars:

Steps:

1. Click **Customize** and click **Customize Mode**.
The **Customize** dialog box opens.
2. Click the **Commands** tab.
3. Click **Schematics** in the **Categories** list.
4. Click **Open Diagram by Diagram Template** in the **Commands** list and drag it onto the Schematic toolbar.
5. Click **Restore Initial Layout**  in the **Commands** list and drag it onto the Schematic Editor toolbar.

Those commands can be dragged and dropped onto any toolbar, but since the Restore Initial Layout requires an edit session to be opened on the schematic diagram it impacts, its best location is on the Schematic Editor toolbar. Place the Open Diagram by Diagram Template on the same toolbar as the Open Schematic Diagrams command , since it is an alternative method of opening schematic diagrams.


6. Click **Close**.

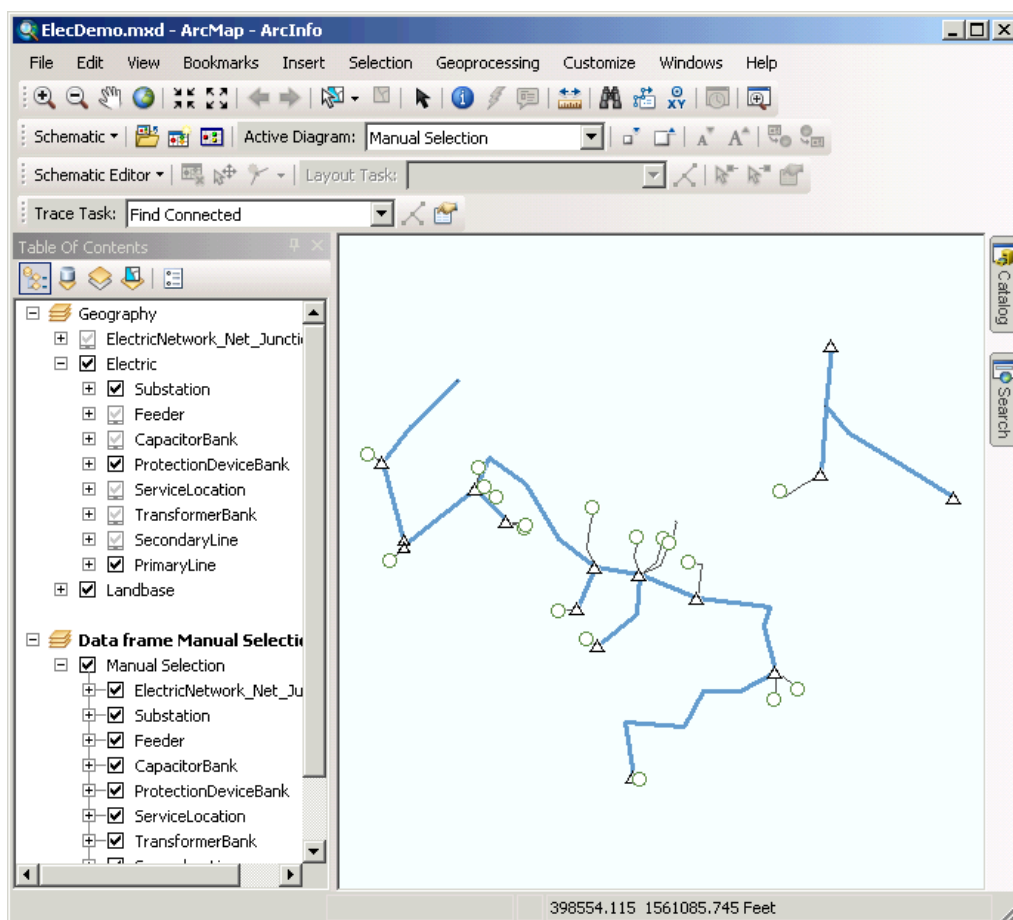
Starting an editing session on a schematic diagram


Before laying out a schematic diagram or refining its content, an edit session must be started on this diagram. Editing sessions are managed schematic diagram per schematic diagram; that is, when starting an edit session while a schematic diagram is active, the editing session only starts for this active diagram.

Several schematic diagrams can be edited at the same time, but editing operations only impact the active schematic diagram. The following steps explain how to start an edit session on a schematic diagram.

Steps:

1. Click the **Open Schematic Diagrams** button  on the Schematic toolbar.
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the
C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo.gdb
geodatabase, double-click the ElecDemo schematic dataset, then double-click the Feeders schematic folder.
3. Click Manual Selection schematic diagram and click **Add**.
The selected diagram appears in a new data frame.




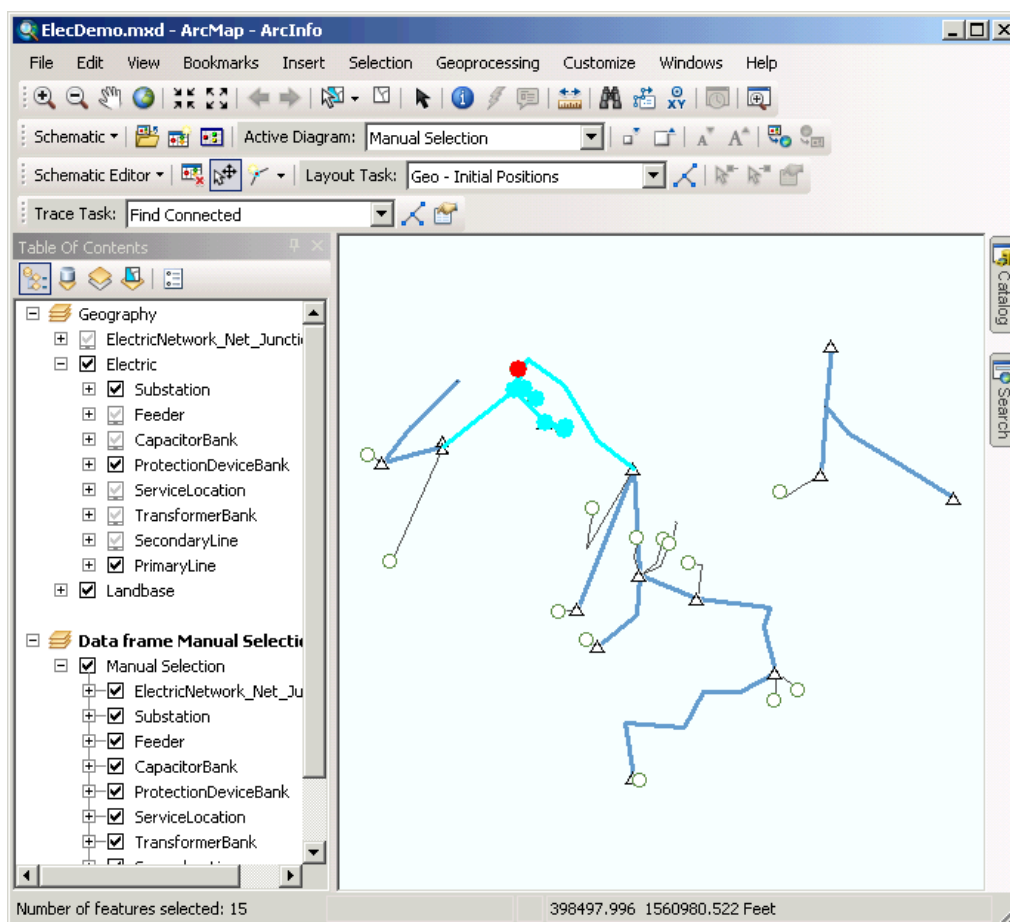
4. Click the **Schematic Editor** drop-down menu on the Schematic Editor toolbar.
5. Click  **Start Editing Diagram**.


The editing session starts on the active schematic diagram. Tools and commands available from the Schematic Editor toolbar are automatically enabled and stay enabled until this diagram is the active one. The diagram status is locked until the editing session is stopped.

Moving schematic features

Steps:

1. Zoom in on the diagram to a set of schematic features. Click the **Edit/Move Schematic Features** button  and select schematic features by drawing a box with the tool.
2. Move the selected set of schematic features by dragging and dropping it at another location.




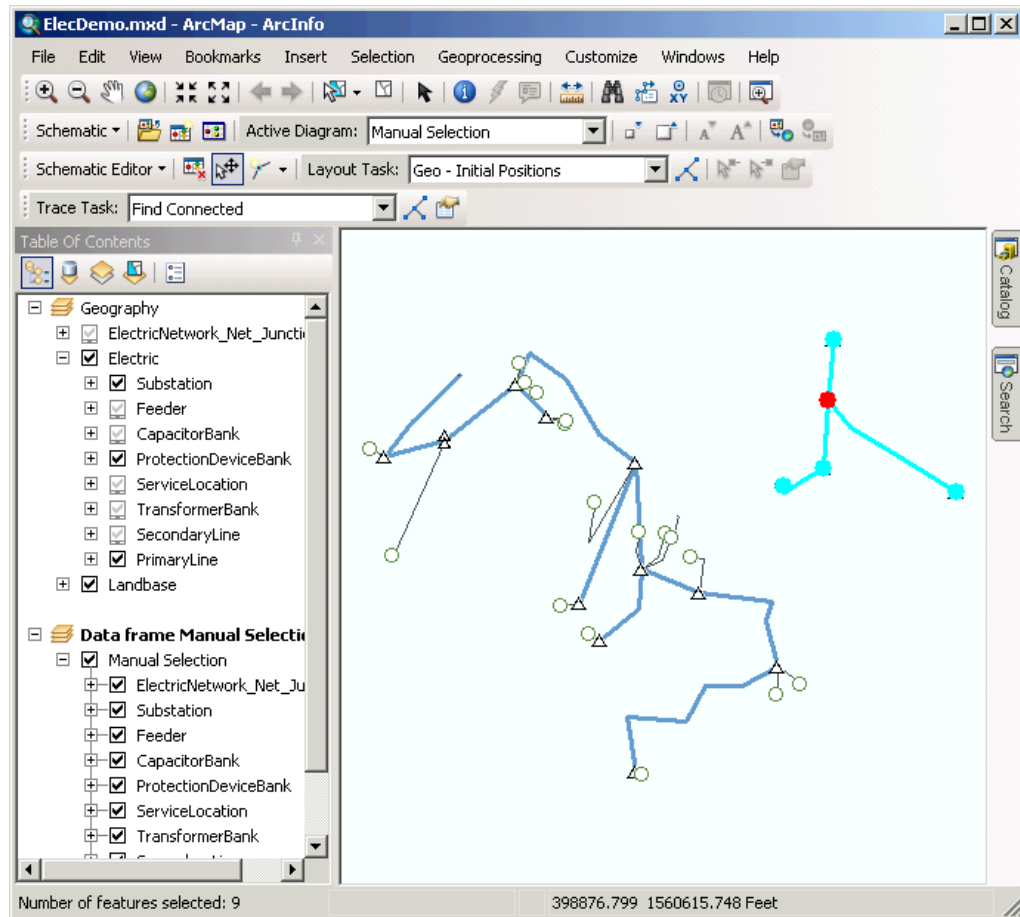
Any editing operation is reversible until the diagram edits are saved. Clicking the **Undo** tool  on the Standard toolbar reverses the last editing action.


3. Click the background of the diagram to cancel the feature selections.

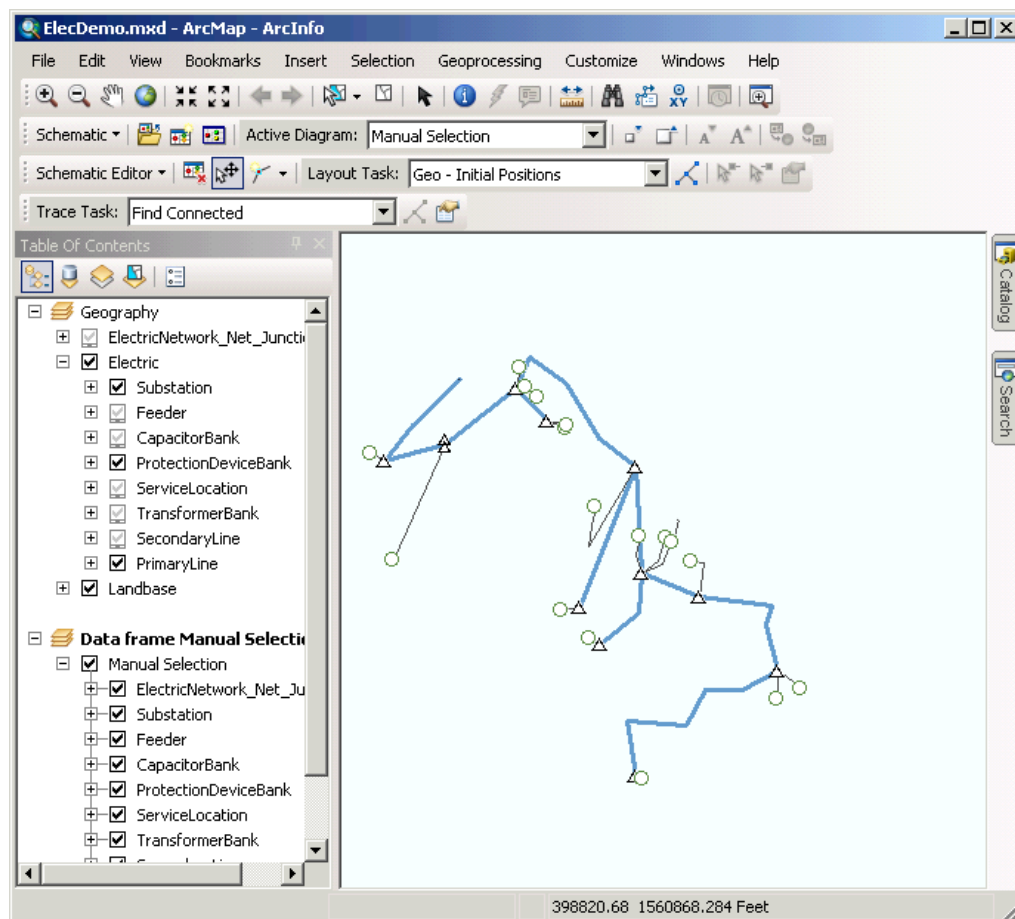
Removing schematic features

Steps:

1. Click the **Edit/Move Schematic Features** button  and select the set of schematic features located at the top right corner on the diagram by drawing a box with the tool.





2. Click the **Schematic Editor** drop-down menu on the Schematic Editor toolbar and click the  **Remove Schematic Features** menu item.
The selected schematic features are removed.



Saving the diagram edits and stopping the editing session

To save edits operated on an active schematic diagram, click the Save Diagram Edits item on the Schematic Editor drop-down menu. When clicking Save Diagram Edits, all the edits operated on the active schematic diagram since the edit session was opened or last saved are taken into account and saved in the schematic database.

Steps:

1. Click the **Schematic Editor** drop-down menu on the Schematic Editor toolbar.
2. Click  **Save Diagram Edits**.
All the editing operations that have impacted the active schematic diagram content since it was opened, such as the new geometries and removed features, are now saved.
3. Click the **Schematic Editor** drop-down menu on the Schematic Editor toolbar and click  **Stop Editing Diagram**.
Even if schematic features that are removed or reduced in schematic diagrams are not displayed any more in the schematic diagram, they are not removed from the schematic tables during the diagram saving operation. They are flagged as undisplayed in the schematic database. You can restore these removed or reduced schematic features when updating the diagram from initial features with the **Persist manually removed, reduced or reconnected**

features option on the **Update Diagram** dialog box. This option will be detailed in the Updating Schematic Diagrams exercise.

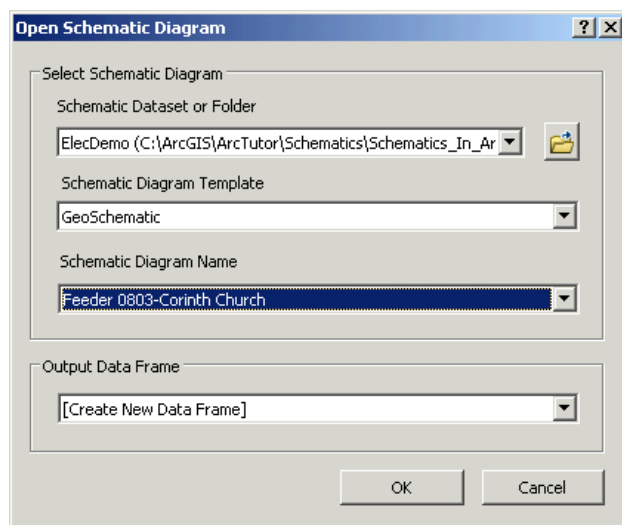
4. Remove the `Manual Selection` data frame from the Table Of Contents.

Rotating a tree

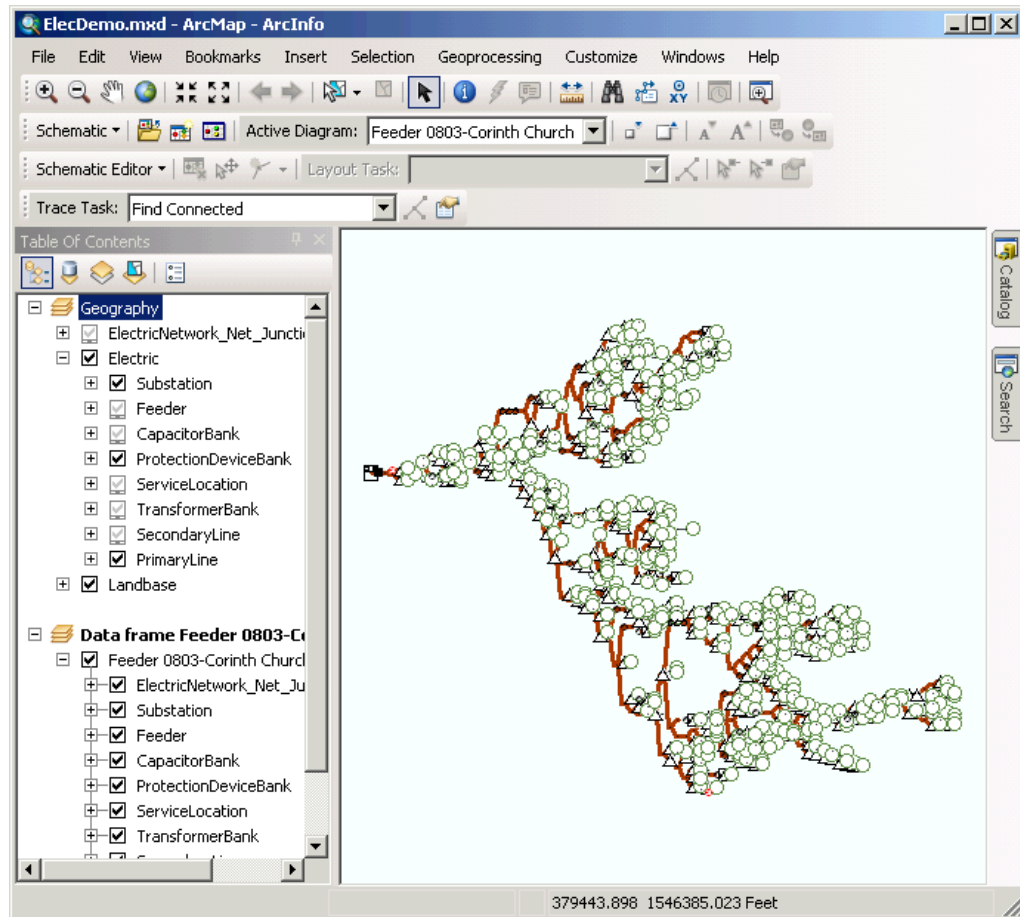
The Rotate Tree command allows you to rotate the tree associated with any schematic feature node currently selected in a schematic diagram. The value for the rotation angle, as well as the other parameters applied by the algorithm (for example, the rotation of the tree nodes), is specified on the Rotate Tree tab of the Schematic Editing Properties dialog box. This command is enabled when an edit session is opened on the active schematic diagram and there is a single node selected in the active schematic diagram. The following steps illustrate this command:



Steps:

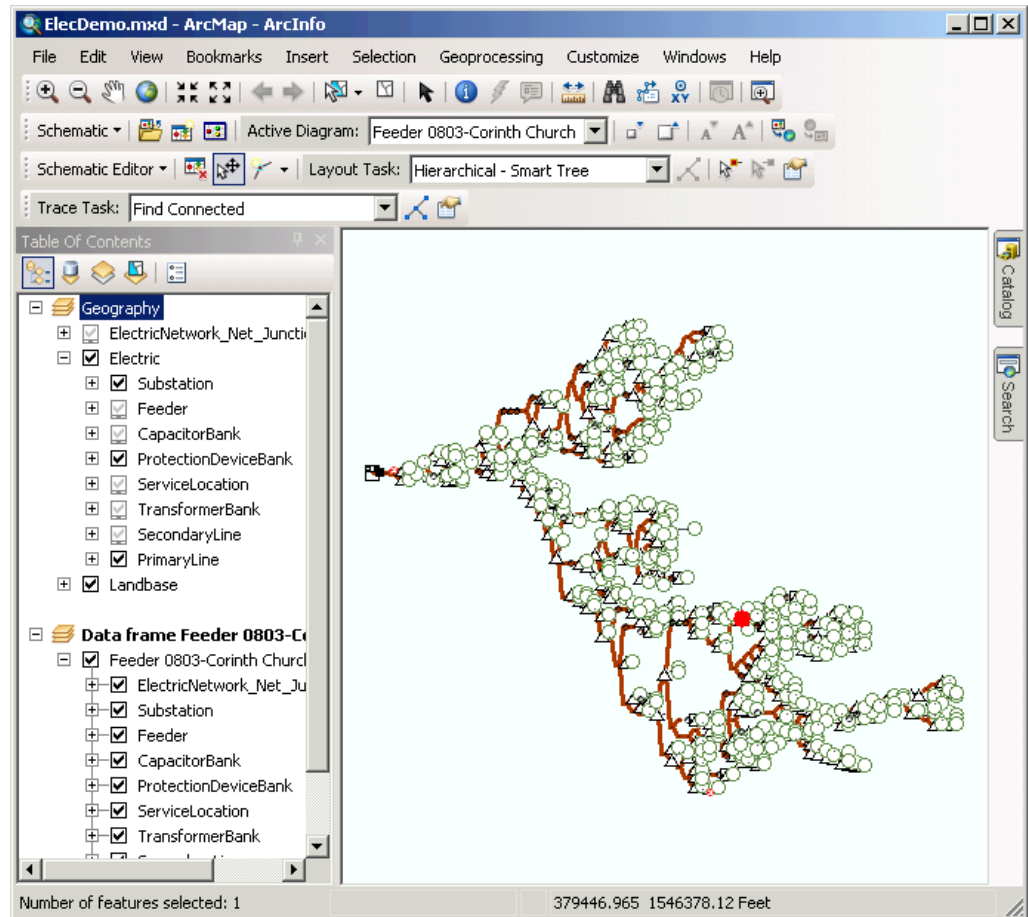
1. Click the **Open Diagram by Diagram Template** button you added to the Schematic toolbar at the beginning of the exercise.
The **Open Schematic Diagram** dialog box appears.
2. Click the **Schematic Diagram Template** drop-down list and click `GeoSchematic`.
3. Click `Feeder 0803-Corinth Church` in the **Schematic Diagram Name** drop-down list.



4. Click **OK**.
The diagram appears in a new data frame.



5. Click **Schematic Editor** and the **Start Editing Diagram** menu  on the Schematic Editor toolbar.
6. You must now select the schematic feature node around which the Rotate Tree command is going to operate. This selection is going to be operated using the Select By Attributes ArcGIS standard command on the schematic diagram content.
 - a. Click **Selection** on the main menu and click  **Select By Attributes**. The **Select By Attributes** dialog box opens.
 - b. Click the **Layer** drop-down list and click `TransformerBank`.
 - c. Double-click `VOID` in the **Fields** list.
 - d. Click the equal sign button `=`.
 - e. Click **Get Unique Values**.
 - f. Double-click `950` in the unique values list.

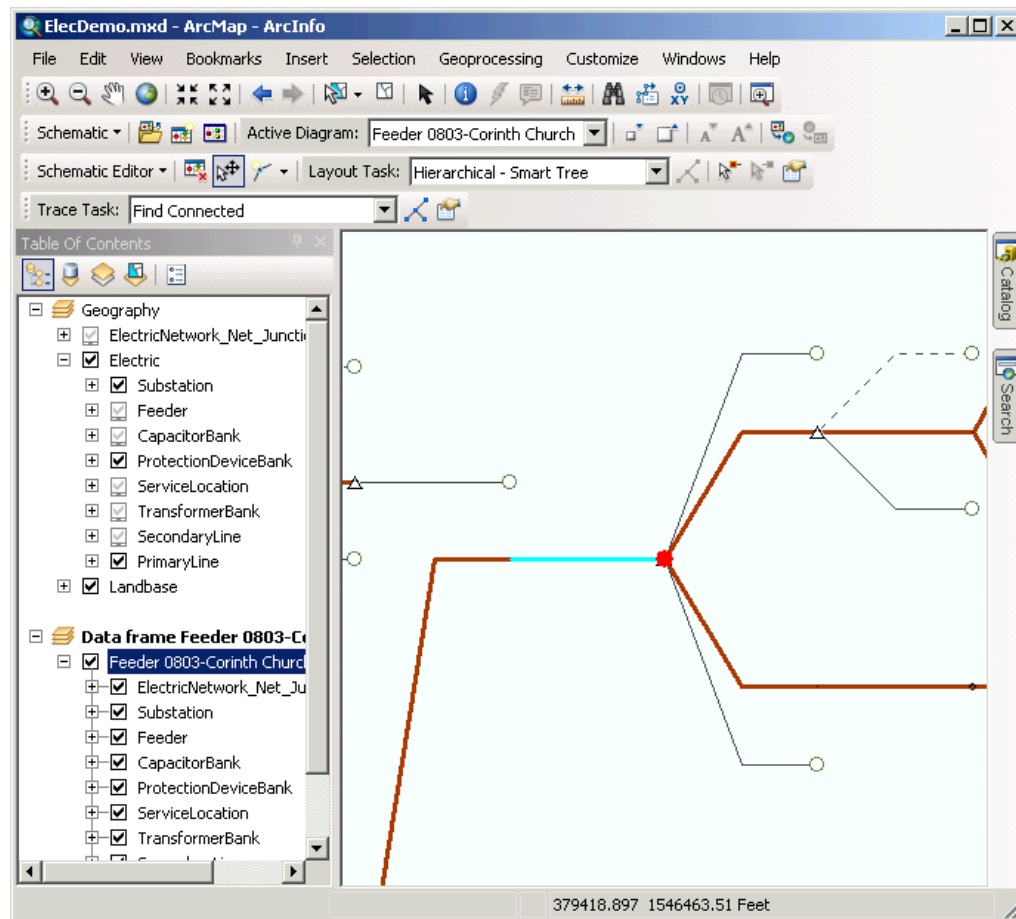


g. Click **Apply** and click **Close**.

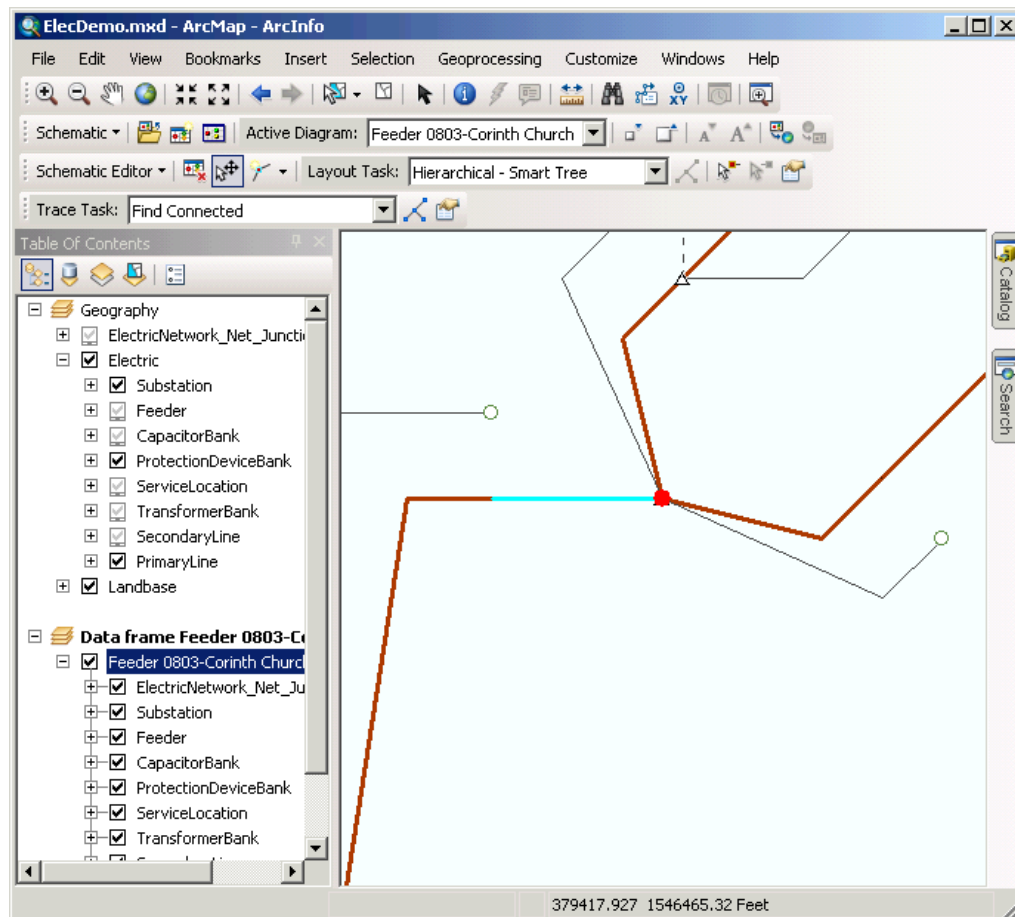
The TransformerBank schematic feature node whose UOID is 950 is now selected in the schematic diagram.


7. Right-click the **Feeder 0803-Corinth Church** schematic layer in the Table Of Contents, point to the **Schematic Selection** menu item, then click **Zoom To Selected Schematic Features**.
8. Click the **Select Features** tool , hold down the SHIFT key, then click the PrimaryLine located at the left of the TransformerBank to select it.



The newly selected PrimaryLine will be interpreted as a barrier and prevents the Rotate Tree command from being executed beyond it. After this step, you should be in the following situation:



9. Click the **Schematic Editor** drop-down arrow and click **Rotate Tree**.



 **Note:** The default rotation angle is 45 degrees. You can set the rotation angle by clicking Editing Properties from the **Schematic Editor** drop-down arrow. Then, click the **Rotate Tree** tab and type a number in the **Angle (degrees)** text box.


10. Click the **Undo** tool  to reverse the action.
11. Click the background of the diagram to cancel the feature selections.
12. Click **Full Extent**  on the Tools ArcMap toolbar.

Using the alignment tools

The Align Nodes tools allow you to align horizontally, vertically, or by an angle in a selected set of schematic feature nodes by moving them along the imaginary axis defined by a reference point that fixes the axis origin. The following steps explain how these alignment tools work:

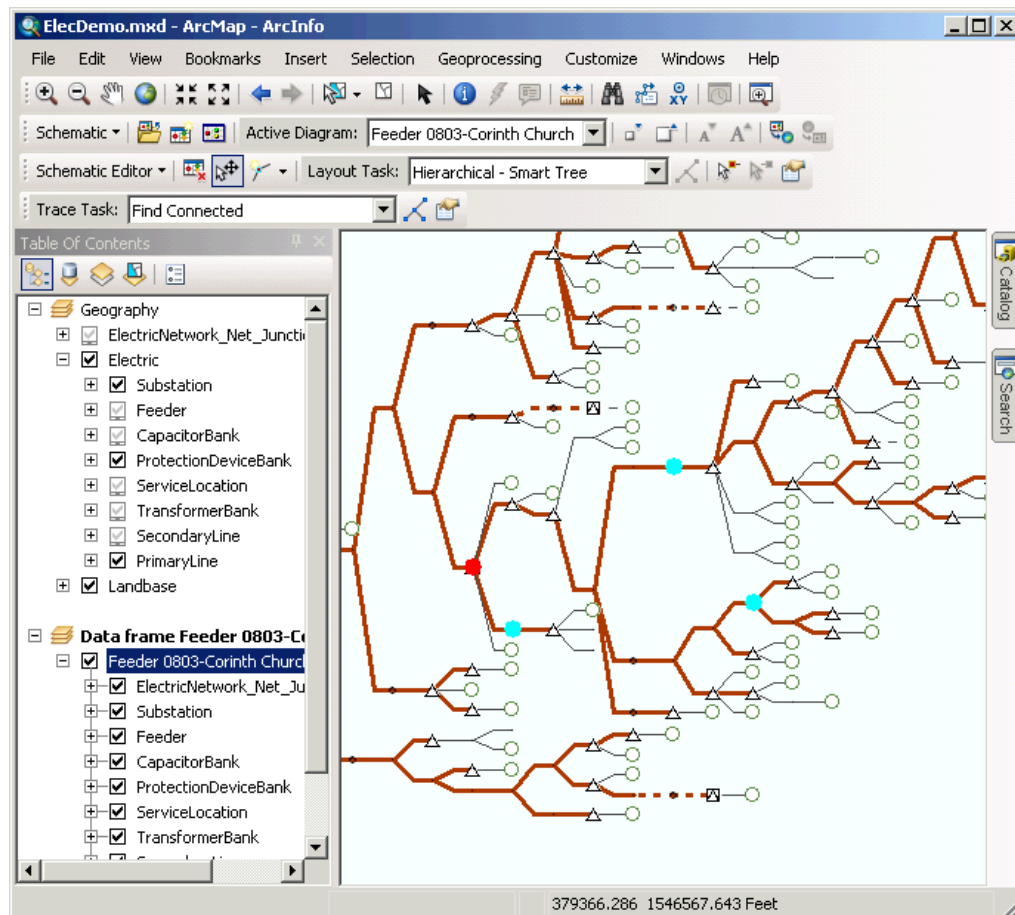
Steps:

1. Zoom in on a part of the schematic diagram.

- Click the **Edit/Move Schematic Features** button  and click a node to be used as the origin node.

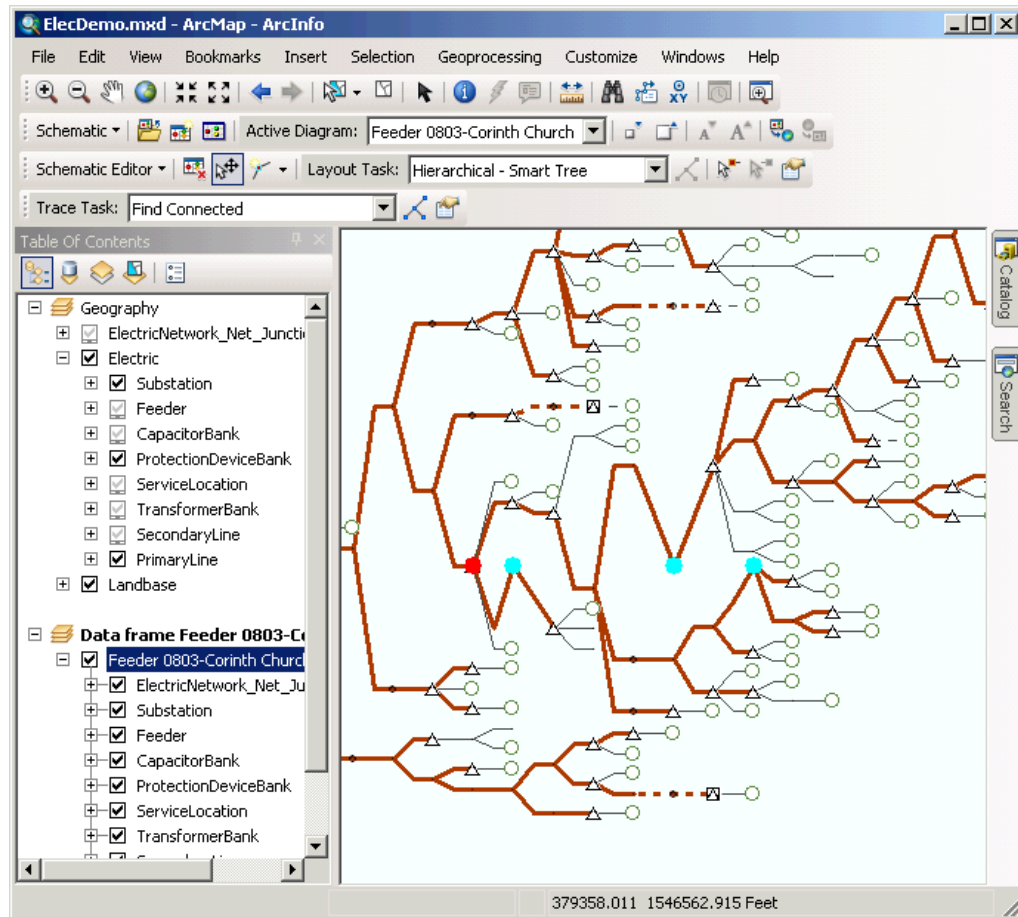
This first selected node, displayed in red, is considered the reference node for the alignment operations.


- Hold down the SHIFT key and click two or three other schematic feature nodes currently located on different branches and levels of the hierarchical tree.

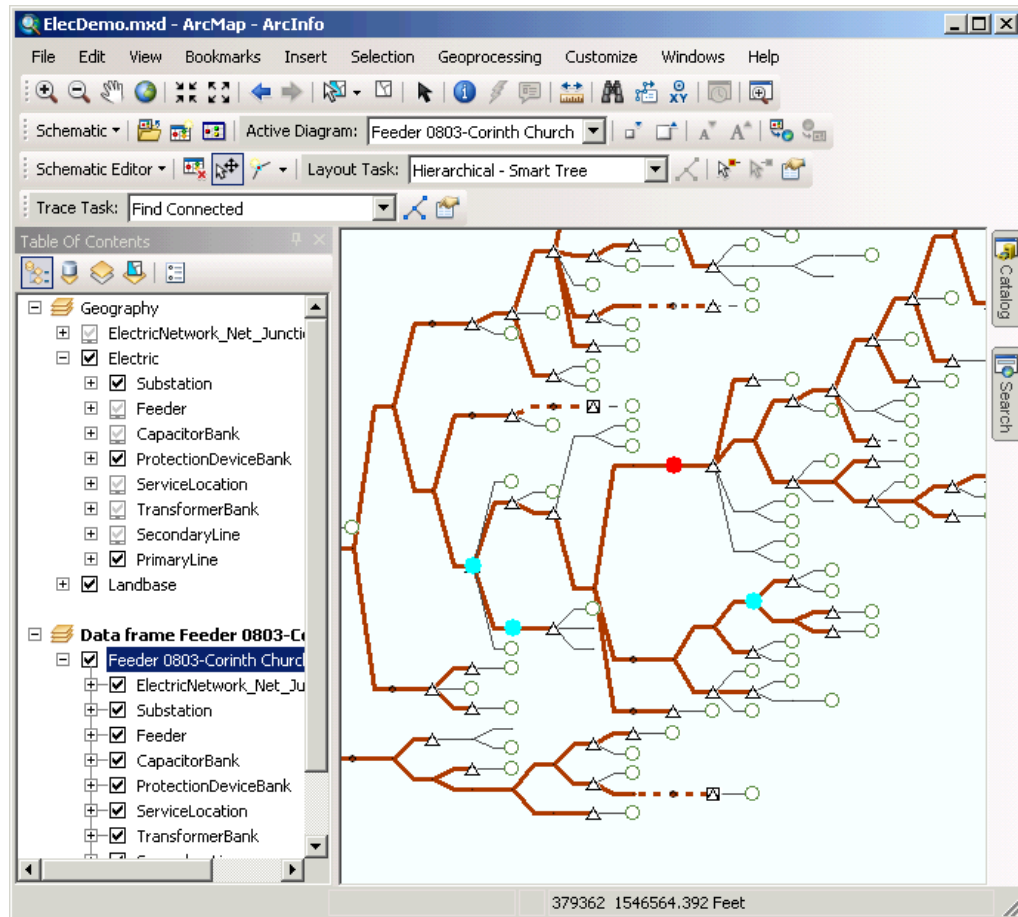


- Click the **Schematic Editor** drop-down arrow, point to **Align Nodes**, then click **Align Vertical Center**.

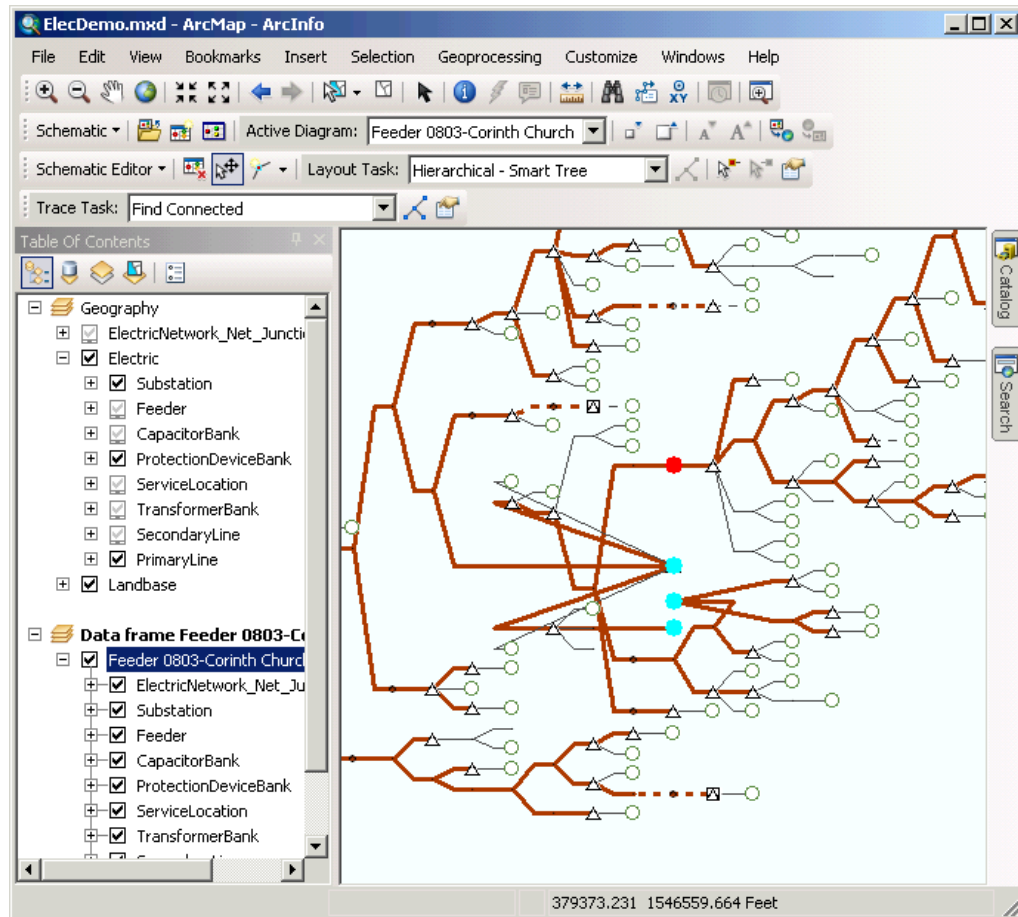
The selected schematic feature nodes move vertically to align with the reference node.




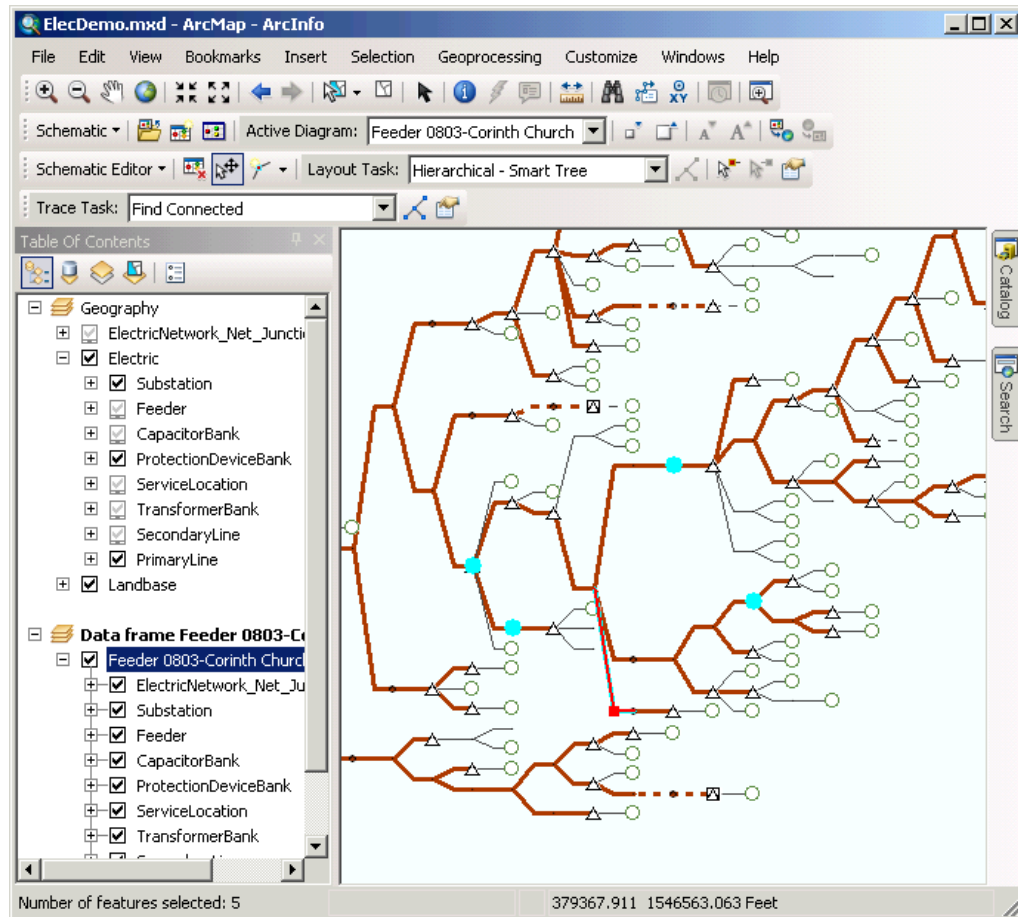
5. Click the **Undo** command  to reverse the action.
6. Keep the currently selected set of schematic features, but change the reference node by holding the CTRL key and clicking one of the selected schematic feature nodes, different from the reference node.
This newly clicked feature displays in red.



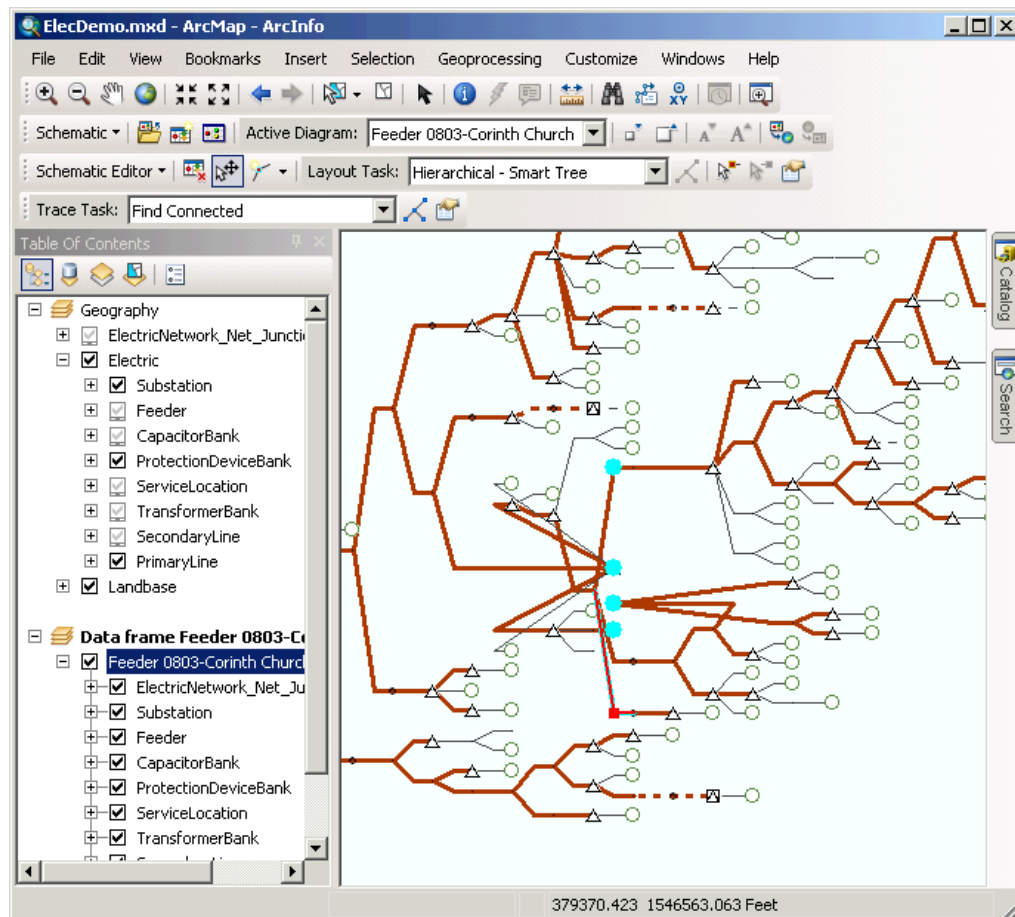
7. Click the **Schematic Editor** drop-down arrow, point to **Align Nodes**, then click **Align Horizontal Center**.
The selected schematic feature nodes move horizontally to align with the reference node.



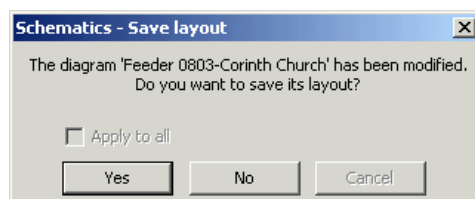
8. Click the **Undo** command  to reverse the action.
9. Keep the set of selected schematic feature nodes and hold the SHIFT key then click a schematic feature link.
10. Hold down CTRL key and click the same schematic feature link again.
The vertex highlighted in red on this link is now considered the reference point.



11. Click the **Schematic Editor** drop-down arrow, point to **Align Nodes**, then click **Align Horizontal Center**.
The selected schematic feature nodes move horizontally to align with the reference vertex.



12. Remove the diagram data frame.
13. Click **No** when the following message appears:



Separate overlapping nodes


The Geo - Spatial Dispatch layout algorithm separates schematic feature nodes in their current positions that are visually close to overlapping in schematic diagrams. This algorithm layout moves the schematic feature nodes independently of their degree, that is, independently of the numbers of links that connect the nodes and independently of the links to which they are connected. The Spatial Dispatch algorithm mainly works with two parameters:

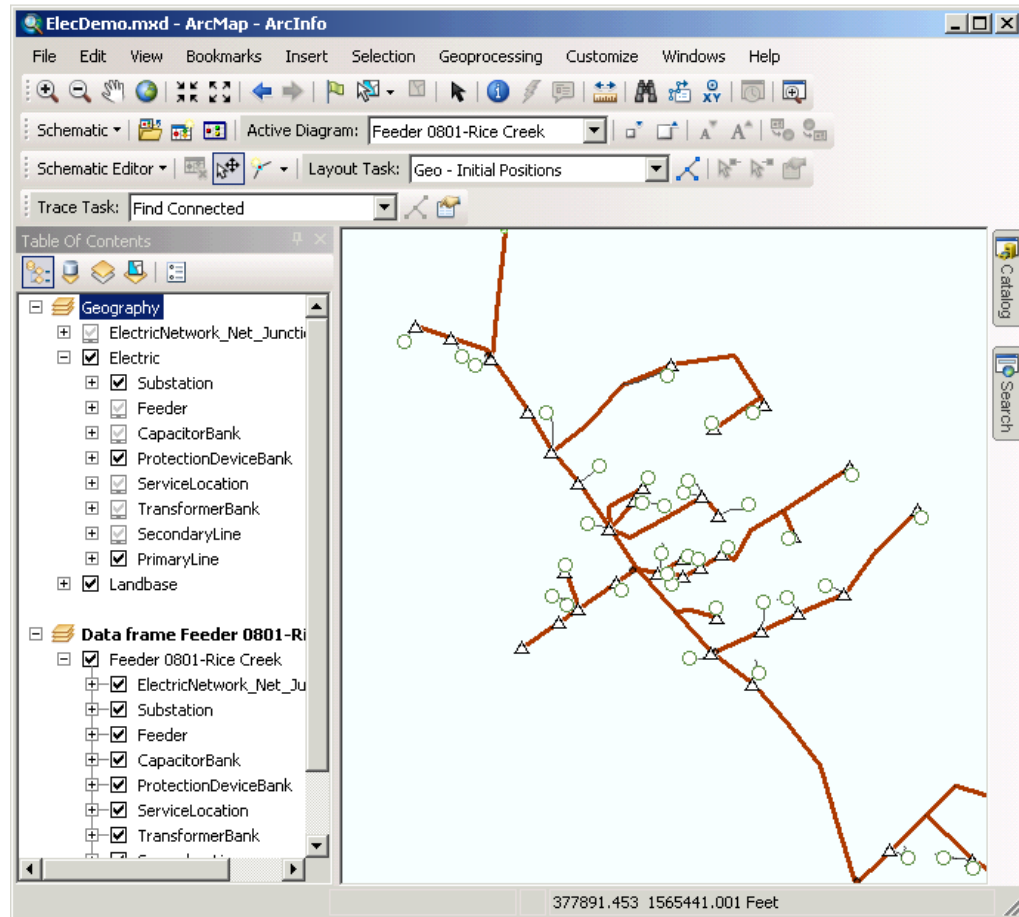
- The Iterations number, which determines the number of Spatial Dispatch algorithm iterations that will be executed before the final result is shown.


- The Maximum shift distance, which is used to quickly increase the schematic node displacement for nodes that are very close. The greater this factor is, the more rapidly and strongly the schematic nodes that are close to overlapping separate.

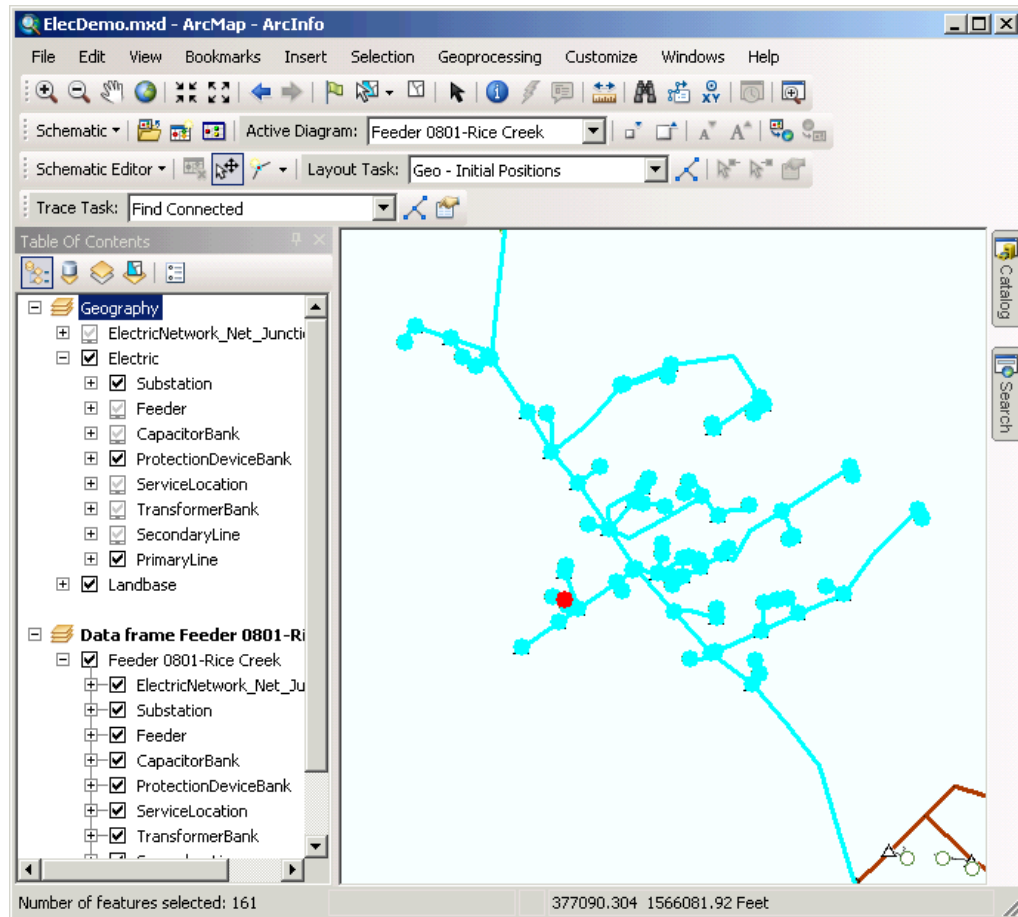
The following section illustrates this algorithm layout.


Steps:

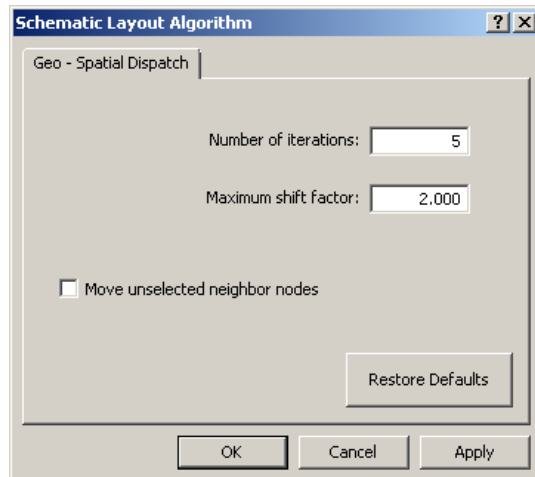
1. During this exercise, you need to use the My Places command. Since this command is not available by default in the ArcMap toolbars, start with the following steps:
 - a. Click **Customize** and click **Customize Mode**.
The **Customize** dialog box opens.
 - b. Click the **Commands** tab.
 - c. Click **Generic** in the **Categories** list.
 - d. Click the **My Places** command and drag it onto the Tools toolbar.
 - e. Click **Close**.
2. Click the **Open Diagram by Diagram Template** button .
The **Open schematic diagram** dialog box appears.
3. Click the **Schematic Diagram Template** drop-down list and click **GeoSchematic**.
4. Click **Feeder 0801-Rice Creek** in the **Schematic Diagram Name** list and click **OK**.
The diagram appears in a new data frame.
5. Click **Schematic Editor** and the **Start Editing Diagram** menu  on the Schematic Editor toolbar.
6. Click the **My Places** button you have just added in step 1.
The **My Places** dialog box opens.
7. Click the **Load** button.
8. Browse to and select the **SchematicFeatures_GeoSpatialDispatch.dat** file located in **C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap** and click **Open**.
9. Select all the items that have been added to the window and click **Zoom To**.
After this step, you should be in the following situation:




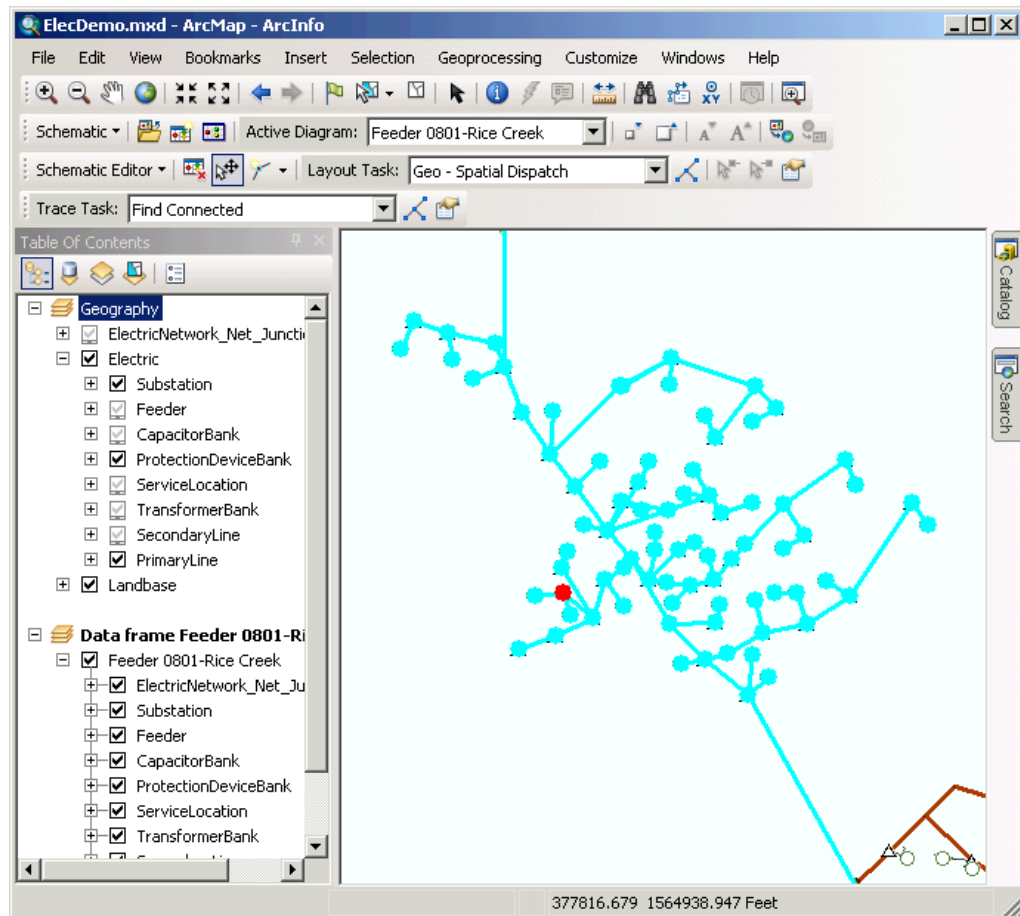
10. Close the **My Places** dialog box.
Note that several of the schematic feature nodes are so close that they seem to overlap.
11. Click the **Select Features** tool  and, by drawing a box with the tool, select everything in the current view:






12. Click the **Layout Task** drop-down list on the Schematic Editor toolbar and click **Geo - Spatial Dispatch**.
13. Click the **Layout Algorithm Properties** button .
The **Geo - Spatial Dispatch** properties page displays on the **Schematic Layout Algorithm** dialog box.
14. Type 5 in the **Iterations number** text box. Keep the value set by default for the **Maximum shift distance** parameter. Check the **Move unselected neighbor nodes** check box.



15. Click **OK**.
16. Click **Apply Layout Task** .



17. Click **Undo** , then click **Redo**  to clearly analyze the difference on the location of the schematic feature before and after the algorithm execution.

18. Click the **Layout Task** drop-down list on the Schematic Editor toolbar and click **Geo - Initial Positions**.
19. Click **Apply Layout Task** .
All the selected schematic features are now displayed with their initial geographic geometry.

Squaring links


The Square Links command computes and inserts vertices along schematic feature links' path routes so these path routes are displayed with right angles. Vertex positions are automatically inserted on link path routes and are computed according to the following:

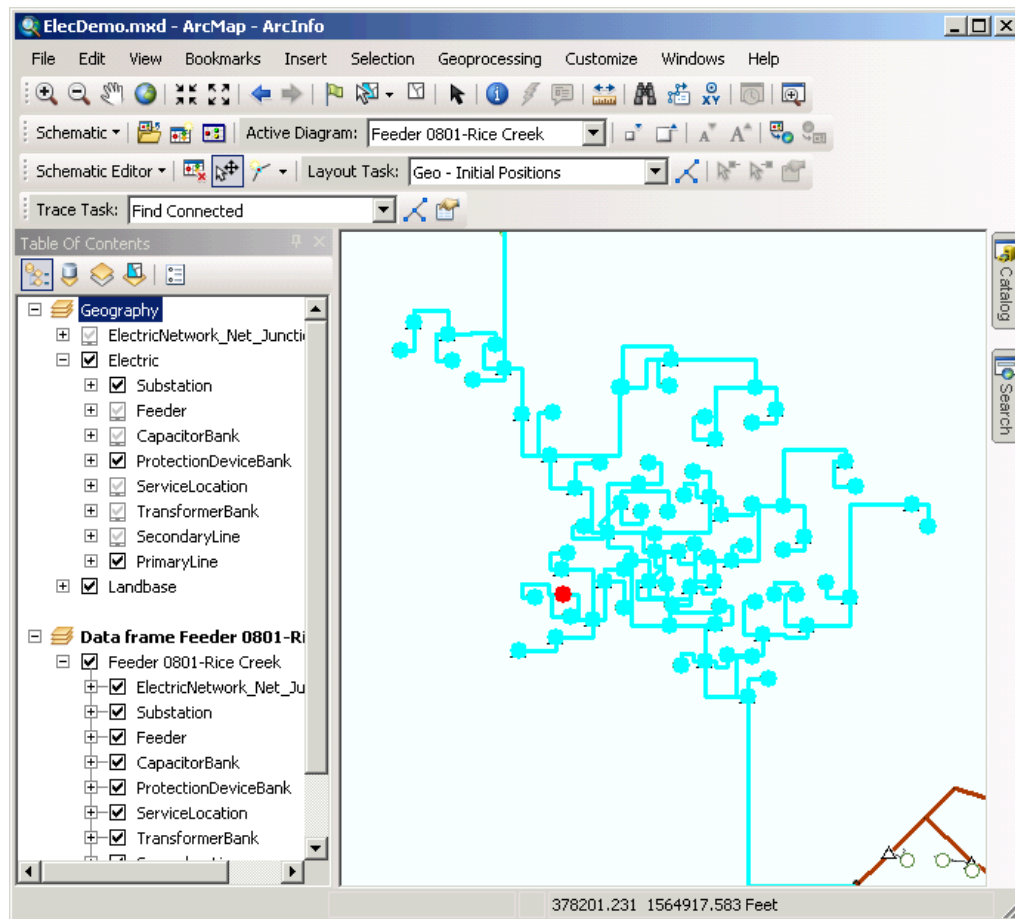
- The current position of the schematic feature links' origin and extremity nodes
- The current position of the vertices if such points already exist along the schematic feature links and the Preserve Path check box is checked on the Square Links tab of the Schematic Editing Properties dialog box


The process takes the direction of the links into account when vertices already exist on the schematic feature links and the Preserve Path check box is checked. In that case, the vertices along the schematic feature link are each treated in turn, that is, from the first vertex displayed along the link path route to the last one.

The following section illustrates the Square Links command.

Steps:

1. Click the **Select Features** tool  and, by drawing a box with the tool, select the same schematic features again.
2. Click the **Schematic Editor** drop-down arrow and click **Square Links**.



3. Click the background of the diagram to cancel the schematic feature selections.
4. Click the **Undo** command  to reverse the action.
5. Remove the diagram data frame. Click **No** if the following message appears: The diagram 'Feeder 0801-Rice Creek' has been modified. Do you want to save its layout?


Finding overlapping links

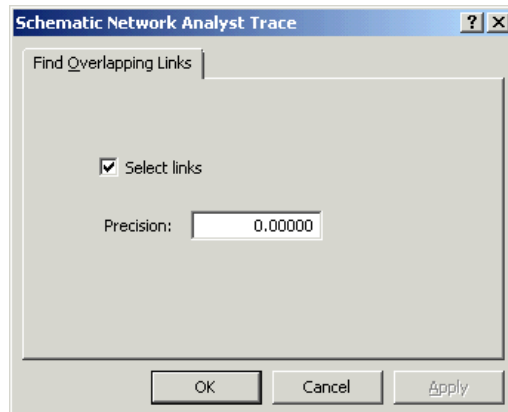
The Find Overlapping Links analyst algorithm allows highlighting of schematic feature links contained in a schematic diagram that are overlapping. Two schematic feature links are said to overlap when they are connected to the same origin and extremity nodes, have the same number of vertices—the same number of intermediate link points—and all those vertices overlap.




The following section exemplifies the Find Overlapping Links schematic trace analyst.

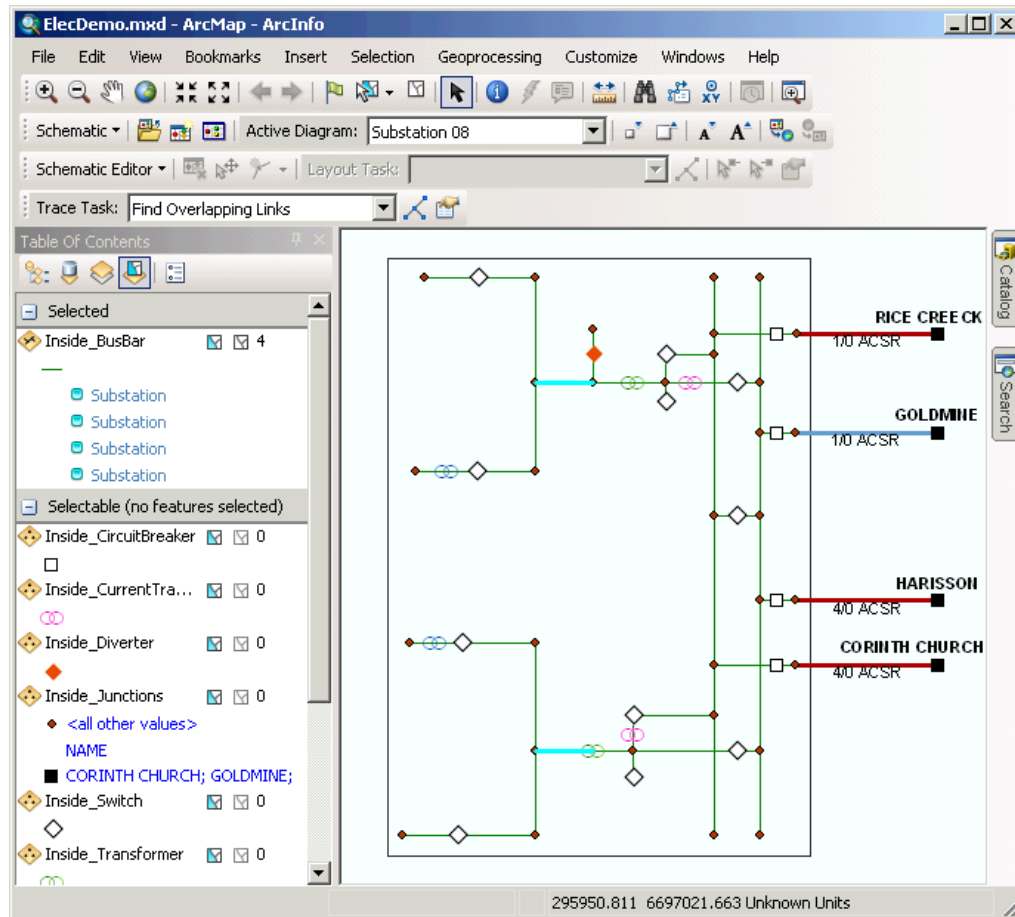
Steps:

1. Click the **Open Diagram by Diagram Template** button .
The **Open schematic diagram** dialog box appears.
2. Click the **Schematic Diagram Template** drop-down list and click *InsidePlants* .
3. Click *Substation 08* in the **Schematic Diagram Name** list and click **OK**.
The diagram appears in a new data frame.

4. Click the **Trace Task** drop-down list on the Schematic Network Analyst toolbar and click **Find Overlapping Links**.
5. Click the **Trace Task Properties** button .
The **Find Overlapping Links** properties page displays on the **Schematic Network Analyst Trace** dialog box.
6. Make sure the **Select links** option is checked in the Find Overlapping Links properties page.



7. Click **OK**.
8. Click **Apply Trace Task** .
The schematic feature links that are overlapping are selected and the diagram extent set to the extent of the trace result.
9. Click **Full Extent**  on the Tools ArcMap toolbar.
10. Click the **List By Selection** button  in the Table Of Contents toolbar.
Four overlapped Inside_BusBar have been selected.





Separating overlapping links

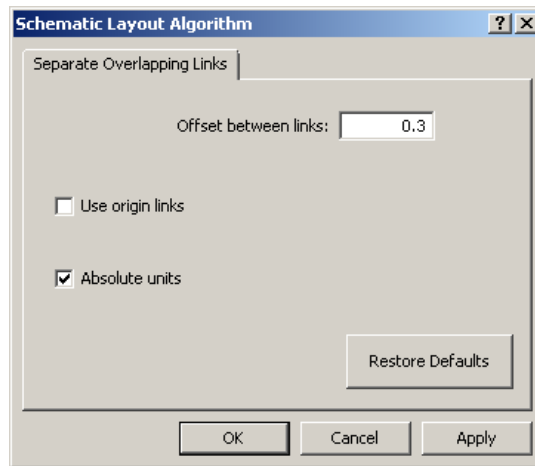
The Separate Overlapping Links layout algorithm separates schematic feature links that are overlapping in a schematic diagram. The algorithm applies the Offset between links parameter as specified on the Separate Overlapping Links layout algorithm properties page. The Offset between links parameter is combined with the current symbol size of the nodes displayed in the diagram to compute the distance between two neighboring links and the distance between the origin/end node and the first/last break point that will be used during the separation process.


The following section exemplifies the Separate Overlapping Links layout algorithm execution.

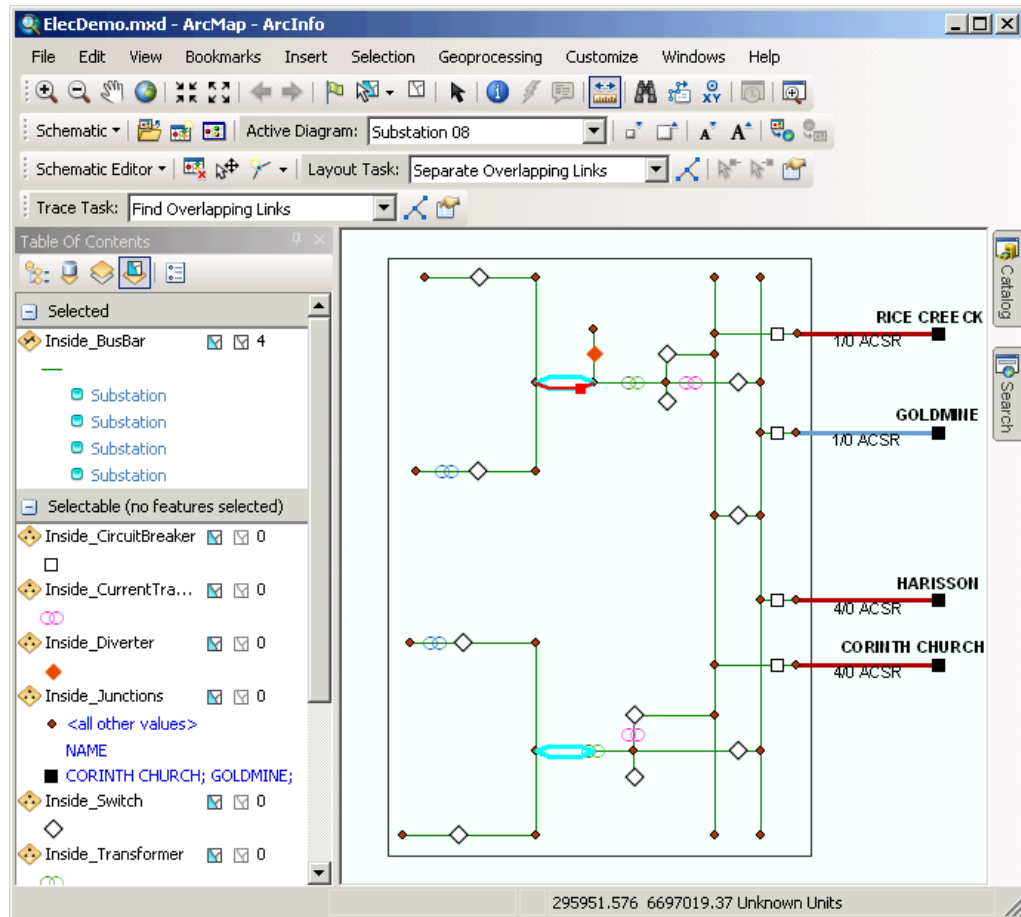
General case



Steps:

1. Click **Schematic Editor** and the **Start Editing Diagram** menu  on the Schematic Editor toolbar to start an editing session on this diagram.
2. Click the **Layout Task** list and click **Separate Overlapping Links**.
3. Click the **Layout Algorithm Properties** button  to open the **Schematic Layout Algorithm** dialog box.
4. Type 0.3 for the **Offset between links** parameter.



5. Click **OK**.
6. Click **Apply Layout Task** .
The four overlapped links are separated.






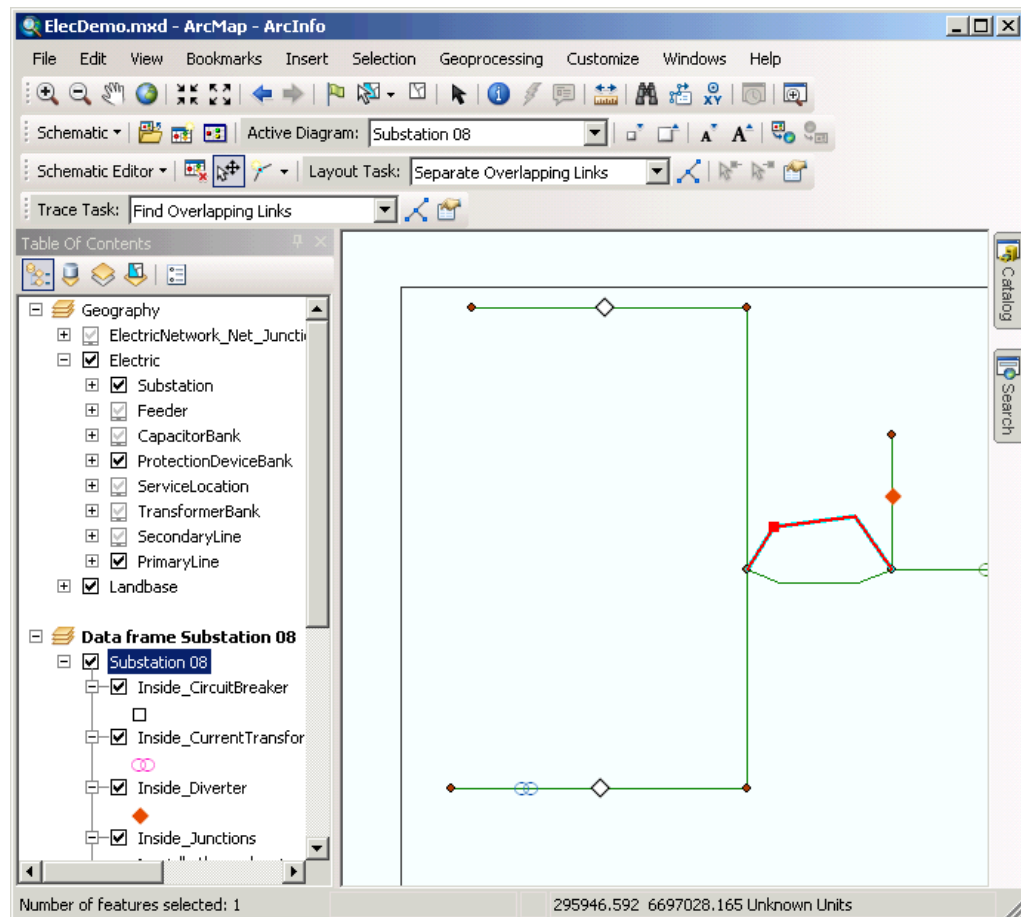
7. Click the **List By Drawing Order** button  in the Table Of Contents toolbar.
8. Right-click the `Substation 08` schematic diagram layer in the Table Of Contents, then click **Schematic Selection** and click  **Clear Selected**.

Other case


The following section exemplifies the Separate Overlapping Links layout algorithm execution. The next steps illustrate another way of working on the Separate Overlapping Links schematic algorithm layout.

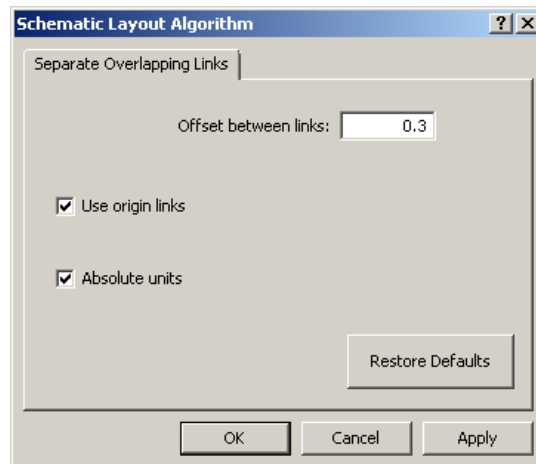
Steps:


1. Zoom in to the set of separated links that are displayed at the top of the diagram.
2. Click the **Select Features** tool  and select the topmost separated link.
3. Click the **Schematic Editor** drop-down menu and click **Remove Schematic Vertices** so the vertices on the link are removed.
4. Click the **Add Vertex** tool .
5. Click and drag a point on this link to create a new vertex on it.
6. Repeat the operation to create another vertex on that link.
7. Click the **Edit/Move Schematic Features** tool  and click that modified link.

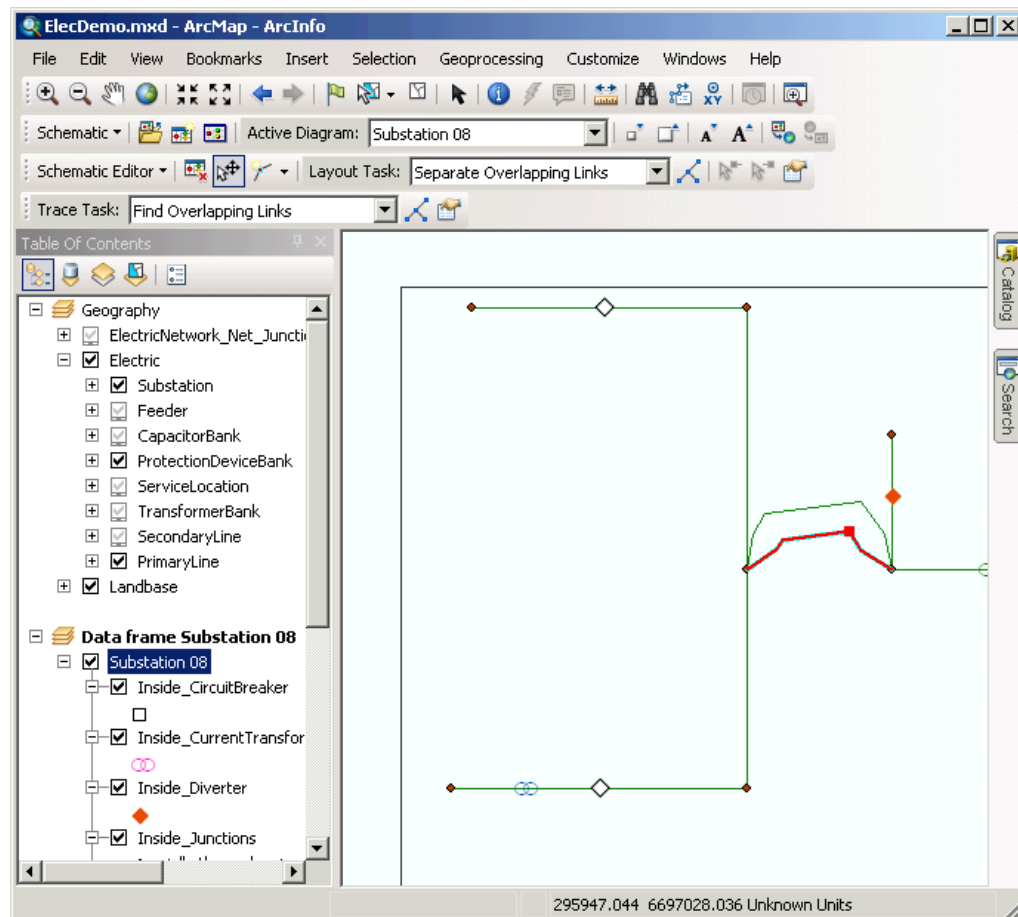


8. Make sure that the **Separate Overlapping Links** is still selected in the **Layout Task** drop-down list.

9. Click the **Layout Algorithm Properties** button  to open the **Schematic Layout Algorithm** dialog box.
10. Check the **Use origin links** option.
Checking this option causes the selected schematic feature link to be used as a reference link for the algorithm execution. In that case, the algorithm copies the vertices that are displayed along that selected link on the other links that connect the same origin and extremity nodes and separates those links.



11. Click **OK**.
12. Click **Apply Layout Task** .

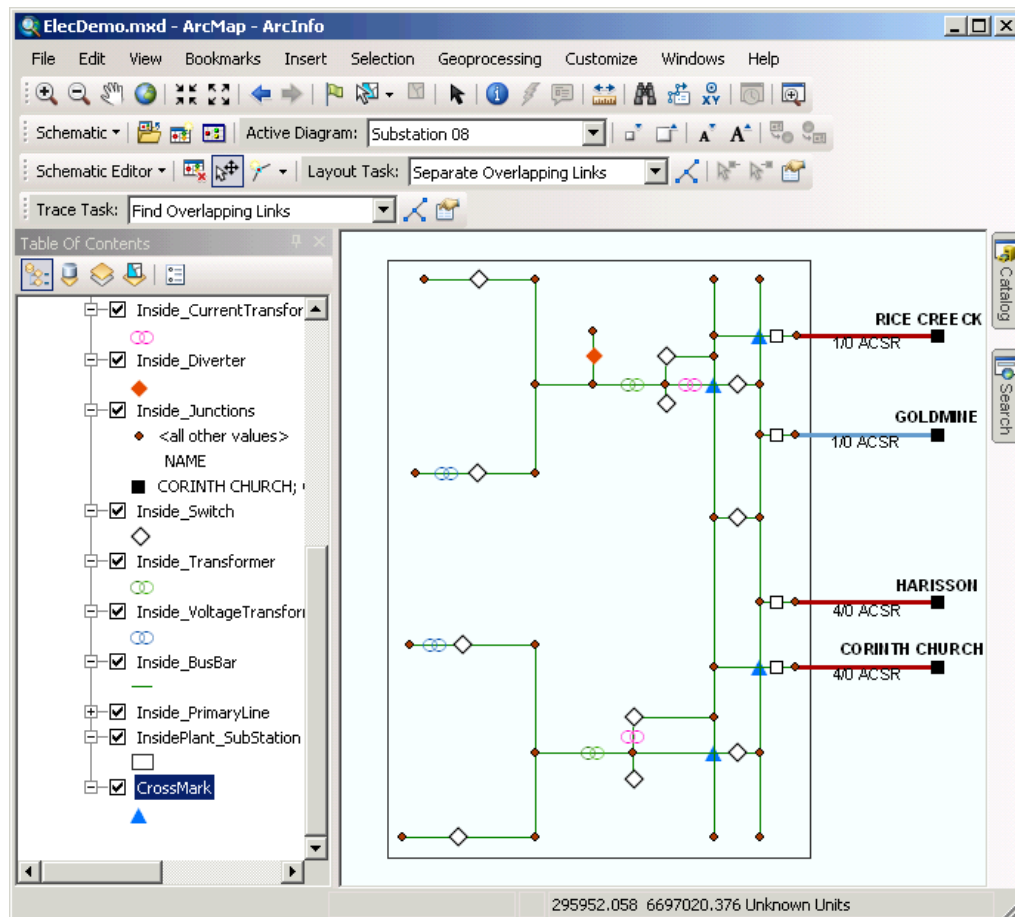


13. Click **Schematic Editor** and click **Stop Editing**.
14. Click **No** when the following message appears: Diagram has changed. Do you want to save the edits?
15. Click **Full Extent** on the Tools toolbar.
16. Right-click the *Substation 08* schematic diagram layer in the Table Of Contents, then click **Schematic Selection** and click **Clear Selected**.

Marking crossing links

Steps:

1. Click **Schematic Editor** and click **Start Editing Diagram**.
2. Click the **Schematic Editor** drop-down arrow and click **Mark Crossing**.
3. In the Table Of Contents window, under the *Substation 08* schematic layer, uncheck and check again the check box at the left of the *CrossMark* feature layer to clearly identify the crossings that are now highlighted.
The next screen shot shows the mark at the identified crossings after their default symbology has been redefined so they display with a blue triangle.



4. Click **Schematic Editor** and click **Stop Editing**.
5. Click **No** when the following message appears: Diagram has changed. Do you want to save the edits?
6. Remove the `Substation 08` data frame.

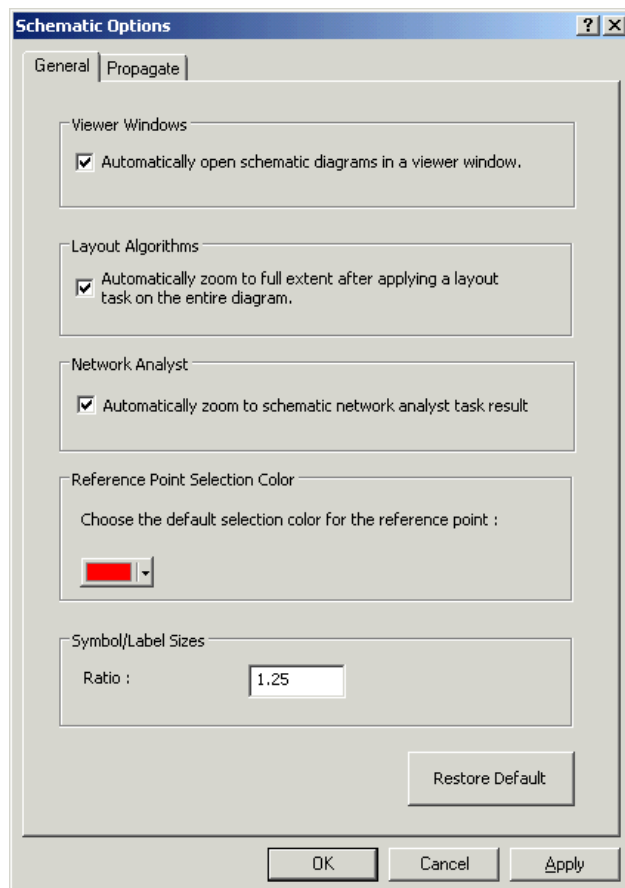
Enabling the viewer windows mode and the automatic full extent after algorithm execution

You can enable the Viewer Windows running mode so that each time a diagram is opened or generated, it is automatically displayed in a viewer window without changing the active data frame. You can also enable the Full Extent After Algorithm Execution running mode so that each time a schematic layout algorithm is executed on any schematic diagram's whole content, an automatic full extent is launched at the end of the algorithm execution. These running modes are enabled from the General tab on the Schematic Options dialog box:

Steps:

1. Click the **Schematic** menu on the Schematic toolbar and click **Schematic Options**. The **Schematic Options** dialog box opens.
2. Click the **General** tab.

3. Check **Automatically open schematic diagrams in a viewer window** in the Viewer Windows section.
4. Make sure the **Automatically zoom to full extent after applying a layout task on the entire diagram** check box is checked in the Layout Algorithms section.



5. Click **OK**.
The **Schematic Options** dialog box closes.

From now, each time a schematic diagram is opened or generated, it will be displayed in a viewer window, and the active data frame will be preserved; each time a schematic layout algorithm is applied on any schematic diagram's whole content, a full extent will be automatically executed at the end of the algorithm execution.




Using the Hierarchical - Main Line Tree algorithm

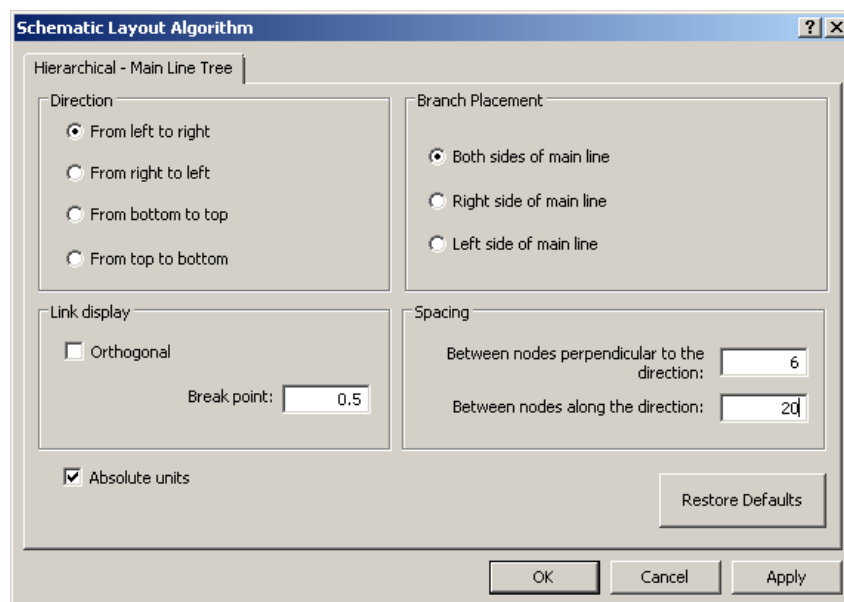
The Main Line Tree layout algorithm arranges hierarchically all the schematic feature nodes and links in the active schematic diagram along the detected main line and places the schematic features according to the parameters currently set on the Hierarchical - Main Line Tree tab. If a selected set has been defined in the active schematic diagram, the algorithm only applies to the selected schematic features. By default, when no root and end schematic feature nodes are set, the main line is the longest branch of the diagram, that is, the branch composed of the most schematic feature links. When a schematic feature root node is set, the


main line is the branch composed of the most links starting from this root. When a schematic feature end node is set, the main line is the branch composed of the links ending at this schematic feature end node. When the schematic feature root and end nodes are set, the main line is the branch composed of the most links starting from this root node and ending at this end node. In any case, the detected main line is placed as a central line, and its related branches are placed either on both sides or at the left or right side of it according to the selected Branch Placement option. In the following section, you'll learn how to operate with the Main Line Tree algorithm layout.

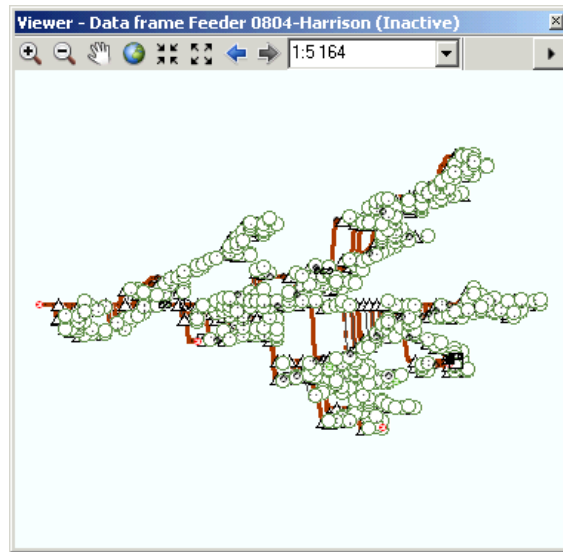
General case



Steps:

1. Click the **Open Schematic Diagrams** button .
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the `Feeders` schematic folder of the `ElecDemo` schematic dataset in the `C:\ArcGIS\ArcTutor\Schematics\Schematics\ElecDemo` geodatabase and select `Feeder 0804 - Harrison`. Click **Add**.
The diagram opens in a viewer window.
3. Click **Schematic Editor** and click the **Start Editing Diagram** menu  on the Schematic Editor toolbar to start an editing session on this diagram.
4. Click the **Layout Task** drop-down arrow and click **Hierarchical - Main Line Tree**.
5. Click the **Layout Algorithm Properties** button  and change the Main Line algorithm properties as follows:
 - a. Type `6` for the **Spacing between nodes perpendicular to the direction**.
 - b. Type `20` for the **Spacing between nodes along the direction**.






6. Click **OK**.
7. Click the **Apply Layout Task** button .
The algorithm applies, and an automatic full extent is launched at the end of the execution.

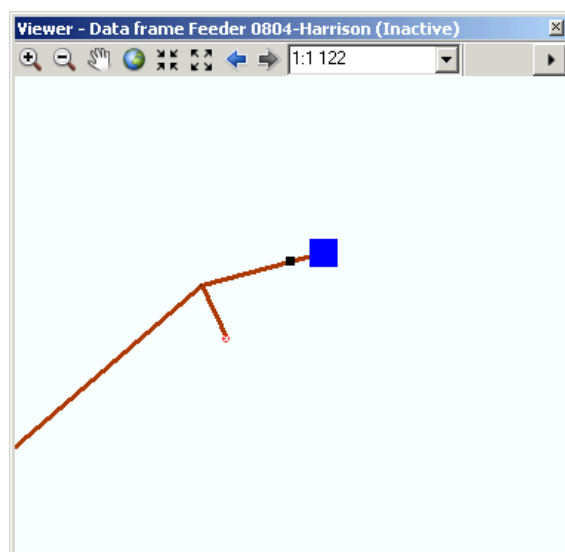



8. Click the **Undo** button  on the Standard toolbar to revert to the former layout.
9. Click the **Full Extent** button  on the viewer window.

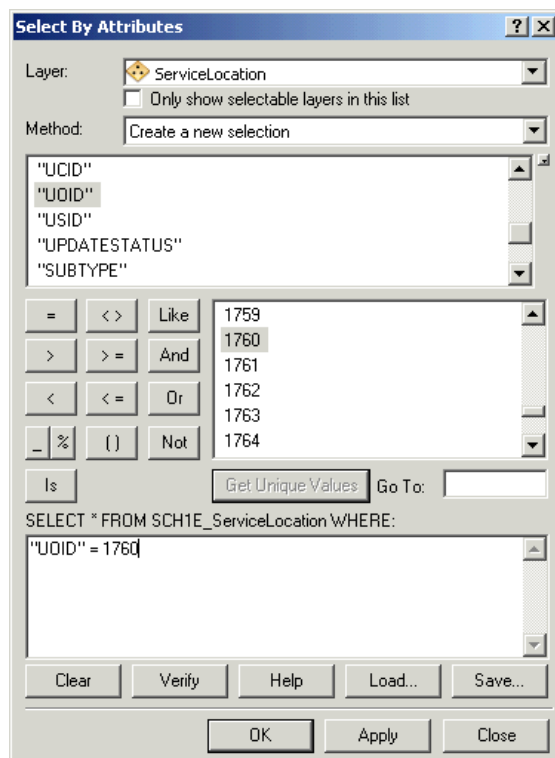
Execution with particular root and end schematic feature nodes



Steps:

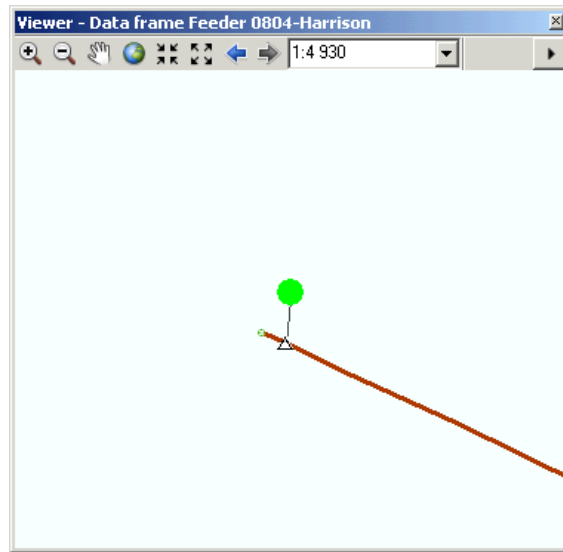
1. In the Table Of Contents, under the Feeder 0804-Harrison schematic layer, right-click the Substation feature layer and click **Selection**, then click **Select All**.
2. Right-click the Feeder 0804-Harrison schematic layer in the Table Of Contents, click **Schematic Selection**, then click **Zoom To Selected Schematic Features**.
3. Click the **Zoom In** tool  and zoom in to the selected Substation schematic feature.
4. Click the **Edit/Move Schematic Features** tool  and click the background of the viewer window to deselect the substation.
5. Make sure the **Hierarchical - Main Line Tree** algorithm is still selected in the **Layout Task** drop-down list.
6. Click the **Set Schematic Root** tool  and click the Substation schematic feature node so it will be set as the root of the tree.
It appears with a blue square:







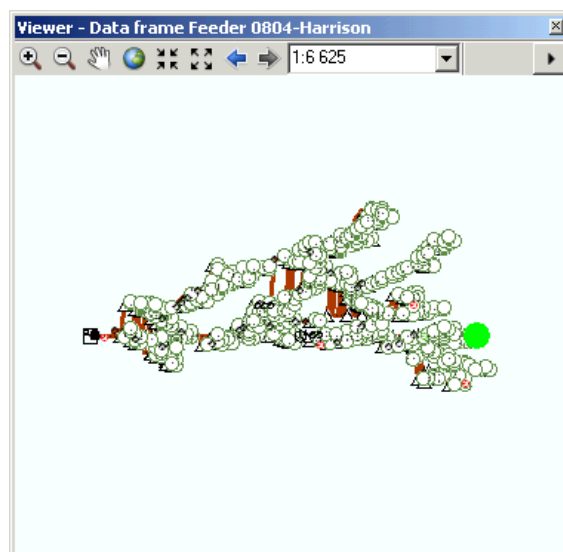
7. Specify an end node. Activate the Feeder 0804-Harrison data frame.
8. Click **Selection** in the ArcMap menu, then click **Select By Attributes**.
The **Select By Attributes** dialog box opens.
9. Click the **Layer** drop-down list and click ServiceLocation.
10. Double-click UOIID in the **Fields** list.
11. Click the equal sign button .
12. Click **Get Unique Values**.
13. Double-click 1760 in the unique values list.







14. Click **Apply** and click **Close**.
The ServiceLocation schematic feature node whose UID is 1760 is now selected in the schematic diagram.
15. Right-click the **Feeder 0804-Harrison** schematic layer in the Table Of Contents, point to the **Schematic Selection** menu item, then click **Zoom To Selected Schematic Features**.
16. Click the **Edit/Move Schematic Features** tool  and click the background of the viewer window to deselect the ServiceLocation.
17. Click the **Set Schematic End** tool  and click the ServiceLocation identified at the previous step.
It appears with a green circle:



18. Click the **Full Extent** button  on the viewer window toolbar to center the diagram in the window.
19. Click the **Set Schematic Root** button  to visualize the root node currently specified, then click  **Set Schematic End** to visualize the currently specified end schematic node.
20. Click **Apply Layout Task** .




21. Click **Set Schematic Root**  to control the root node as the root of the main line, then click **Set Schematic End**  to control the position of the end node on the main line.
22. Click  **Save Diagram Edits** on the **Schematic Editor** menu on the Schematic Editor toolbar to save the current diagram layout.
23. Click the **Edit/Move Schematic Features** tool  to disable the highlighting of the root/end node.

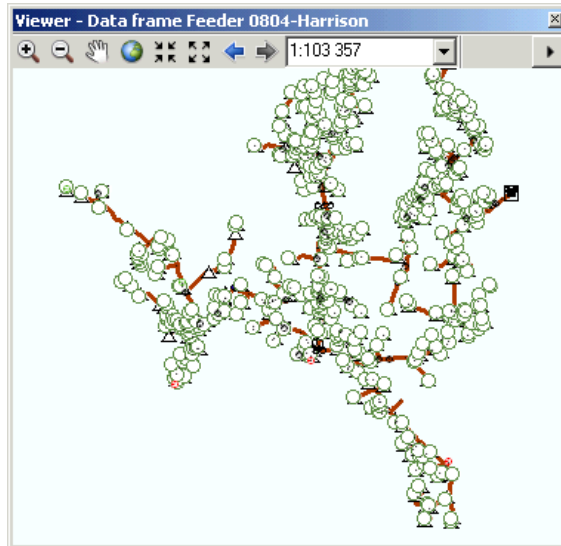
Restoring schematic features' geo - initial positions

To get back to the initial layout of the features, you may execute the Geo - Initial Positions schematic layout algorithm:

Steps:


1. Click the **Layout Task** drop-down arrow and click **Geo - Initial Positions**.
2. Click **Apply Layout Task** .

All the schematic features in the diagram are restored to their initial position:

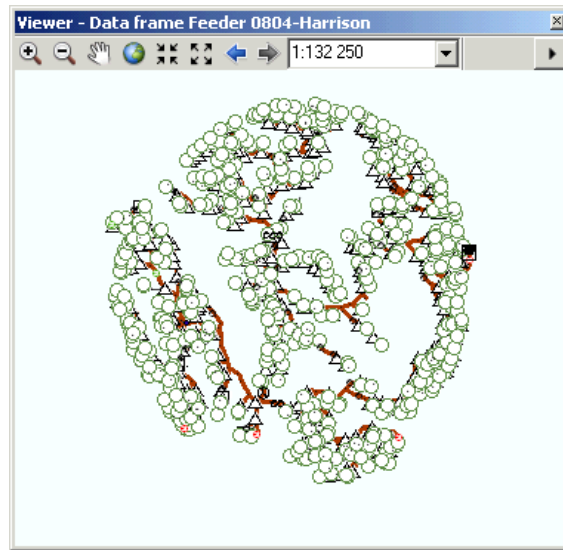



Restoring schematic features' saved positions

Steps:

1. Click the **Layout Task** drop-down arrow, then click **Force Directed**.
2. Click **Apply Layout Task** .


All the schematic features in the diagram are restored to their initial position:

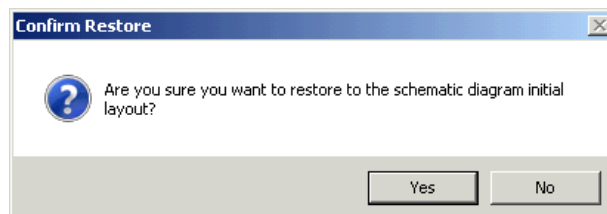




3. Click **Restore Saved Positions** in the **Layout Task** drop-down menu.
4. Click **Apply Layout Task** .
The saved layout of the schematic features is restored.

Removing a schematic diagram's saved layout from the schematic database

Steps:

1. Click the **Restore Initial Layout** button  you added at the beginning of the exercise.
The following dialog box displays:





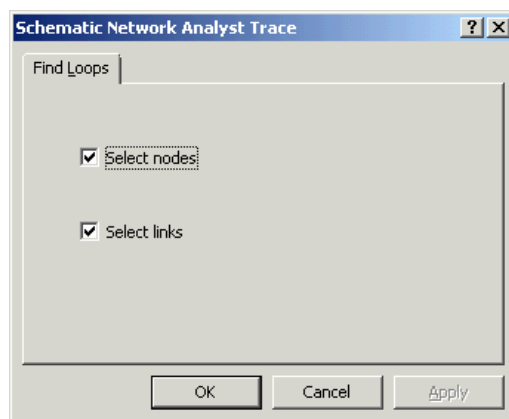
2. Confirm the restoration of the initial layout.
All the schematic features contained in the active diagram are restored to their initial positions. The diagram layout has been removed from the schematic database. As no layout exists any more for the diagram, the Restore Initial Layout button is unavailable.
3. Click **Full Extent**  on the viewer window.
4. Click  **Save Diagram Edits** on the **Schematic Editor** menu on the Schematic Editor toolbar.
5. Remove the Feeder 0804-Harrison data frame.

Detecting loops in a schematic diagram

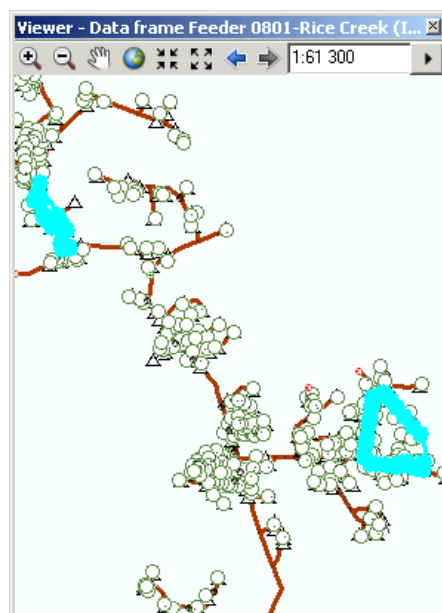
You can identify loops on your network using the Find Loops schematic trace analyst algorithm.



Steps:

1. Click the **Open Schematic Diagrams** button .
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the `Feeders` schematic folder of the `ElecDemo` schematic dataset in the `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo` geodatabase and select `Feeder 0801-Rice Creek`.
3. Click the **Trace Task** drop-down arrow on the Schematic Network Analyst toolbar and click **Find Loops**.
4. Click the **Trace Task Properties** button  to open the **Schematic Trace Task Properties** dialog box.
5. Verify that the **Select nodes** and **Select links** check boxes are checked and click **OK**.



6. Click **Apply Trace Task** .





7. Click the **Full Extent** button  on the viewer window.
8. Right-click the `Feeder 0801-Rice Creek` schematic diagram layer in the Table Of Contents, then click **Schematic Selection** and click  **Clear Selected**.

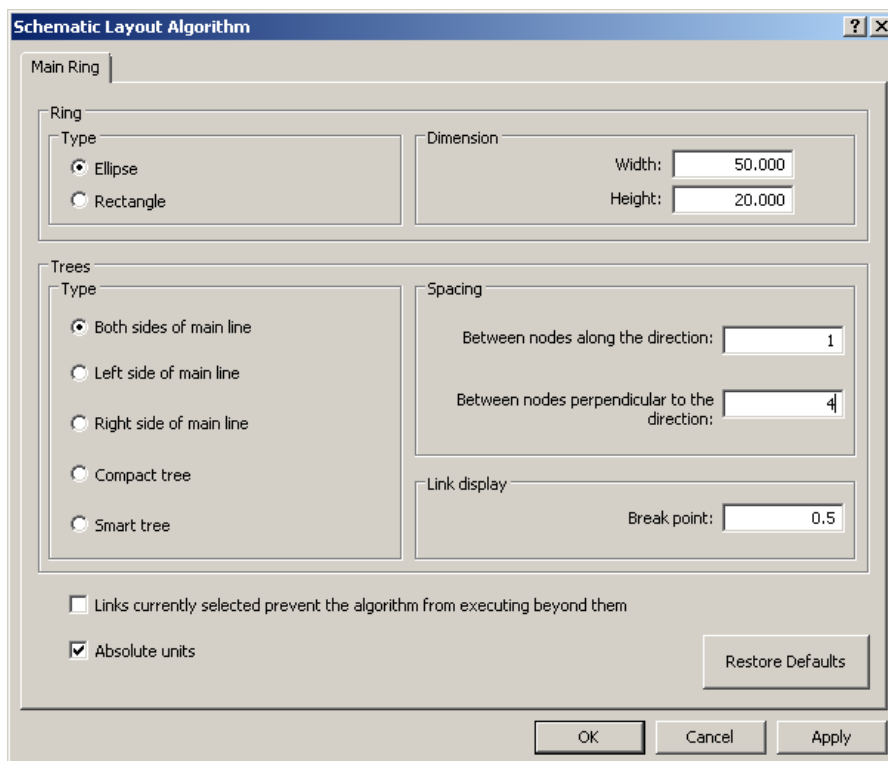
Laying out schematic diagram content around a main loop

Like there are loops in the diagram, there is an interesting way to lay out the network around the main loop by using the Main Ring layout algorithm. The Main Ring layout algorithm arranges the schematic feature nodes and links in the active schematic diagram around the main ring and lays out hierarchically the schematic feature nodes and links that connect to the detected main ring's nodes according to the parameters currently set on the Main Ring tab. The main ring is the longest loop of the schematic diagram, that is, the loop formed by the most links. If a selected set has been defined in the active schematic diagram, the algorithm only applies to the selected schematic features.

The following section illustrates how to operate the Main Ring layout algorithm. Note that detecting the loop like you've just done in the previous section is not a prerequisite for executing the algorithm. If the schematic diagram contains no loop, the Main Ring layout execution has no effect.

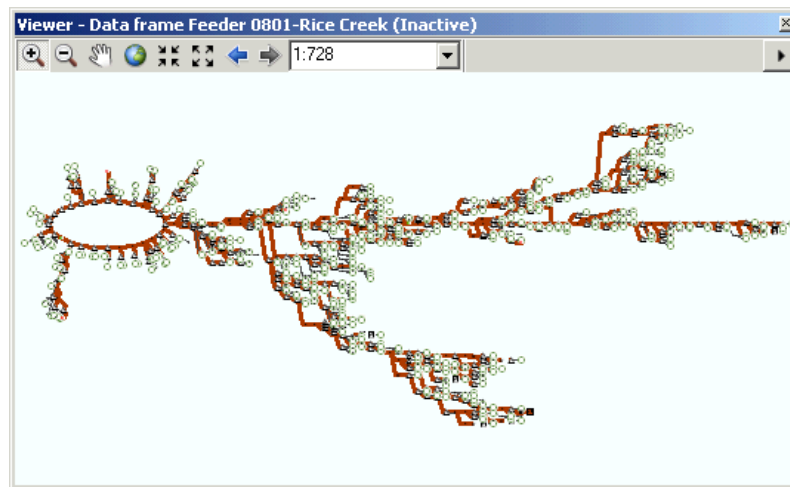
Steps:



1. Click the **Schematic Editor** and click the **Start Editing Diagram** menu  on the Schematic Editor toolbar to start an editing session on this diagram.
2. Click the **Layout Task** drop-down arrow and click **Main Ring**.
3. Click the **Layout Algorithm Properties** button .
4. In the **Spacing** area, type 1 for the **Between nodes along the direction** parameter, then type 4 for **Between nodes perpendicular to the direction**.



5. Click **OK**.
6. Click the **Apply Layout Task** button .

The following screen shot shows the result obtained after the algorithm execution and the symbols in the diagram have been decreased for a better visualization of the main loop:







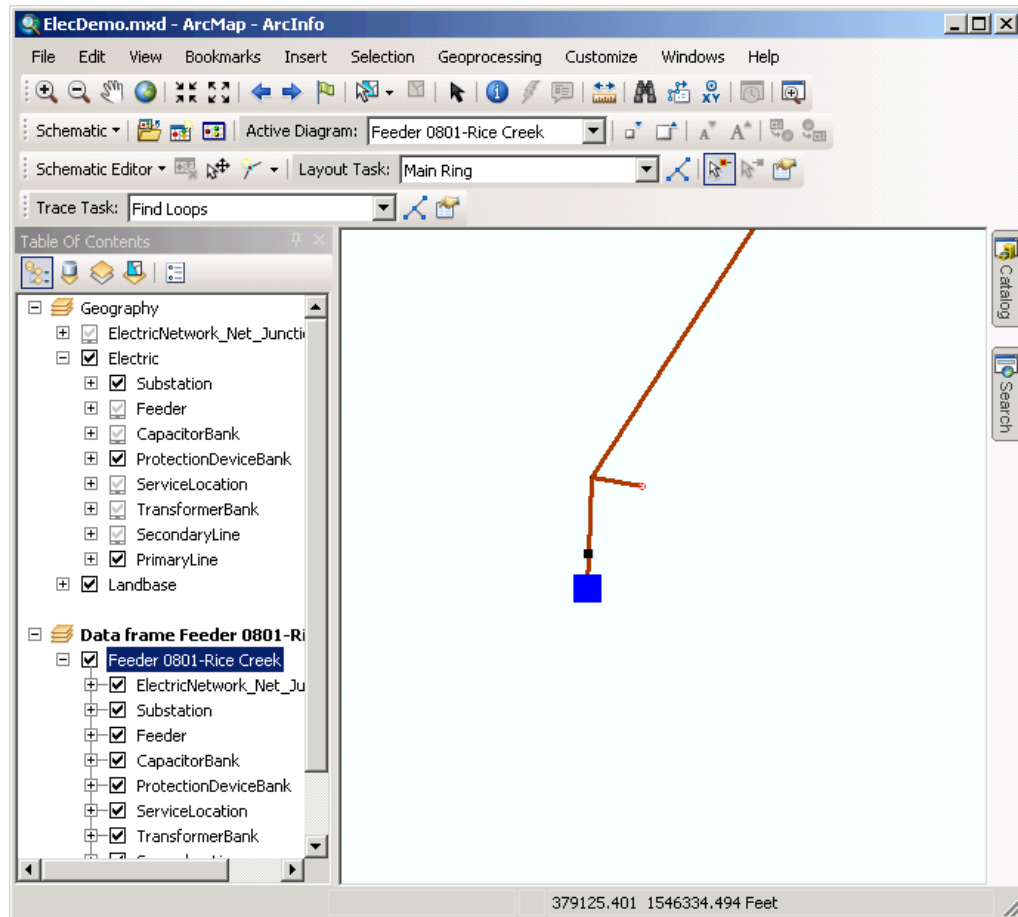
7. Click the **Undo** button  on the Standard toolbar to revert to the former layout.
8. Close the viewer window.
9. Activate the `Feeder 0801-Rice Creek` data frame and click **Full Extent**  on the Tools toolbar.



Using the Orthogonal algorithm

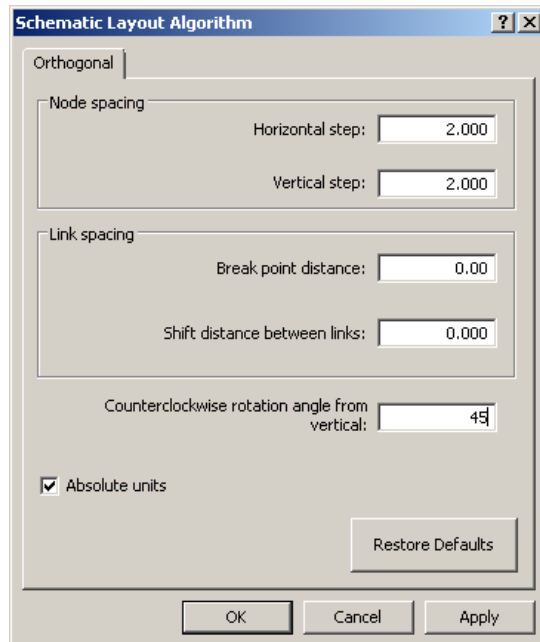
The Orthogonal layout arranges the schematic feature nodes and links in the active schematic diagram orthogonally in a hierarchical order.

Steps:

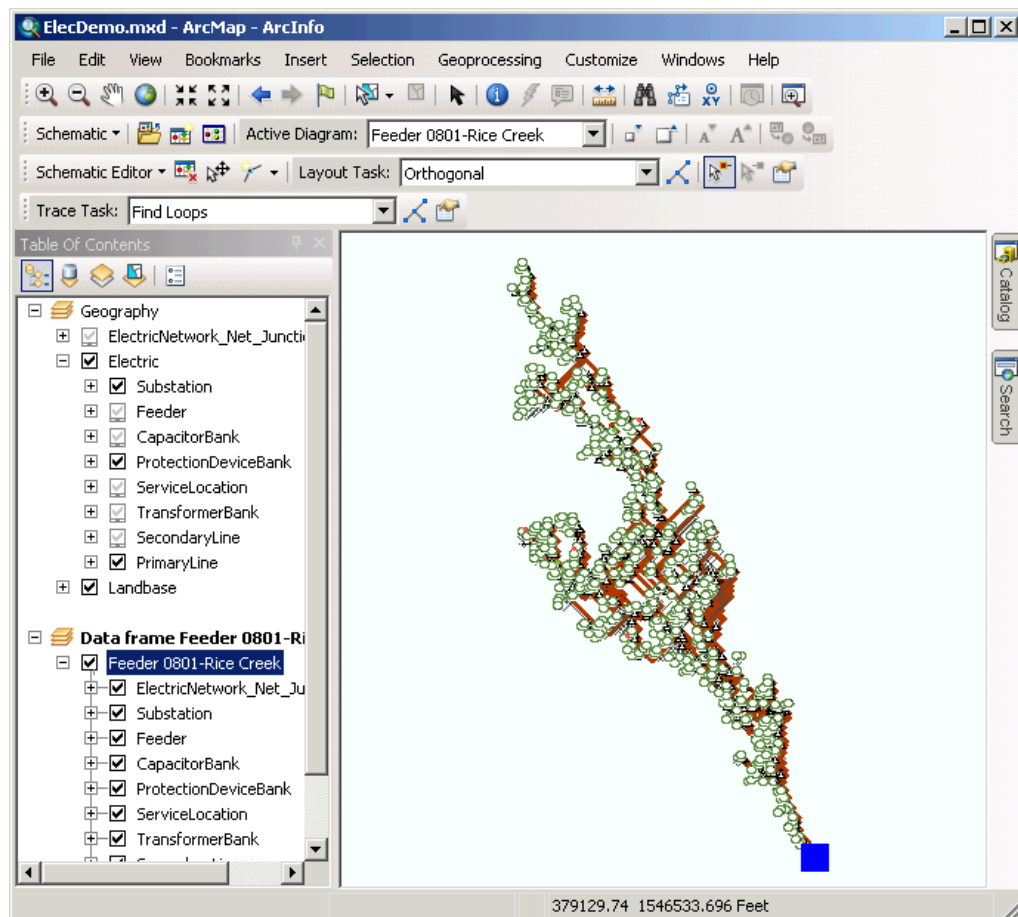
1. In the Table Of Contents, under the `Feeder 0801-Rice Creek` schematic layer, right-click the `Substation` feature layer and click **Selection**, then click **Select All**.
2. Right-click the `Feeder 0801-Rice Creek` schematic layer in the Table Of Contents, click **Schematic Selection**, then click  **Zoom To Selected Schematic Features**.
3. Click the **Zoom In** tool  and zoom in to the selected `Substation` schematic feature.
4. Click the **Edit/Move Schematic Features** tool  and click the background of the viewer window to deselect the substation.
5. Click the **Layout Task** drop-down arrow and click **Orthogonal**.
6. Click the **Set Schematic Root**  button and click the `Substation` schematic feature node so it will be set as the root of the tree.
It displays with a blue square.



7. Click **Full Extent**  on the Tools toolbar.
8. Click **Layout Algorithm Properties** .
The **Orthogonal** properties page displays on the **Schematic Layout Algorithm** dialog box.
9. Type 45 for the **Counterclockwise rotation angle from vertical**.



10. Click **OK**.
11. Click the **Apply Layout Task** button .




Using the Geo - Partial Overlapping Links algorithm

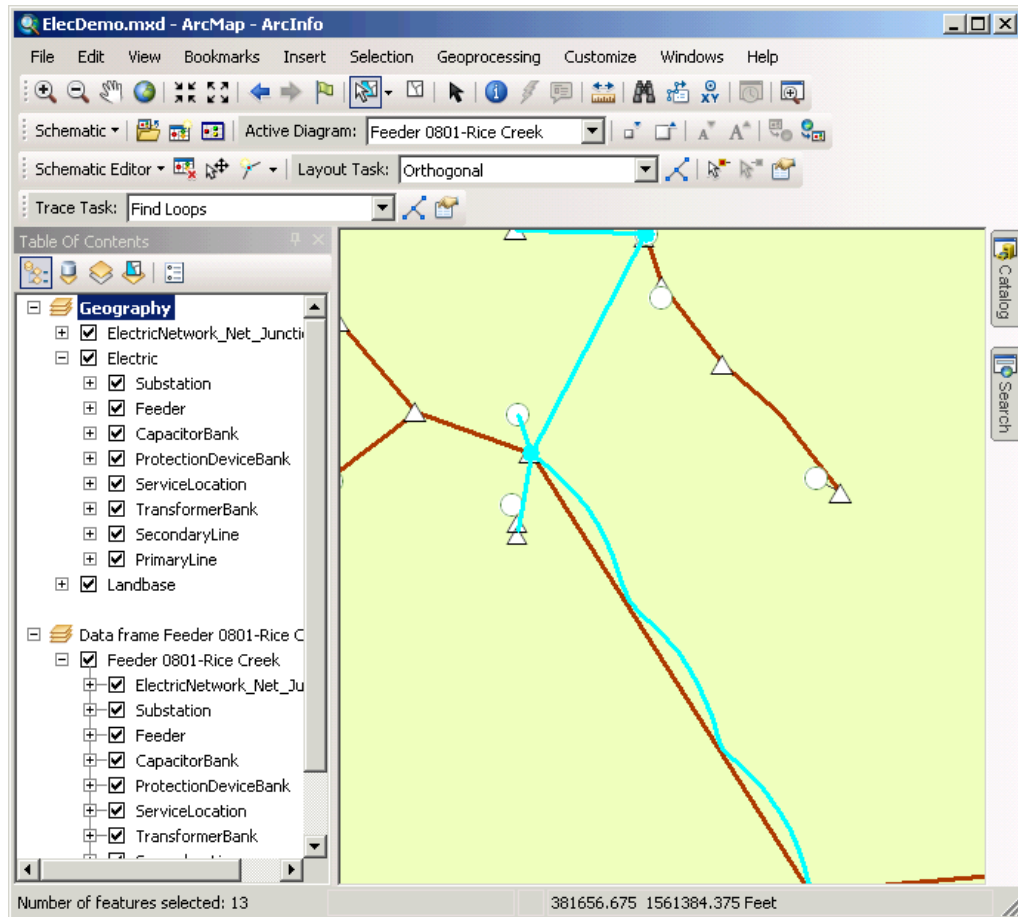
The Geo - Partial Overlapping Links layout algorithm detects the collinear links or the collinear portions of links (the link segments) that overlap or nearly overlap in the active schematic diagram and separates them according to the parameters set on the Partial Overlapping Links tab. The algorithm detects and groups together the parts of link segments close to each other, more or less parallel, and having more or less the same length. Each set of segments in the schematic diagram is spread equitably on the left side and the right side of the middle of the set of segments. The distance between each segment is then equal to the Offset parameter specified on the Partial Overlapping Links tab. The process preserves the original orientation of the segments so that a segment laying on the left side of another will still end up on the left side.

The following section explains how to operate the Geo - Partial Overlapping Links algorithm layout.

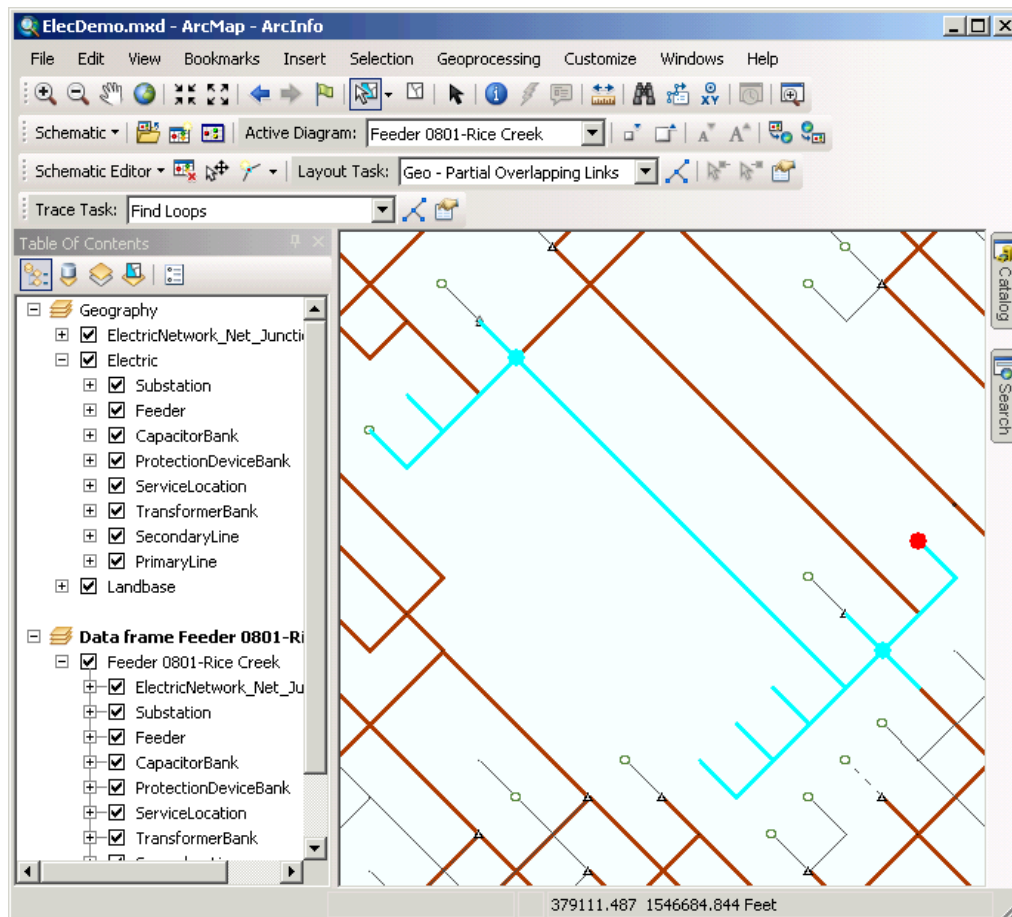
Steps:

1. Activate the **Geography** data frame.
2. Click the **My Places** button you added in step 1.
The **My Places** dialog box opens.
3. Select all the items in the list and click **Remove All**.
4. Click the **Load** button.
5. Browse to and select the `Edges_FindOverlappingLinks.dat` file located in `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap` and click **Open**.
6. Select all the items that have been added to the window and click **Zoom To**.
7. Click the **Select Features** tool  and select all the edges that are flashed-in when clicking the Zoom To button.

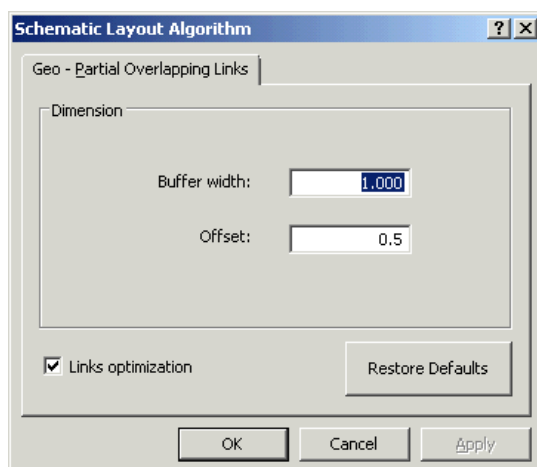
After this step, you should be in the following situation:



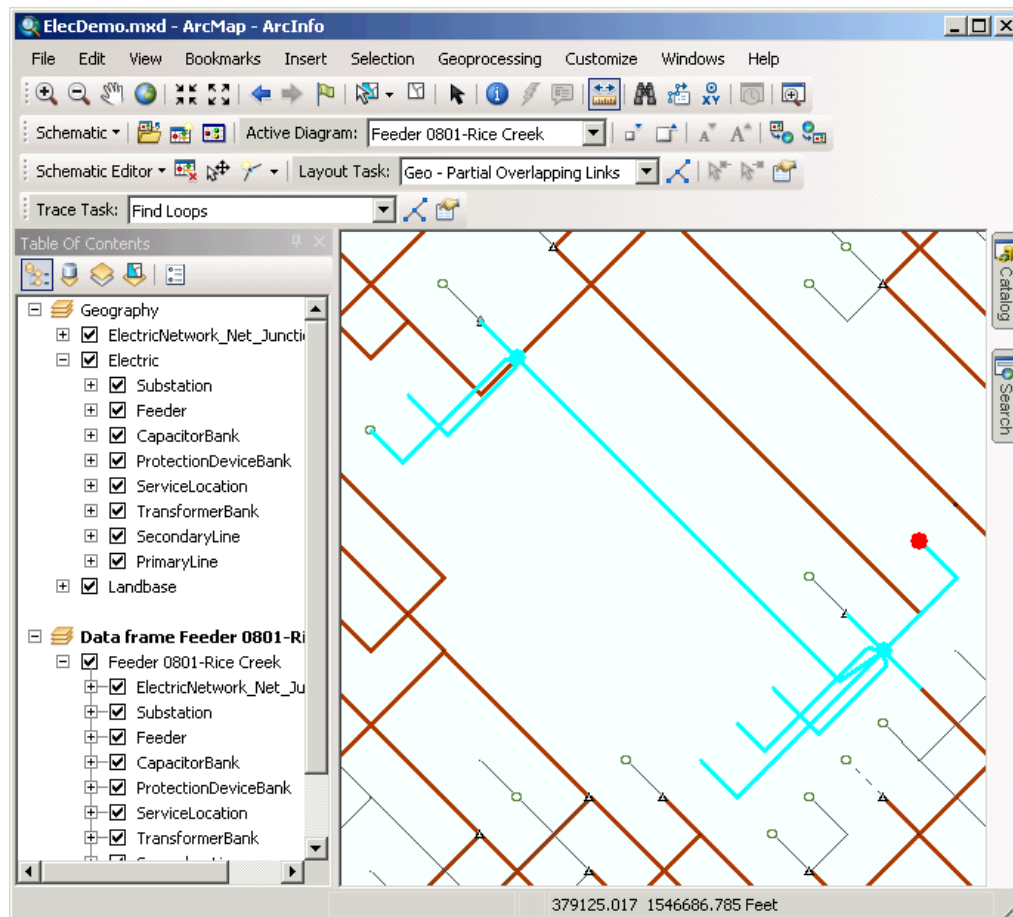
8. Close the **My Places** dialog box.
9. Click **Propagate Map Selection To Schematic**.
10. Activate the **Feeder 0801-Rice Creek** data frame.
The schematic features associated with the features selected in the map are selected in the diagram.
11. Right-click the **Feeder 0801-Rice Creek** schematic layer in the Table Of Contents, click **Schematic Selection**, then click **Zoom To Selected Schematic Features**.



12. Click **Geo - Partial Overlapping Links** in the **Layout Task** drop-down list and click **Layout Algorithm Properties** so the Geo - Partial Overlapping Links properties page opens on the **Schematic Layout Algorithm** dialog box. Keep the parameters default values.





13. Click **OK**.
14. Click **Apply Layout Task**.





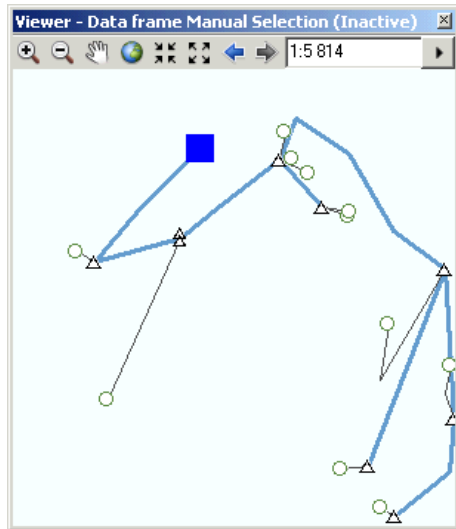
15. Remove the diagram data frame. Click **No** when the following message appears: The Diagram 'Feeder 0801 - Rice Creek' has been modified. Do you want to save its layout?
16. Click **Selection** on the main menu and click ☒ **Clear Selected Features**.
17. Click **Bookmarks** and click **Overview**.




Copying a diagram layout on another diagram

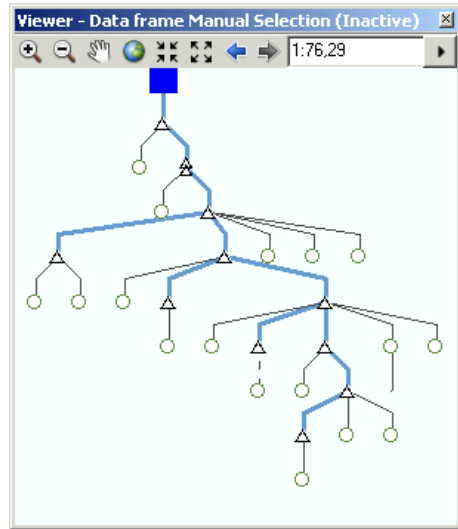
Steps:

1. Click the **Open Schematic Diagrams** button .
The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the **Feeders** schematic folder of the **ElecDemo** schematic dataset in the **C:\ArcGIS\ArcTutor\Schematics\Schematics\ElecDemo** geodatabase and select **Manual Selection**. Click **Add**.
The diagram opens in a viewer window.
3. Click **Schematic Editor** and click the  **Start Editing Diagram** menu on the Schematic Editor toolbar to start an editing session on this diagram.
4. Click the **Layout Task** drop-down arrow and click **Hierarchical - Smart Tree**.

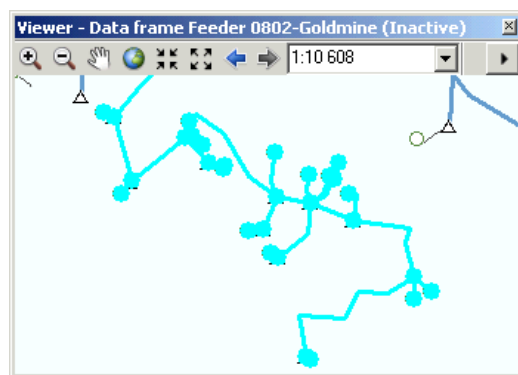
5. In the Table Of Contents, under the **Manual Selection** schematic layer, right-click the **ElectricNetwork_Net_Junctions** feature layer, click **Selection**, then click **Select All**.
6. Zoom in on the **Electric_Network_NetJunctions** schematic feature node at the top of the diagram.
7. Click the **Edit/Move Schematic Features** tool  and click the background of the viewer window to cancel the selection.
8. Click the **Set Schematic Root** tool  and click this small **ElectricNetwork_Net_Junctions** schematic feature node so it is set as the root of the tree.



9. Click the **Full Extent** button  on the viewer window.
10. Click **Layout Algorithm Properties** .
The **Hierarchical - Smart Tree** properties page displays in the **Schematic Layout Algorithm** dialog box.
11. Check the **From top to bottom** option in the Direction area and click **OK**.
12. Click **Apply Layout Task** .

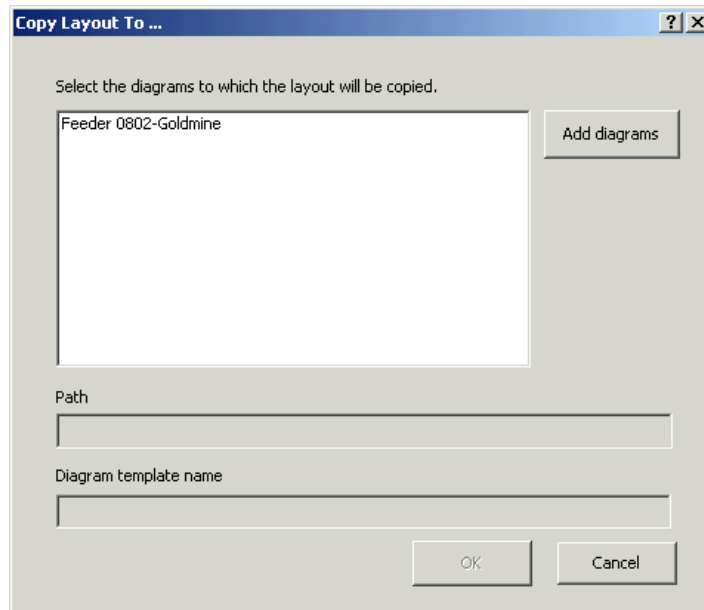


13. Right-click the **Manual Selection** schematic layer in the Table Of Contents, click **Schematic Selection**, then click **Select All Schematic Features**.
14. Click **Propagate Schematic Selection To Map** to visualize the associated features in the Geography data frame.
15. Click the **Open Schematic Diagrams** button, navigate to the **Feeder 0802-Goldmine** schematic diagram stored in the Feeder schematic folder of the ElecDemo schematic dataset, then click **Add**.
The schematic diagram opens in a viewer window.
16. Click **Propagate Map Selection To Schematic** to visualize the schematic features contained in Feeder 0802-Goldmine that are associated with the same geographic features.
17. Right-click the **Feeder 0802-Goldmine** schematic layer in the Table Of Contents, click **Schematic Selection**, then click **Zoom To Selected Schematic Features**.

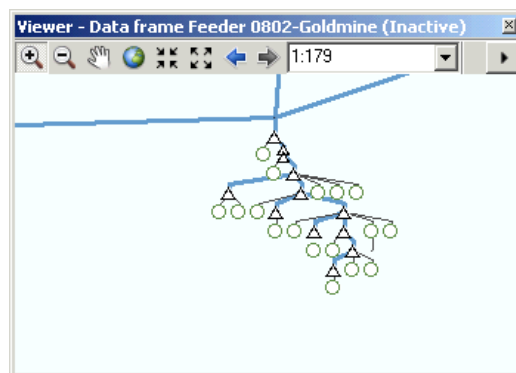


18. Click the **Schematic** drop-down menu on the Schematic toolbar and click **Clear All Diagram Selections** to deselect all the schematic features currently selected in all schematic diagram layers.
19. Right-click the **Manual Selection** schematic layer in the Table Of Contents and click **Copy Layout**.

The **Copy Layout To** dialog box opens:



20. Click **Feeder 0802 - Goldmine** and click **OK**.
The position of all the schematic features contained in the Manual Selection diagram are reported on the schematic features contained in Feeder 0802-Goldmine that are associated with the same geographic features.
21. Zoom out to see that the neighbored schematic features have not been impacted.



22. Close ArcMap.
The **Schematics - Save Layouts** dialog box opens.
23. Click the **Apply to all** option and click **No** so that no diagram is saved.
24. Click **No** again so that the .mxd file is not saved.

Exercise 4: Updating schematic diagrams

In this exercise, you will learn how to update schematic diagrams.

Prerequisite:

During this exercise, you will have to work on some schematic diagrams that were generated in exercise 2 and/or laid out in exercise 3.

Steps:

1. Start ArcMap.
2. Open the `ElecDemo.mxd` file stored in `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap`.

Complexity:
Beginner



Data Requirement:
ArcGIS Tutorial Data Setup

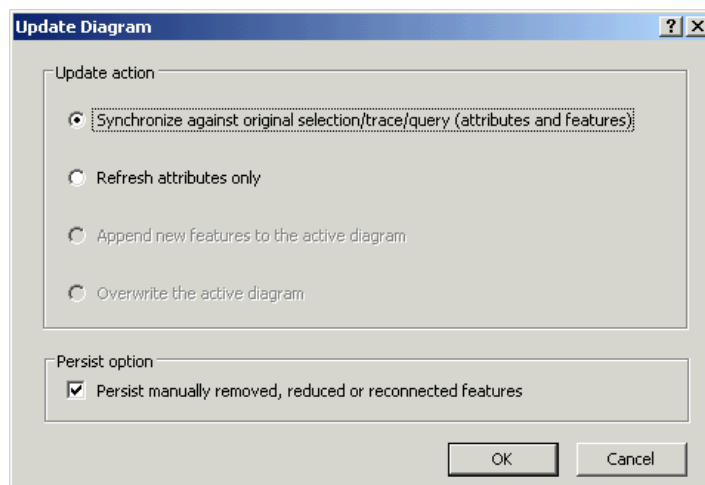
Data Path:
`C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap`

Goal:
Learning how to update schematic diagrams

Updating a diagram from initial features


Steps:

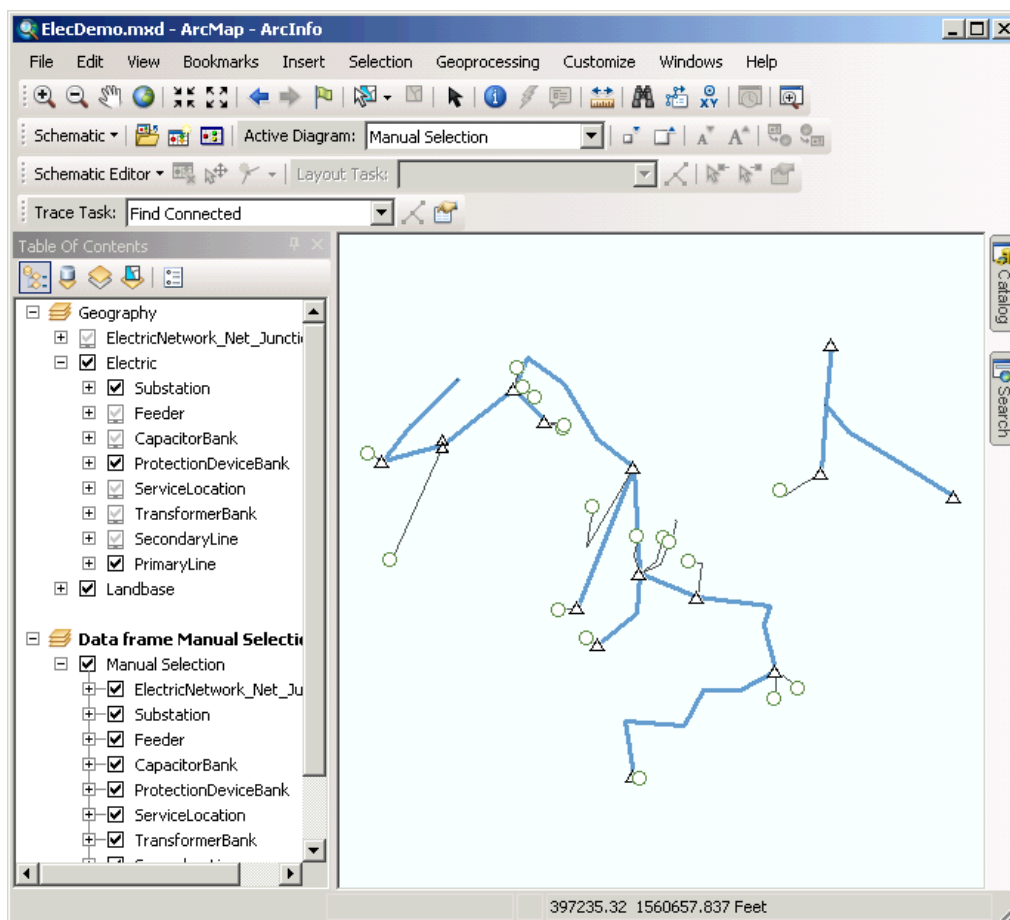
1. Click the **Open Schematic Diagrams** button  on the Schematic toolbar. The **Select Schematic Diagrams To Open** dialog box appears.
2. Navigate to the `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo` geodatabase, then double-click the `ElecDemo` schematic dataset.
3. Click the `Manual Selection` schematic diagram and click **Add**. The selected diagram appears in a new data frame. This diagram was laid out and saved at the beginning of the previous exercise.
4. Click the **Schematic** drop-down menu on the Schematic toolbar and click  **Update Diagram**. The **Update Diagram** dialog box opens.



The Synchronize against original selection/trace/query option is checked by default. Because schematic features were manually removed from this schematic diagram since it was generated, the Persist manually removed, reduced or reconnected features check box is available. By default, this check box is checked to prevent the schematic features that were intentionally removed/reduced from the schematic diagram from reappearing and schematic

feature links that have been intentionally disconnected and reconnected in the diagram from being the same way they were at diagram generation.


5. Keep the **Synchronize against original selection/trace/query** option checked, but uncheck the **Persist manually removed, reduced or reconnected features** check box so these schematic features display again in the schematic diagram after the update.
6. Click **OK**.
7. Click **Full Extent** .
The content of the Manual Selection diagram displays like in the below screen shot at the right. All the schematic features that were removed are restored to their initial positions. The other schematic features are restored to their saved positions.



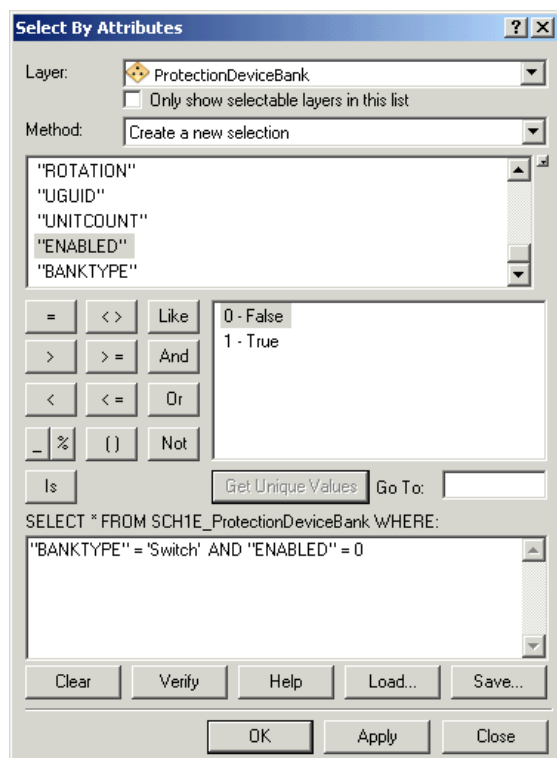
8. Remove the Manual Selection data frame.

Updating a diagram generated from a trace

Steps:

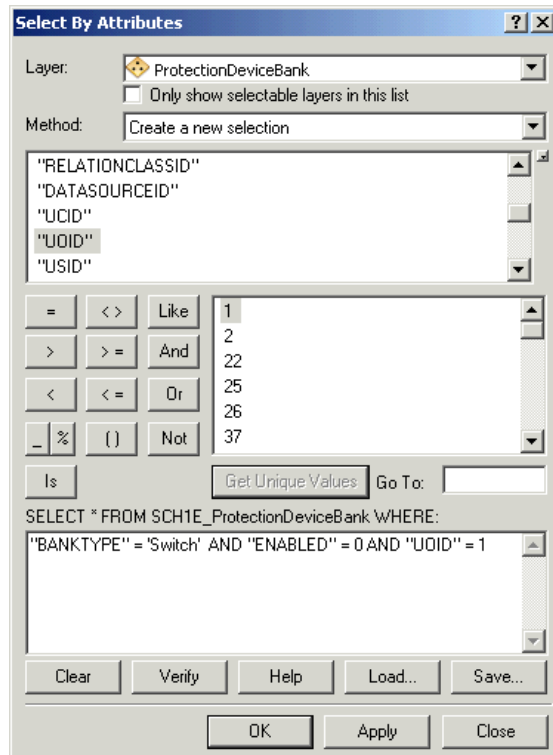
1. Click the **Open Schematic Diagrams** button  on the Schematic toolbar, navigate to the C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo geodatabase, then double-click the ElecDemo schematic dataset.

2. Click the `Feeder 0804-Harrison` schematic diagram that was generated from a trace during exercise 2 and click **Add**.
The selected diagram appears in a new data frame.
 3. Click **Selection** on the main menu and click **Select By Attributes**.
 4. On the **Select By Attributes** dialog box that opens, click the **Layer** drop-down list and click `ProtectionDeviceBank`.
 5. Double-click `BANKTYPE` in the Fields list.
 6. Click the equal sign button `=`, then click **Get Unique Values**.
 7. Double-click `Switch - Switch` in the unique values list.
 8. Click the `And` button, then double-click `ENABLED` from the fields list.
 9. Click the equal sign button `=`, then click **Get Unique Values**.
 10. Double-click `0 - False` from the unique values list.
- The **Select By Attributes** dialog box appears with the following query information:

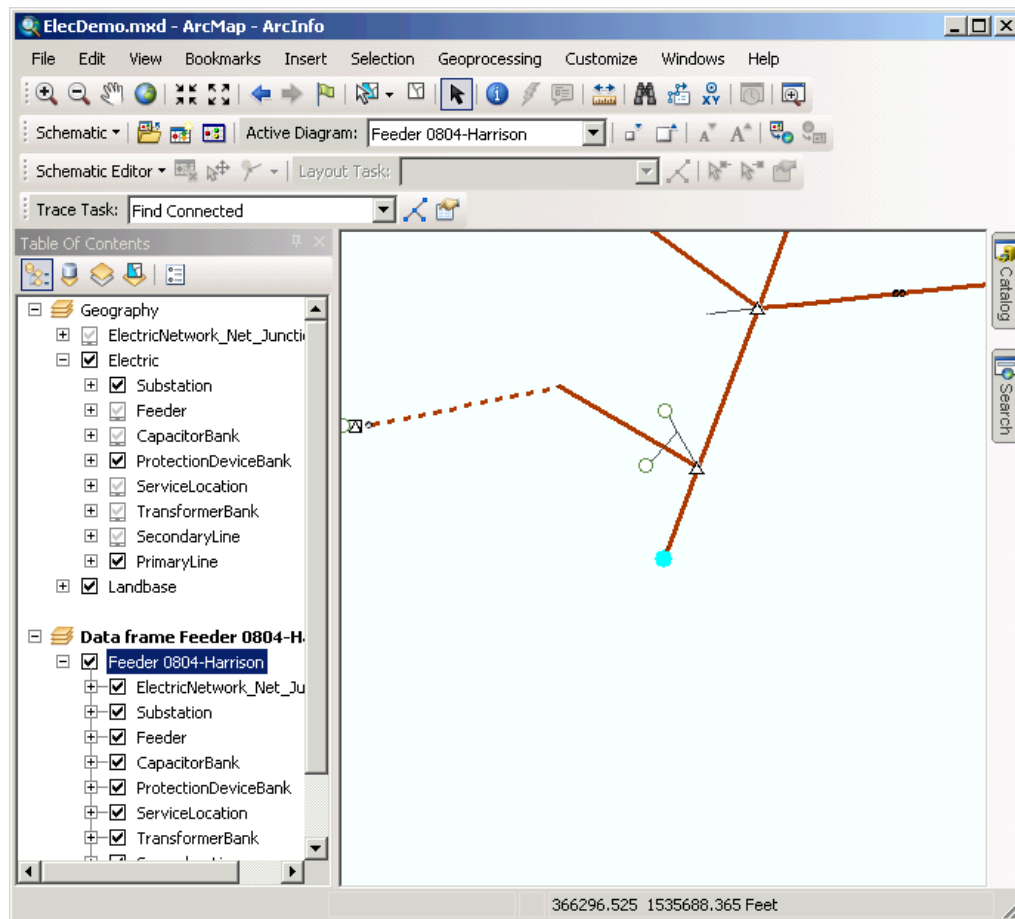





11. Click **Apply** and click **Close**.
Notice that four switch schematic features resulting from the Select By Attributes function are now selected in the active schematic diagram. These switches are opened, and the parts of the network beyond them were not returned from the initial trace. You are now going to close the geographic switch feature associated with one of these selected schematic features before updating the diagram and see the impact.
12. Click **Selection** on the main menu and click **Select By Attributes** to reopen the **Select By Attributes** dialog box.

13. Click the **And** button, then double-click **UOID** in the fields list.
14. Click the equal sign button **=**, then click **Get Unique Values**.
15. Double-click **1** in the unique values list:

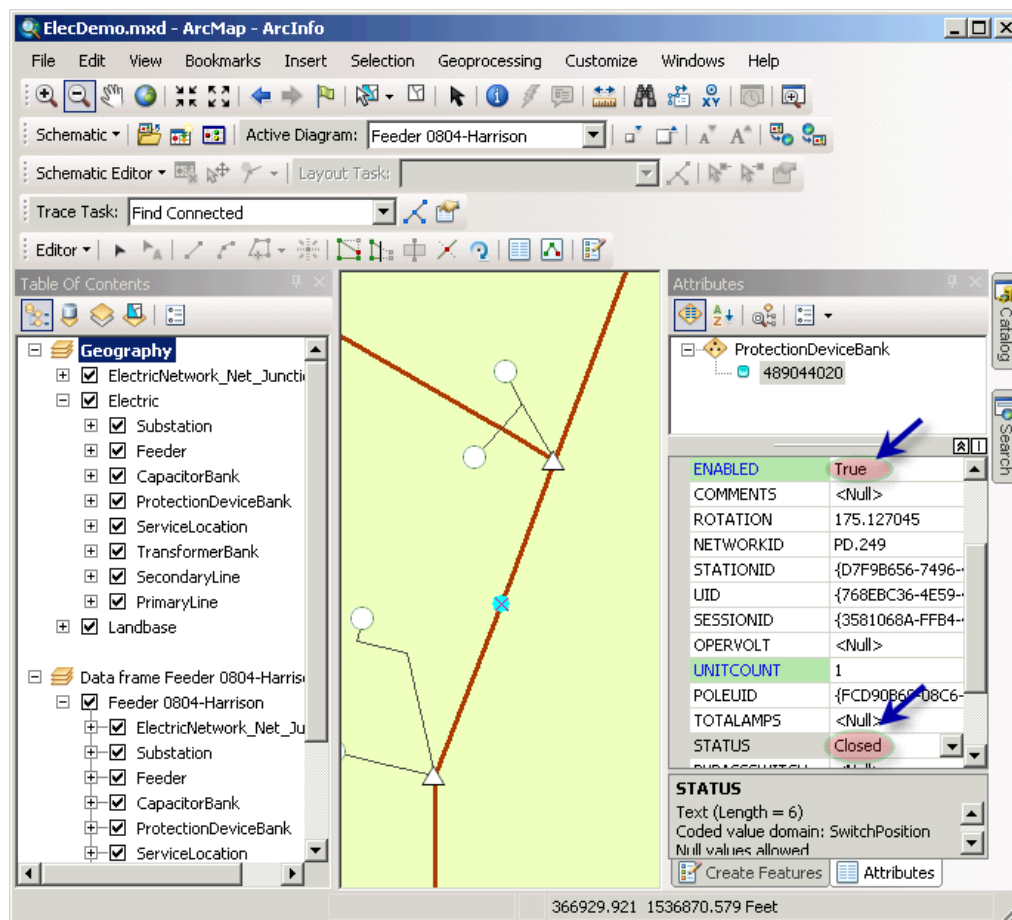


16. Click **Apply** and click **Close**.
17. Right-click the schematic layer in the table of contents, click **Schematic Selection**, then click **Zoom To Selected Schematic Features**.



18. Click the **Propagate Schematic Selection To Map** button .
19. Activate the **Geography** data frame and click **Selection**, then click the  **Zoom to Selected Features** menu.
20. Click the **Zoom In** tool  and zoom in to the selected ProtectionDeviceBank.
21. Click **Customize** on the main menu and click **Customize Mode**.
22. On the Toolbars tab, check the **Editor** check box and click **Close**.
The Editor toolbar is now displayed.
23. Arrange this new toolbar under the main menu.
24. Click the **Editor** drop-down menu and click **Start Editing**.
The **Editing** window opens.
25. Make sure the ProtectionDeviceBank is still selected in the map. If it is not, click the **Edit** tool on the Editor toolbar and click the ProtectionDeviceBank.
26. Click the **Attributes** button on the Editor toolbar.
The **Attributes** window opens.
27. Change the Enabled field from False to True.
28. Change the Status field from Open to Closed.

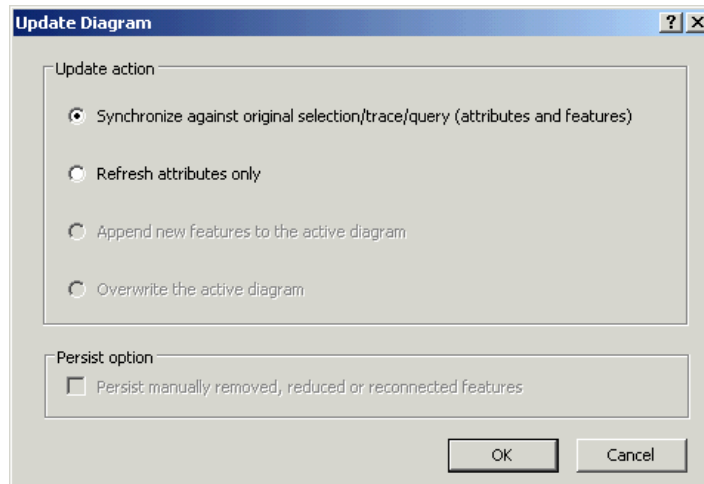
The blue arrows on the following screen shot show the changes that should have been done at the end of this step:



29. Click the **Editor** drop-down menu and click **Save Edits**.
30. Click the **Editor** drop-down menu again and click **Stop Editing**.
The **Attributes** window closes.
31. Activate the **Feeder 0804-Harrison** data frame.
32. Click the **Schematic** menu on the Schematic toolbar and click **Update Diagram**.
The **Update Diagram** dialog box appears.

Tip: The **Update Diagram** dialog box also opens when right-clicking the schematic layer in the table of contents and clicking the **Update Diagram** shortcut menu.

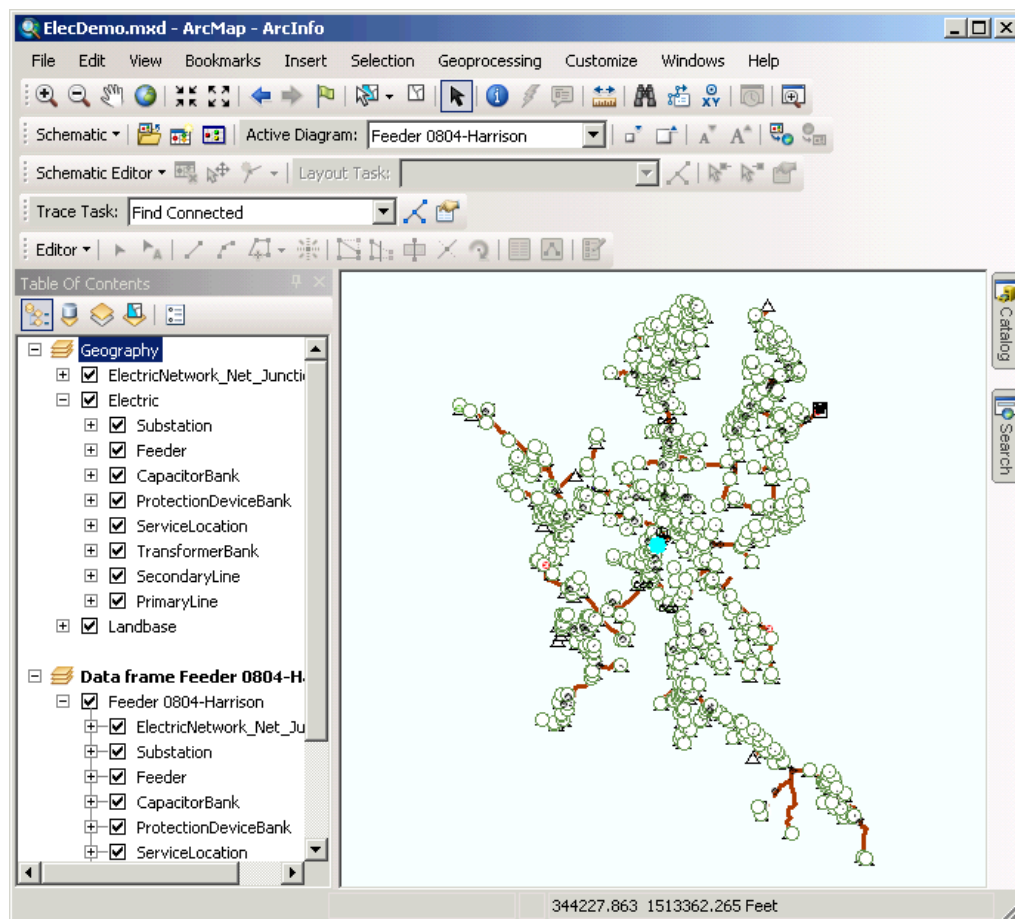
33. Make sure the **Synchronize against original selection/trace/query** option is checked.



34. Click **OK**.

The entire content of the schematic diagrams is updated according to the new trace result based on the trace parameters that were maintained in the schematic database when the diagram was generated.

35. Click **Full Extent** .





Since the switch was closed, the trace goes beyond the switch. Without selecting this new trace result in the map, Schematics has reexecuted the trace in memory and updated the diagram accordingly.

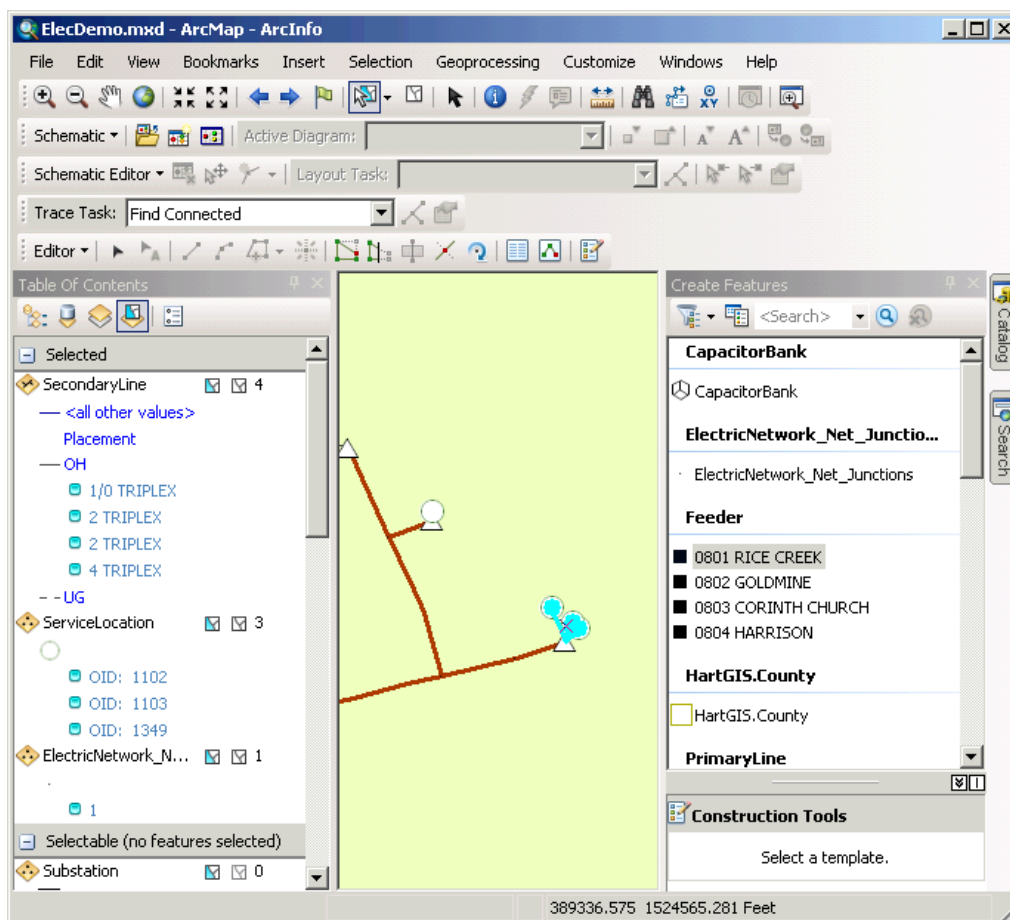
36. Remove the schematic diagram data frame.




Updating a diagram after deleting geographic features

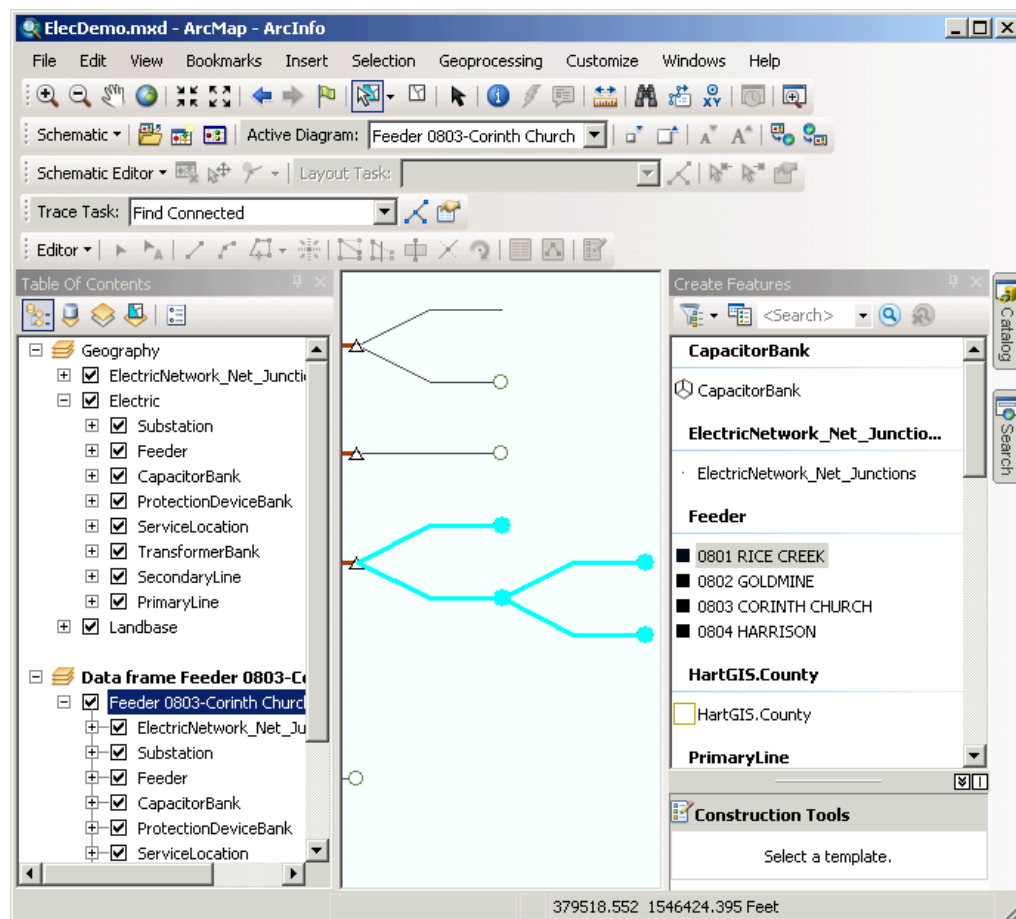
Steps:

1. If there are features selected in the map, click the **Selection** menu and click **Clear Selected Features**.
2. On the Editor toolbar, click the **Editor** drop-down menu and click **Start Editing**. The **Editing** window opens.
3. Click **Bookmarks** on the main menu and click **Delete Features**.
4. Click the **Select Features** tool  and select the same set of features as shown in the following screen shot.


If you click the **List By Selection** button  in the table of contents toolbar, you may have three selected ServiceLocations, four selected SecondaryLines, and one ElectricNetwork_Net_Junction:

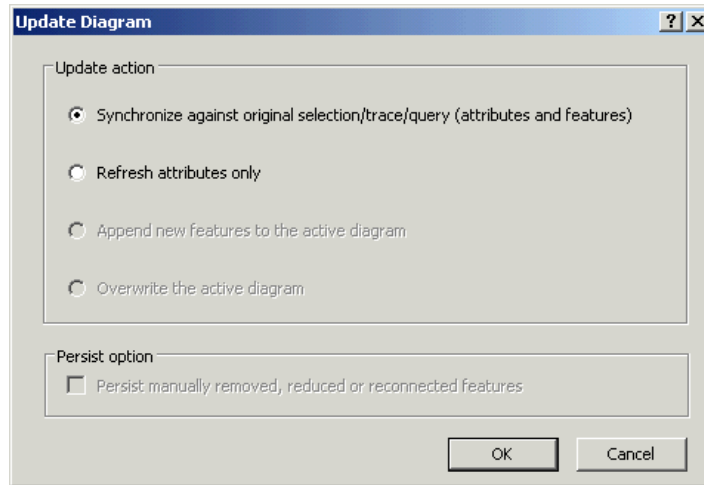


5. Click **List By Drawing Order** .
6. Click the **Open Schematic Diagrams** button .
The **Select Schematic Diagrams To Open** dialog box appears.
7. Navigate to the `Feeders` schematic subfolder of the ElecDemo schematic dataset in the `C:\ArcGIS\ArcTutor\Schematics\Schematics_In_ArcMap\ElecDemo` geodatabase.
8. Click `Feeder 0803-Corinth Church` in the diagram list and click **Add**.
The diagram appears in a new data frame.
9. Click the **Propagate Map Selection To Schematic** button .
The associated schematic features in the active diagram are selected.
10. Right-click the `Feeder 0803-Corinth Church` schematic layer in the table of contents, point to the **Schematic Selection** menu item, then click **Zoom To Selected Schematic Features**.

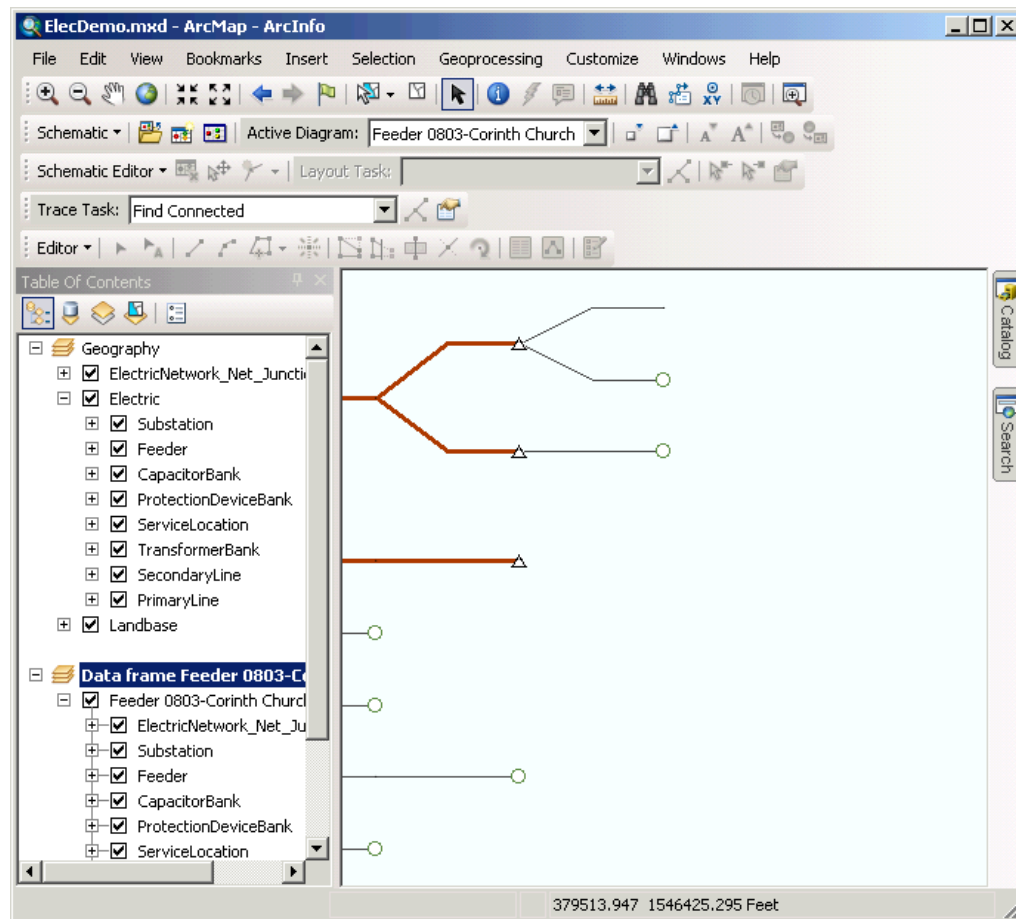


11. Activate the `Geography` data frame.
12. Click the **Edit Tool** button and press the DELETE key on your keyboard.
The selected `ServiceLocations`, `SecondaryLines`, and `ElectricNetwork_Net_Junction` are deleted.
13. Save the geographic feature edits and stop editing.

14. Activate the `Feeder 0803-Corinth Church` data frame.
15. Click **Selection** in the ArcMap main menu and click **Clear Selected Features**.
16. Click the **Schematic** menu on the Schematic toolbar and click  **Update Diagram**.
The **Update Diagram** dialog box appears, and the **Synchronize against original selection/trace/query** option is checked.



17. Click **OK**.
The schematic features that were selected before step 10 in the diagram no longer exist after the update:



18. Right-click the diagram data frame in the table of contents.
19. Click **Remove**.
20. Expand the *Geography* data frame in the table of contents.
21. Click **File** and click **Exit**.
22. Click **No** when the following message appears: Save changes to ElecDemo.mxd?