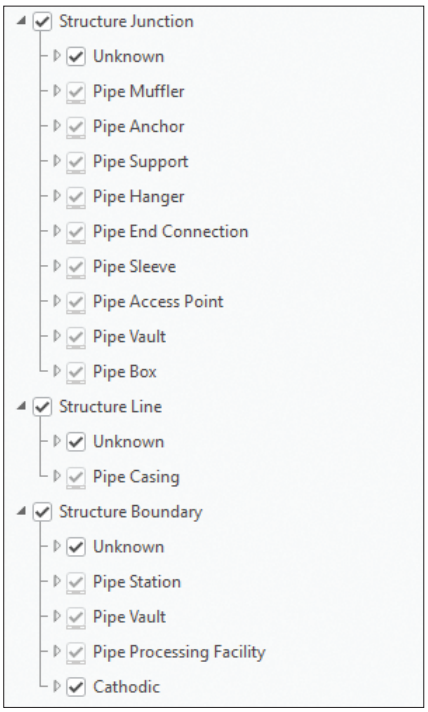
Tutorial 4-1: Exploring the structure network

1. From the **Datasets_For_UN_Skills_Book** folder, open **Gas and Pipeline Utility Network.aprx**.

2. From the **Catalog** pane, double-click the **Gas and Pipeline Network Editor** map to open it.

   Utility assets often have features or components that support or have an impact on reliability. They can be key elements that are inspected and maintained the way their counterparts are operated to provide service to customers. In the utility network, these features are modeled in structure networks that exist in every utility network. The structure network consists of one point layer (structure junction), one line layer (structure line), and one polygon layer (structure boundary), as well as two tables to support points and lines that share geometries (structure junction object, structure edge object).

3. In the **Contents** pane, expand the **Structure Junction**, **Structure Line**, and **Structure Boundary** layers.



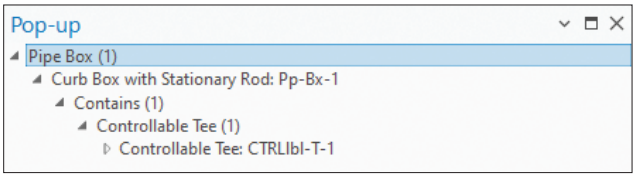
Explore structure junction features

4. Within the **Structure Junction** layer, right-click the **Pipe Box** layer and click **Attribute Table**.

   This will return one record in the table.

5. Select the record and press **Ctrl+I** to open the **Pop-up** information window.

6. At the top of the **Pop-up** window, click the arrow next to **Pipe Box** to expand the list of objects.



   The **Pipe Box** has internal objects. Other examples of junctions might include anchors, braces, or other supporting devices.

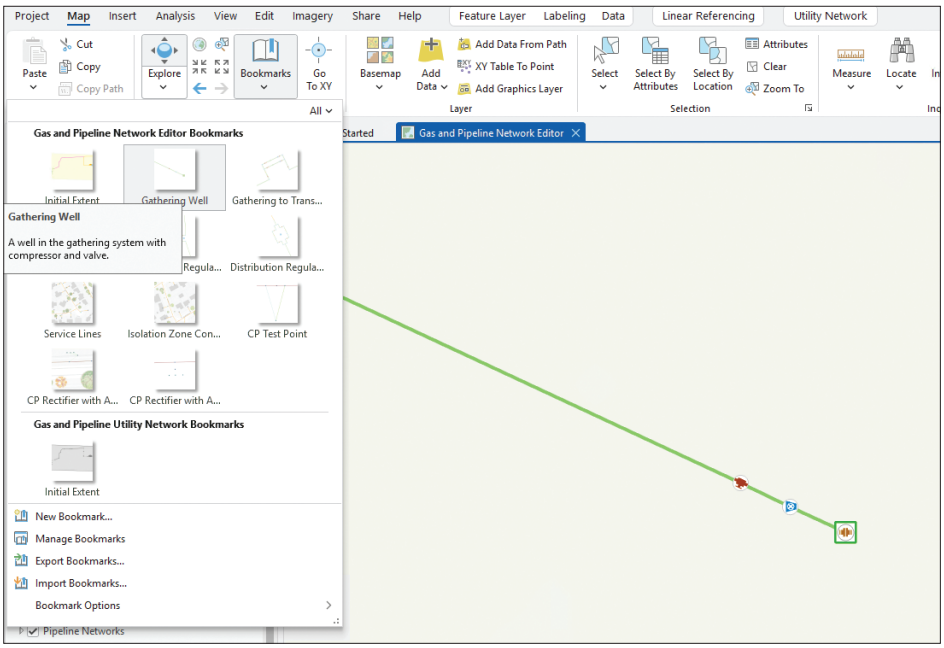
7. Close the **Pop-up** window and the attribute table.

Explore structure line features

The **Gas and Pipeline Network Foundation** map consists of a gathering zone to show how wellheads can be modeled and connected to transmission pipeline features. One example of a structure line feature is the pipe casing feature in the **Structure Line** layer.

8. On the ribbon, click the **Map** tab. In the **Navigate** group, click **Bookmarks** and select the **Gathering Well** bookmark.

   The map will zoom to the **Gathering Well** location.



Open the Create Features pane

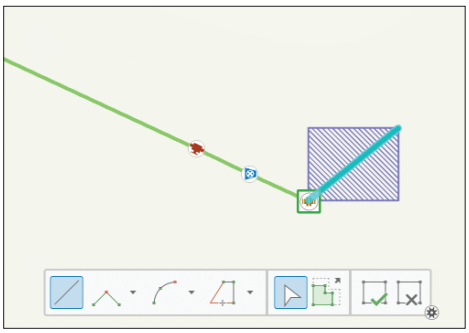
Pipe casing is used to provide structural integrity for the gas to flow to the collection elements of the wellhead. You will create a casing feature to be represented on the map.

9. Click the **Edit** tab. Within the **Features** group, click **Create** to open the **Create Features** pane.

10. In the **Create Features** pane, search for Casing to return the **Structure Line : Pipe Casing** feature template.

11. Click the **Casing** feature.

12. Beneath the feature name, select the **Line** tool to create a line from the wellhead in the center of the **Map** view in any direction.

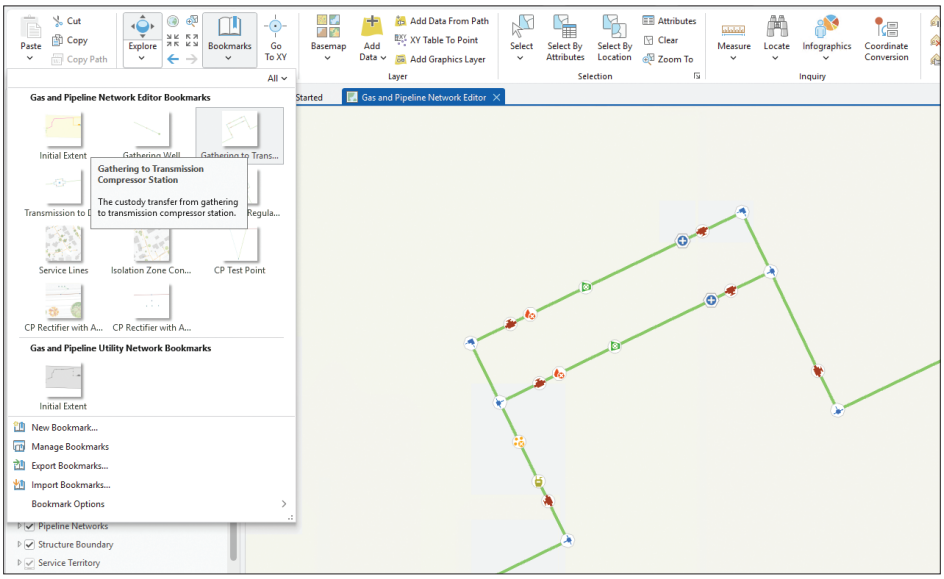


13. At the bottom of the map, on the **Configure** toolbar, click the **Finish** button (a square with a checkmark).

Explore structure boundary features

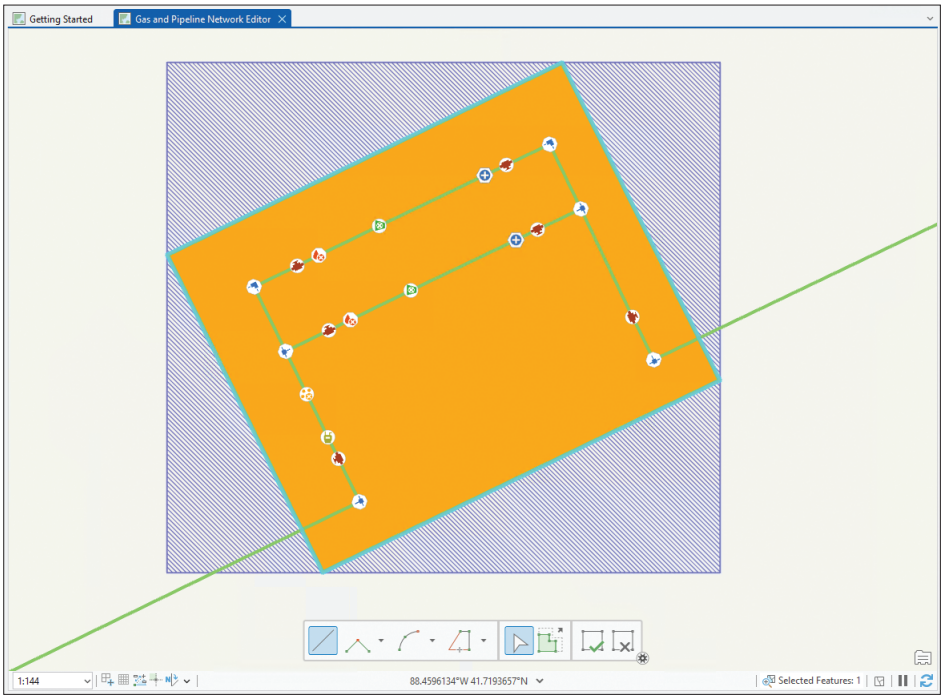
The **Gas and Pipeline Network Foundation** has a transmission compression station where the gathering zone facilities are shifted to transmission pipes. The **Structure Boundary** layer has a plant station to represent the station as a facility.

14. From the **Bookmarks** list, select the **Gathering to Transmission Compression Station** bookmark.



15. Open the **Create Features** pane.
16. Using the search bar, type Station Structure to return the **Structure Boundary : Pipe Station** feature class. Click the **Station Structure** feature.
17. For **Station Name**, click <**Null**> and type Baseline Station as the name of the facility. Press **Enter**.
18. Under the feature name, click the **Polygon** tool.
19. On the map, use the **Polygon** tool to create a box around all the features of the facility.

    This box will become the pipe station for the transmission compressor station.



20. Click the **Finish** button.
21. On the **Edit** tab, in the **Manage Edits** group, click **Save** to save your edits.

Tutorial 4-2: Working with domain networks

The utility network is often described by a commodity or domain, such as electric, gas, water, or communications. The behavior of electric power down a line is significantly different from gas or water pipes. Domain networks have a number of feature layers to model the unique properties of utility assets that have operational properties.

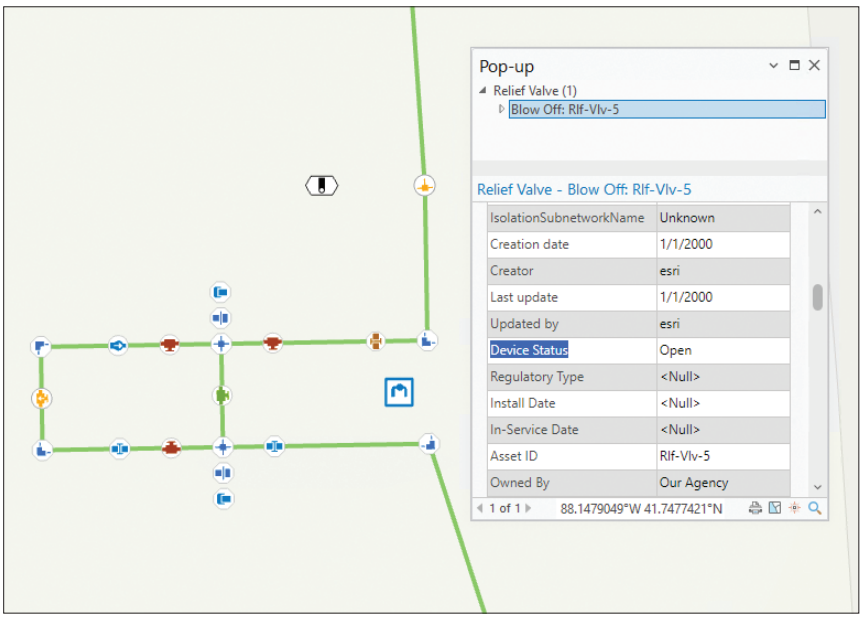
Explore pipeline device features

The **Device** layer is unique in that features modeled as devices have action, can enable or disrupt flow, and can meter, monitor, or modify flow of electricity, gas, water, or any commodity that's modeled. One example of a pipeline device can be found by using the **Distribution Regulator Station** bookmark.

1. Open the **Bookmarks** list and click the **Distribution Regulator Station** bookmark.

2. On the map, toward the left side of the station, click the **Relief Valve** (orange valve symbol) to view the **Pop-up** window.

   You can tell that this is a pipeline device by looking at the **Device Status** field. It shows as **Open**, which means that it's flowing. The **Relief Valve** can be converted to a closed state or bypassed using other valve configurations.



Explore pipeline junction features

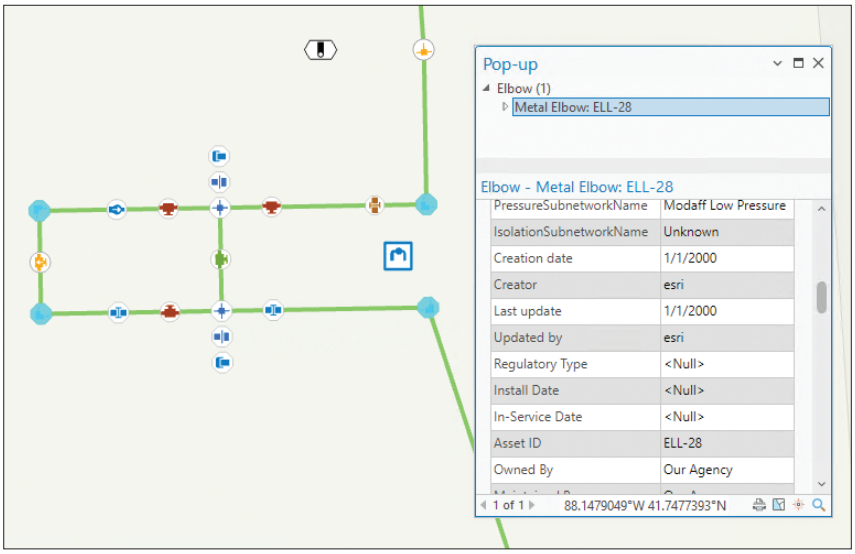
The **Junction** layer represents points that are like devices. They are connected features but don't have action. They are akin to connectors, sleeves, flanges, and elbows. You can explore pipeline junctions using the same **Distribution Regulator Station** bookmark.

3. In the **Contents** pane, expand the **Pipeline Junction** layer. Right-click the **Elbow** layer and click **Selection** > **Select All**.

   All the elbows in the station are now highlighted.

4. Click one of the selected elbows and scroll through the attributes in the **Pop-up** window.

   You can see that these devices are in a fixed-flow configuration.



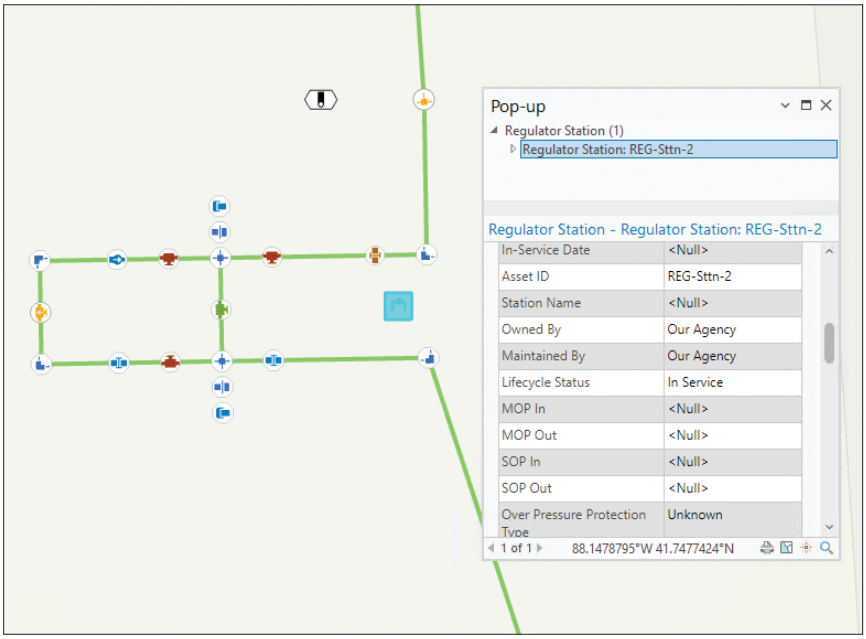
5. Click the **Map** tab. In the **Selection** group, click **Clear** to clear your selection.

Explore pipeline assembly features

Assemblies are point features that function as containers, such as vaults, bays, or housings for devices and junctions that have a common purpose. Using the same **Distribution Regulator Station** bookmark that you used for the devices and junctions, you can identify the station's assembly feature.

6. On the map, toward the right of the station, click the **Assembly** feature (square symbol).

7. In the **Pop-up** window, review all the features that are contained by the facility.

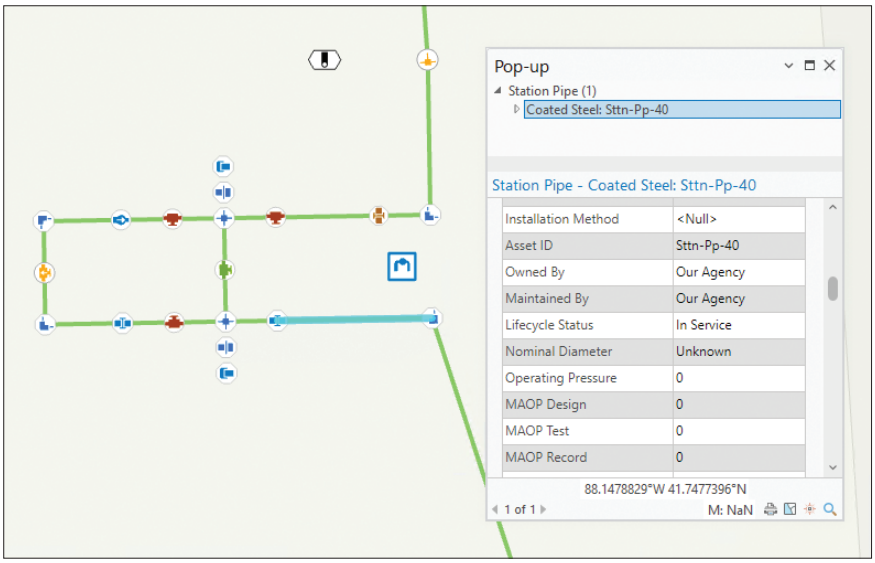


Explore pipeline line features

The **Line** layer represents pipelines, cables, or wires that are the primary conduit for the commodity specific to the utility model. **Line** features occur at all scales and capabilities for any utility model.

8. On the map, click any line feature and review its **Pop-up** window.

   In the **Distribution Regulator Station**, the line features represent station pipes.



Explore pipeline subnetwork lines

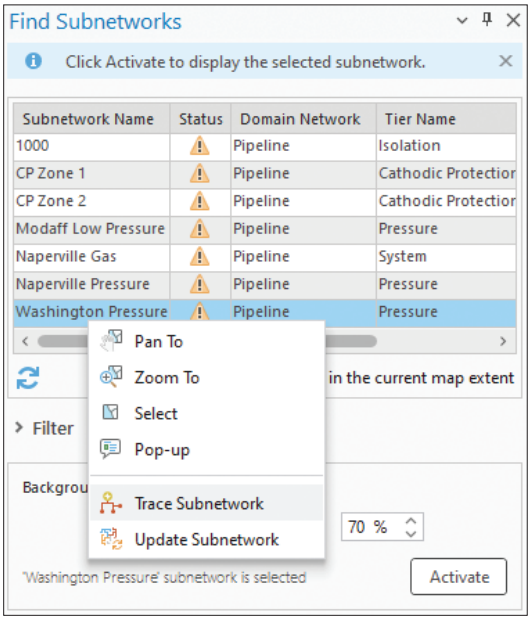
Subnetwork lines represent the feeders or circuits and are a repository of key attributes from all the domain features (**Devices, Junctions, Assemblies**, and **Lines**). To see an example of a subnetwork line, you'll browse the **Washington Pressure** subnetwork.

9. In the **Bookmarks** list, click **Washington Pressure Subnetwork**.

10. Click the **Utility Network** tab. In the **Subnetwork** group, click the **Find** button to open the **Find Subnetworks** pane.

11. In the list of subnetworks, find the **Washington Pressure** subnetwork.

12. Right-click the subnetwork and click **Trace Subnetwork**.



13. Right-click the subnetwork again and choose **Pop-up** to open the **Pop-up** window.

Explore nonspatial objects

Tables are provided in the utility network to enable objects that augment the structure network and any type of network domain. These tables can fully participate with structure and domain network features. For each domain, there's a single edge object (representing lines with shared geometry) table that models lines using nonspatial records and a single junction object (representing point features with shared geometry) table that can be used to model devices, assemblies, or junctions as nonspatial records. Modeling features using nonspatial objects can be highly performant when working with large datasets and when representing features with a shared geometry or congested map area. For examples of nonspatial objects, consider fiber strands in a cable (domain network) or ducts in a duct bank (structure network).