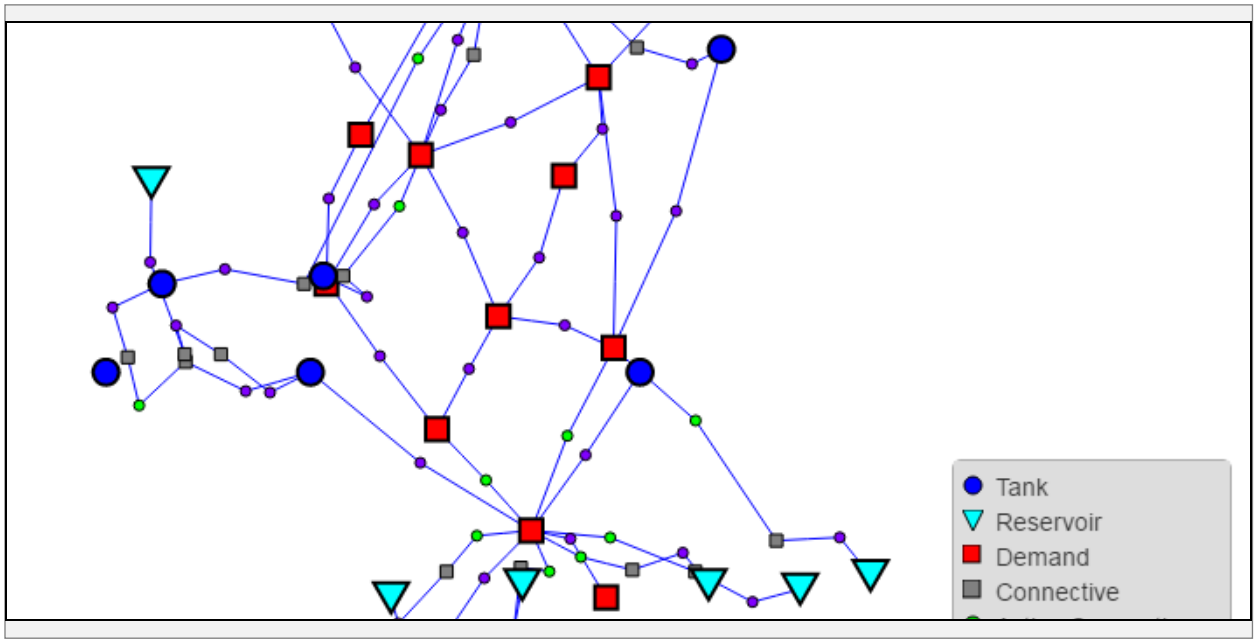
CityWater Tutorial

CityWater – View Conceptual Schematic

How to view a conceptual schematic for your project



Objectives

This tutorial reviews the conceptual schematic tools available in the Pressure Zone Schematic add-on for CityWater™.

Prerequisites

- Login and User Profile

Requirements

- CityWater Account with Pressure Zone Schematic Add-on
- Internet access

Time

- 10–20 minutes

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1 Getting Started

CityWater provides a useful way to visualize your EPANET project using conceptual zones and schematics. You will need the Pressure Zone Schematic add-on for CityWater and at least one EPANET model uploaded to complete this tutorial.

If you are not already logged in to your CityWater account, access the Aquaveo™ Portal by doing the following:

1. Open a web browser. For the best experience, use Google Chrome, Mozilla Firefox, or Safari.
2. Navigate to the Aquaveo Portal using this address: https://portal.aquaveo.com
3. Log in to your CityWater account. For this tutorial, you will need to use an administrative account.
4. Open the CityWater app by selecting its app icon in the Apps Library.

2 Conceptual Zone Layers

The Pressure Zone Schematic add-on for CityWater includes the conceptual approach to understanding the water distribution model. Using proprietary algorithms, the model is automatically delineated into conceptual zones, roughly equivalent to pressure zones.

There are two major types of conceptual zones: hydraulic zones and boundary zones. The hydraulic zones consist of at least one node, but are often composed of many nodes and links that are hydraulically connected (i.e. no boundaries made up of valves or pumps to separate them).

Boundary zones consist of one or more pumps, valves, or closed pipes that separate the hydraulic zones. In the Pressure Zone Schematic add-on, two additional layers are provided on the map for visualizing the conceptual zones.

To view the zone layers:

1. Navigate to the Map page for one of your projects by selecting the **Map** button for that project.
2. Select the “Zone” variable in both the Node Layer and the Link Layer drop down menus in the Layers tab on the left.

Note: On small screens, the Layer controls may be hidden. Use the button in the header to show the controls.

3. Select any element and view its properties to view the Zone Name.

The naming of zones is done automatically on the Legend with the following convention:

- Hydraulic zones are named with an “N”
- Boundary zones are named with an “L”

3 Conceptual Schematic

The Conceptual Schematic provides a simplified visualization of the conceptual zones and provides a high level overview of the most important elements in the model. From the map, access the Conceptual Schematic by:

1. Select the **Go To Schematic** link from the Navigation menu.

Note: On small screens, the Navigation menu may be hidden. Use the button in the header to show the menu.

The Conceptual Schematic is an interactive network diagram. The various nodes on the network represent conceptual elements of the model, including both the hydraulic zones and the boundary zones. The links between the nodes represent the relationships between each zone.

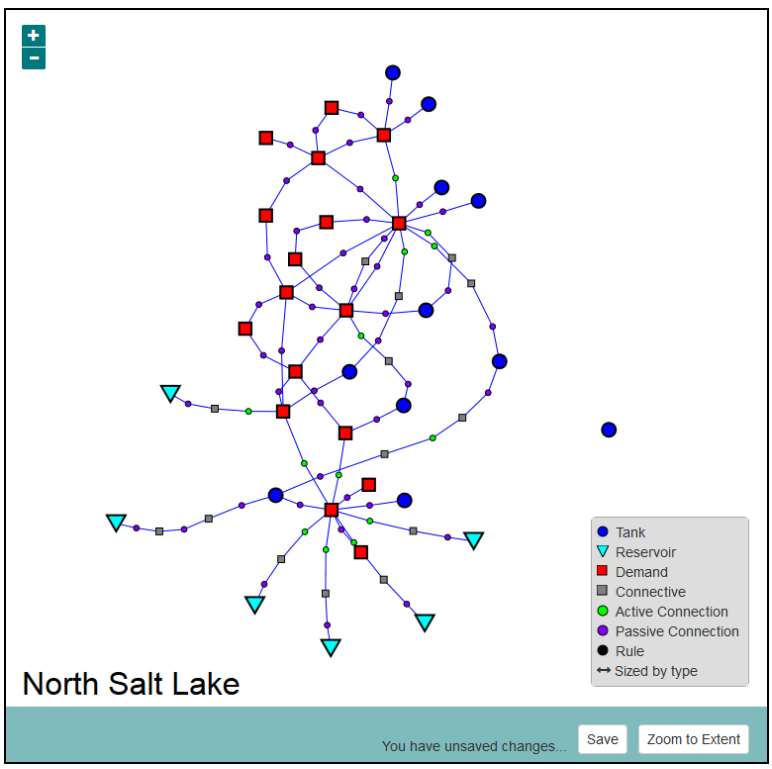

Figure 1: Schematic example in Free Flow mode

4 Hydraulic Zones on the Schematic

Use the legend at the right to decipher the type of each node. The hydraulic zones are divided into two categories:

- Demand Hydraulic Zones, shown as red squares
- Connective Hydraulic Zones, shown as gray squares

As the names suggest, the Demand Hydraulic Zones are hydraulic zones where demand is applied in the model. The Connective Hydraulic Zones have no demand applied and are essentially pass through nodes and links. Each tank and reservoir in the model is also represented as individual nodes on the conceptual schematic.

1. Select one of the Demand Zones (red squares).
2. Review the properties that are displayed in the Properties tab in the left menu.
3. Notice that it includes a count of the different types of elements in that zone. Remember that the hydraulic zones represent a group of nodes and links that are hydraulically connected.
4. Review the other properties provided for each demand zone, which include elevation, velocity, flow, headloss, demand, head, pressure, and quality.

Since the hydraulic zones consist of a group of nodes and links, the values for these properties represent an average value over all the elements in the zone. If the model is an extended period simulation, these values are also averaged over all the time steps in the model. These statistics help you to quickly understand the role the zone plays in the model (e.g., high pressure zones, low flow zones, high and low Demand Zones).

5. Select one of the tank elements (blue circles) on the schematic.

A similar set of properties is displayed for the tank in the Properties tab, but note that the tank count is one. This will always be the case for tanks and reservoirs. In this case, the values of the properties shown will only be averages if the model is an extended period simulation.

6. Click on the **Tank Count** link in the properties.

This will display the Components table underneath the Properties table in the left-hand menu. In this case, there is only one component, the single tank. Relevant model properties for the tank are displayed here.

7. Click on the value of the Label property for the tank. This will take you to the map. Notice that it zooms to and highlights the tank.
8. Click on the **Go To Schematic** link in the Navigation menu at the left to return to the schematic.

5 Boundary Zones on the Schematic

The boundary zones are also divided into two categories:

- Active Connection Boundary Zones, shown as green circles
- Passive Connection Boundary Zones, shown as purple circles

Active Connection Boundary Zones have at least one pump in them, indicating that they add energy to the system. The Passive Connection Boundary Zones have no pumps and usually consist of valves or closed pipes. Notice that there is always a boundary zone between any of the tanks, reservoirs, or hydraulic zones.

1. Select one of the Active Connection Zones.
2. Review the properties displayed in the Properties tab in the left-hand menu.

The properties include a count of the valves, pumps, and pipes that are included in the zone. They also include averaged values for applicable model results and parameters.

Negative values for flow and velocity indicate that they flow in the opposite direction of the positive flow direction.

Flow directions are not displayed by default and will be discussed more in the Display Options section.

3. Click on one of the element count links (such as Pump Count) to show the properties for each of the individual components of that type.

You can link to the map as before by selecting either the individual component label to highlight that component or by clicking the zone label to highlight all of the elements in the zone. The latter is often useful to visualize the boundary between zones.

6 Display Options

The Conceptual Schematic provides several display options to aid in developing a quick understanding of the distribution system represented by the model. The display options are grouped into the following categories: Sizing, Display, and Pinning.

6.1 Sizing

The sizing display options allow you to adjust the size of the nodes on the Conceptual Schematic by type or by value. The default is to display by type, emphasizing the Tanks, Reservoirs, and Demand Zones.

1. Select the Display tab in the left-hand menu.

2. Change the types of the nodes that are emphasized using size by checking the appropriate boxes on or off.
3. Size the nodes by model values selecting the **By Value** radio option and then selecting the desired value.

In some comparisons, the tanks and reservoirs tend to skew the display, so they are not included by default.

4. To include the tanks and reservoirs, check the box next to the **Include Tanks and Reservoirs** control.

6.2 Display

These display options allow you to display labels on each node in the Conceptual Schematic, the flow direction indicators, the rule nodes, and the elevation scale if pinned by elevation. These options are all off by default to prevent the schematic from becoming too cluttered.

1. Select the Display tab by clicking on it in the left-hand menu.
2. Turn on the labels by selecting the checkbox next to the Labels display option.

Tanks and Reservoirs are named according to the element name in the model. The hydraulic and boundary zones are named using the “N” and “L” naming convention, which is not very intuitive. However, you can customize the labels to a more easily understood name.

3. Select one of the Demand Zones (indicated by a red box).
4. Click on the **Edit** button next to the zone label property.
5. Enter the desired name in the dialog that appears and press **Save**. The label updates on the schematic and will be saved the next time you access it.

6.3 Free Flow Pinning

The schematic simulates a repelling force at each node to automatically sort itself out by default. While this is convenient, it also means the diagram will rarely be generated with the same orientation twice. Fortunately, the Conceptual Schematic allows you to pin nodes and save the pinned locations. This allows you to orient the schematic to your liking.

1. On the Display tab, select Free Flow as the Mode.
2. While holding the Ctrl button on the keyboard, click and drag any of the nodes on the schematic.
3. Release the mouse button when you have moved the node to the desired location.
4. Repeat this process on three more of the schematic nodes so that you have four pinned nodes total.

5. Notice that the footer of the Conceptual Schematic page displays a status message: “You have unsaved changes…” and refers to the pinned node positions.
6. Press the **Save** button to save all changes and then refresh the page in the browser.

Changes are saved automatically every few minutes. You can also press the **Save** button in the footer to save the changes. Notice that the pinned nodes remain pinned when the schematic is regenerated and the rest of the nodes in the schematic automatically sort themselves based on the pinned nodes.

7. Unpin any pinned node by holding the Ctrl button and clicking on it with the mouse.
8. Clear all the pinned nodes by selecting Pinned and then selecting Free Flow. This restores the behavior of the schematic to its default state.
9. Press the **Save** button to save the changes.

6.4 Pinning by Elevation or Head

Another useful pinning option is to pin the nodes in the schematic by their elevation or by their head:

1. Select the Display tab on the Navigation menu.
2. Select **Pinned** as the Mode.
3. Select By Elevation under Pinning to have each node pinned by the average elevation of the zone.
4. Select By Head under Pinning to have each node pinned by the average head of the zone.
5. Turn on the display of the elevation scale by checking the box to the left of the Elevation Scale control.
6. Press the **Save** button to save the changes.

Only the Demand Hydraulic Zones, Connective Hydraulic Zones, Tanks, and Reservoir nodes are affected. The vertical ordinate of these nodes is adjusted such that the vertical positioning of the nodes is relative to their average elevations. The horizontal positioning is unaffected. If you find some nodes are overlapping after pinning by elevation, you can drag them apart horizontally.

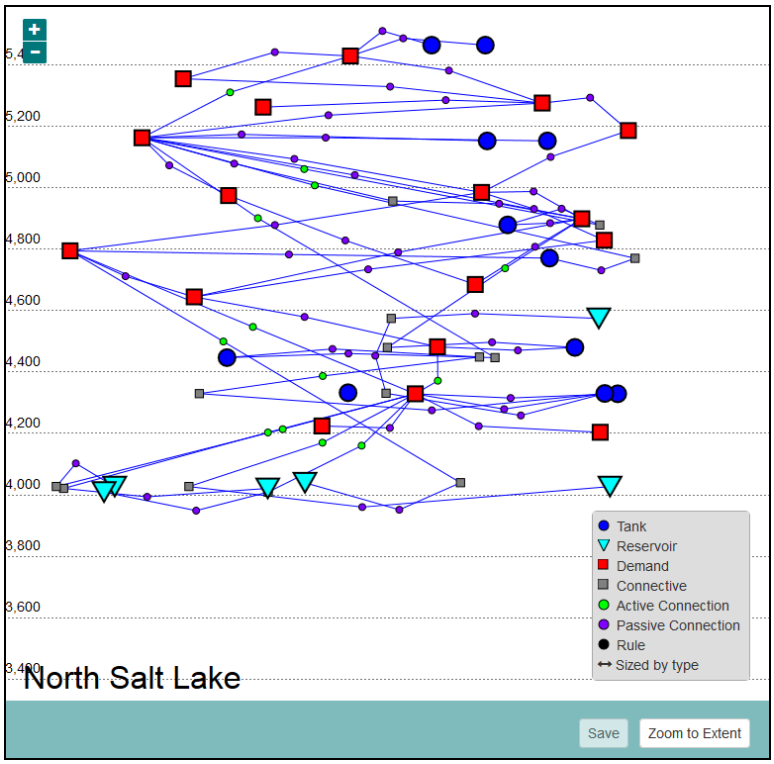

Figure 2: Pinned by elevation

7 Conclusion

This concludes the “View Conceptual Schematic” tutorial for CityWater. Items discussed in the tutorial included:

- Viewing zone layers
- Accessing the conceptual schematic
- Using hydraulic zones
- Using boundary zones
- Using the conceptual schematic display options

