



TRAINING GUIDE

## Water Flushing

# Water Flushing

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The water flushing modules allow you to setup a plan for systematically flushing out a series of hydrants in your water system along a route, or tracking a direct hydrant flushing. The flushing records track the volumes, dates, and times of each flushing against the hydrants, pipes & valves.

## Contents

Water Flushing Routes .....	2
Water Flushing Route Child Records .....	4
Water Flushing History .....	7
Water Flushing History Child Records .....	8
Direct Hydrant Flushing .....	12
Water Loss .....	13

## Water Flushing Routes

The Water Flushing Routes module allows you to set up routes for flushing valves, hydrants, and pipes. This module also displays flushing history recorded in the Water Flushing History module for each route, as well as work orders associated with the flushing history. We will look at the Water Flushing Routes module as it is used in the Lucity Web interface.

Water Flushing Routes is located in the Water > Water Distribution > Flushing menu.

Route ID	Inactive Route	Zone Text	Reach	Type Text	Reason Text	Total Duration	Total Target Vol	Total Pipe Length
1	<input type="checkbox"/>	Pressure Zone 1	Standard	Dead-End	Semi-Annual Cleaning	0.00	0.00	
2	<input type="checkbox"/>	Pressure Zone 1	Standard	Low Point	Semi-Annual Cleaning	0.00	0.00	
3	<input type="checkbox"/>	Pressure Zone 2	Standard	Undirectional	Semi-Annual Cleaning	0.00	0.00	
4	<input type="checkbox"/>	Pressure Zone 2	Standard	Low Point	Annual Cleaning	0.00	0.00	
5	<input type="checkbox"/>	Pressure Zone 2	Standard	Low Point	Annual Cleaning	0.00	0.00	
6	<input type="checkbox"/>	Pressure Zone 2	Standard	Low Point	Annual Cleaning	0.00	0.00	
7 - College Blvd	<input type="checkbox"/>	Pressure Zone 1	Street Length	Dead-End	Annual Cleaning	0.00	0.00	

The Water Flushing Routes view displays information for various Water Flushing Route records. The fields displayed in this view are completely customizable for your organization (or department, or user, etc), so may vary. Each of the fields displayed in the view are filterable and sortable.

You can click the form button beside any record to see the detailed information for the record. This form is also completely customizable, but will generally display the following information.

Route Rec #  Route ID\*   Inactive Route

**Attributes**

Zone <input type="text" value="1 Pressure Zone 1"/>	Total Duration <input type="text" value="0.00"/>
Reach <input type="text" value="Standard"/>	Total Target Vol <input type="text" value="0.00"/>
Type <input type="text" value="2 Dead-End"/>	Total Pipe Length <input type="text" value="0.00"/>
Reason <input type="text" value="2 Semi-Annual Cleaning"/>	
Location <input type="text"/>	

**Work Data**

Default WO Cat <input type="text"/>	<input type="checkbox"/> No WO/PM/Req
WO Comment <input type="text"/>	

General Comment

## Header Information

The **Route Rec #** is an auto-generated unique identifier for this record. The system uses this record for look-ups behind the scenes.

The **Route ID\*** is another unique identifier, selected by the record creator. This can be any combination of numbers, letters and symbols to help you identify this specific route.

**Inactive Route** allows you to remove the route from selectability in picklists, in essence, to “retire” the route, but maintain the historical linked information to the route.

## Attributes

- **Zone** is a user-defined area picklist, likely a list of pressure zones that the route is located in.
- **Reach** is a text field that allows anything to be typed in it.
- **Type** allows you to select the type of route it is (unidirectional, dead-end, etc).
- **Reason** provides a way to track the reason the flushing route was created. This could be due to a set cleaning schedule.
- **Location** is a text field that allows you to fill in any general location information.
- **Total duration**, **Total Target Volume**, and **Total Pipe Length** are all auto-calculated based on the associated assets to the Water Flushing Route. For example, the Total Pipe Length is a sum of all linked pipes to the Hydrants being flushed.

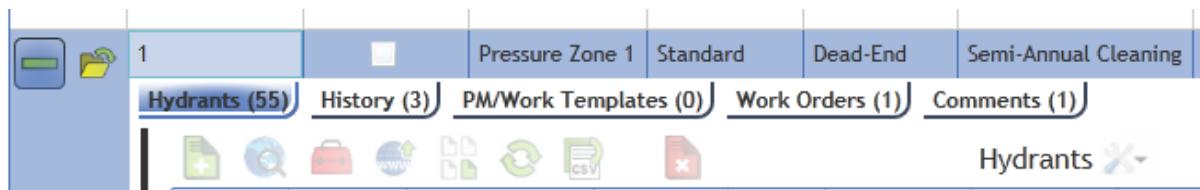
## Work Data

- **Default Work Order Category** allows to you to set a type of category which will be auto-filled in whenever a Work Order, etc. is generated from this record.
- **No Work Order/Pm/Template** is a checkbox, which, when set to true, will remove this route from any related Work Order/Pm/Template picklists so it is not selectable. This will also remove the ability to create these records directly from the record from the Water Flushing Route view.
- **WO Comment** is a text field that allows any comment to be filled in that should carry over on the asset to the work order.

## Other

Other user-defined custom fields can be included for any additional information needing to be tracked, as well as a short general comment field. Creation fields and Last Modified fields will track when and who created and last updated this record.

## Water Flushing Route Child Records



When hitting the + button, you display related child records for each Water Flushing Route record. The child records displayed vary, but could include: Hydrants (including the linked Valves and Pipes), Water Hydrant Flushing History for that Route, PM/Work Templates that route is assigned to, Work Orders, and Comments.

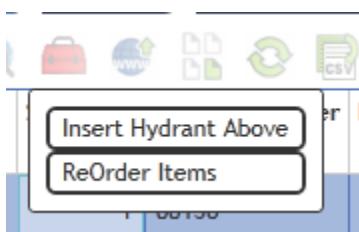
### Hydrants:

This child grid is where all the hydrant asset information related to the water flushing is stored. The individual hydrants that are on the water flushing route are tracked here. Each hydrant record is specific for the water flushing route: it tracks not only the Hydrant number, but the sequence in the route, the individual flush type, and the Target Flush Duration, Gallons Per Minute, and Volume for each hydrant. Additional fields can also be included.

The form displays the following fields:

- Sequence:** 1
- Flush Type:** (dropdown menu)
- Hydrant Number\***: 00138
- Target Flush Duration**: (dropdown menu)
- Target GPM**: (dropdown menu)
- # of Nozzles Used**: (dropdown menu)
- Target Volume**: (dropdown menu)
- Notes**: (text area with scroll bars)

Toolkit items in the hydrants view allows the hydrants that are added to be reordered, or that allows you to insert a new hydrant at the top of the list (rather than the bottom, which is the default).



The pipes and valves for each hydrant can be linked as well. This allows calculation of the total length of pipes flushed, and additional information about valve exercising.

	Sequence	Hydrant Number	Building No	Address	Street Name	Street Suffix
	1	00138				

Valves (1) Pipes (1)

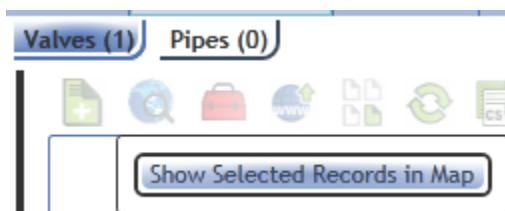
In the valves grid, the toolkit provides an option to Change Hydrant Sequence Number or to Open Closed Valves.

Recommendation: It is recommended to have a dummy hydrant record that you add to the end of every Flushing Route to help in cleanup. This tool is run in the Valves grid for the dummy hydrant.

Running the Open Closed Valves process on the Dummy Hydrant will add all of the closed valves from the rest of the route to the Valves grid. Those valves that should not be opened can simply be deleted from the grid.

47 Dummy Hydrant									
Valves (1) Pipes (0)		Valves							
		to Text	Building No	Address	Street Name	Street Suffix	Street Type	Direction	Open Text
	00001		9520		MISSION		RD		

For any of these route, hydrant, pipe or valve assets, you can use the show in map feature for all selected in order to view in the GIS Web map.



### History:

This view shows some basic information about historical flushing history. Water Flushing History is also a separate module to track additional dates, multiple assets, and individual amounts of the flushing. All the information for a historical event will roll up into this child record. This includes Total Volume & Total Pipe Length. More detailed event information can be found by opening up the History record separately. See *Water Flushing Route History section for more details*.

### PM/Work Templates:

When a flushing route is included on a template or scheduled work order (PM), the route is automatically linked to that PM or Template, which is displayed in the child grid. The details shown will include PM/Template ID and Text, Category/Task/Problem for the PM/Template, and details about what kind of PM/Template it is. Toolkits available for these PM/Templates are: Calculations for Average Durations and Estimates based on Historical Data.

### Work Orders:

When a flushing route is used to generate a work order, the route is automatically linked to that work order, which is displayed in the child grid. The work orders may display additional information about the water flushing process, including labor, time, materials, etc.

### Comments:

Allows for the additional tracking of an unlimited number of text comments. These comments can also track who and when each comment record was created or last modified.

Finally, the Water Flushing Routes module has two toolkit items called “Create Flushing History and WO for Current Filter” and “Create Flushing History and WO for Selected Records”.

The screenshot shows a software interface titled "Water Flushing Routes". At the top, there is a toolbar with various icons. Below the toolbar, a header bar displays "Flushing Routes" and a dropdown arrow. The main area contains a table with two rows. The first row is highlighted with a yellow background and contains the text "Create Flushing History and WO for Current Filter". The second row contains the text "Create Flushing History and WO for Selected Records". To the left of the table, there are filter buttons for "Zd" and "Pr". The table has three columns: "Total Duration" and "Total Target Vol" (both showing 0.00). At the bottom of the table, there are buttons for "Pressure Zone", "Standard", "Dead End", and "Scrubbing Cleaning".

These will allow you to select all filtered or selected routes you are viewing and generate new flushing histories for them, along with an associated work order. The work order will automatically include the flushing route as an asset. Depending on your Water Option settings, the following assets may also be included:

- In Flushing Route, Copy Hydrants to Work Orders with Tool
- In Flushing Route, Copy Valves to Work Orders with Tool
- In Flushing Route, Copy Pipes to Work Orders with Tool

## Water Flushing History

The Water Flushing History module allows users to record water flushing data and attributes, as well as track the flushing records related to valves, hydrants, and pipes. This module allows users to record flushing data using the routes defined in the Water Flushing Route module. We will look at the Water Flushing History module as it is used in the Lucity Web interface.

Water Flushing History is located in the Water > Water Distribution > Flushing menu.

The screenshot shows the Lucity web application interface for Water Flushing History. At the top, there is a navigation bar with icons for Home, Water Flushing Routes, Water Flushing History, and other system functions. Below the navigation bar is a toolbar with various icons for file operations like New, Open, Save, Print, and CSV export. The main area is titled "Water Flushing History" and contains a table with the following data:

Route ID	Last DateFlushed	Flushed By	Zone Text	Reach	Type Text	Reason Text	DateFlushed	Total Volume	Tot
1			Pressure Zone 1	Standard	Dead-End	Semi-Annual Cleaning			
1		Whitney Rose	Pressure Zone 1	Standard	Dead-End	Semi-Annual Cleaning	8/31/2016		
5		Alonso Culligan	Pressure Zone 2	Standard	Low Point	Annual Cleaning		0	
4		Lakia Norden	Pressure Zone 2	Standard	Low Point	Annual Cleaning		0	
3		Ilene Jamerson	Pressure Zone 2	Standard	Undirectional	Semi-Annual Cleaning		0	
2		Margy Merck	Pressure Zone 1	Standard	Low Point	Semi-Annual Cleaning		0	
1		Whitney Rose	Pressure Zone 1	Standard	Dead-End	Semi-Annual Cleaning	8/1/2016	0	

The Water Flushing History view displays information for the historic flushing events. These are separate than, but could be associated with, a work order. The fields displayed are customizable and easily sortable and filterable.

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

You can click the form button beside any record to see the detailed information for the record. This form is completely customizable, but will generally display the following information.

The form displays the following data:

Route ID*	1
Flushed By	Whitney Rose
Last Date Flushed	
Zone	1 Pressure Zone 1
Reach	Standard
Type	2 Dead-End
Total Volume	0
Total Pipe Length	0.00

Most of these fields are automatically filled in and un-editable. The values are being carried over from the route information. The Flushed By field and General Comment field are available for editing by the user. There also a number of custom fields available for any additional information that needs to be tracked.

## Water Flushing History Child Records

Hydrants (5)	Additional Dates (0)
Hydrants	

When hitting the + button, you display related child records for each Water Flushing History record. The available child records display Additional Dates and Hydrants (including associated valves and pipes).

### Additional Dates

Enables users to add any additional dates on which the route was flushed.

## Hydrants

All of the hydrants along the associated Water Flushing Route will be included in this list. This will also include the associated valves and cleaned pipes if included. Each individual Water Flushing History Hydrant record will have its own unique information to be filled out about the flushing event. This includes the following fields:

<b>Sequence</b>	1	<b>Target Flush Duration</b>	2.00	<input checked="" type="checkbox"/> Exercised	
<b>Flush Type</b>		<b># of Nozzles Used</b>	1	<b>Exercised Date</b>	8/27/16
<b>Hydrant Number*</b>	00521	<b>Target GPM</b>	100	<b>Target Pipe Vol (gal)</b>	0
<b>Notes</b>					
<b>Flushed By</b>	Flushing Crew 2	<b>Static Pressure (psi)</b>	42.00		
<b>Date Flushed</b>	8/27/16	<b>Residual Pressure (psi)</b>	25.00		
<b>Start Time</b>	8:15 AM	<b>Flow at 20 psi</b>	68.96		
<b>End Time</b>	8:30 AM	<b>Chlorine Start</b>			
<b>TimeFlushed</b>	15.00	<b>Chlorine End</b>			
<b>Discharge Rate</b>	60	<b>Problem 1</b>			
<b>Discharge Volume</b>	900	<b>Problem 2</b>			
<b>Total Pipe Length</b>		<b>Problem 3</b>			
<b>Water Loss Number</b>					

- **Sequence** is the order of the hydrant in the flushing route.
- **Flush Type** is the specific type of flushing that occurred.
- **Hydrant Number\*** is a required field that needs to be associated with an existing Hydrant Asset Record.
- **Notes** allows any additional comments or notes regarding the event.
- **Target Flush Duration** allows you to track a number of minutes of anticipated flushing.
- **# of Nozzles Used** allows you to track a number.

**Target GPM** allows you to track a number of gallons per minute desired.

- **Exercised** and **Exercised Date** allow you to select if and when the valves were exercised.

- **Flushed by** is a text field for tracking who did the flushing.
- **Date Flushed, Start Time and End Time** track when the flushing on this hydrant actually occurred.
- **Time flushed** is a number of minutes the flushing took.
- **Discharge Rate** allows you to track the number of gallons per minute of water flushed.
- **Discharge Volume** will use Time and Discharge Rate to auto calculate a number of gallons flushed.
- **Target Pipe Volume in Gallons and Total Pipe Length** are auto calculated from the associated Pipe records.
- **Water Loss Record #** is the auto ID of a new Water Loss Record in the Lucity system. This is automatically generated when the new History record is saved, and tracks the total Volume used during the flushing.
- **Static Pressure and Residual Pressure** allow you to track the pounds per square inch of pressure during the flushing.
- **Flow at 20 psi** will allow you to track the rate of flow at 20 psi, and will automatically calculate if discharge rate and the two pressures have values.
- **Chlorine Start and Chlorine End** can track the Chlorine measurement of the water at the beginning and end of the flushing.
- **Problem** fields allow you to select any problems that occurred during the flushing. These use a user-defined picklist.

**Water Flushing History Additional Flushing Dates Form**

<b>Flushed By</b> Andrea	<b>Date Flushed*</b> 9/01/2015	<b>Time Flushed</b> 30.00
<b>Start Time</b> 8:00 AM	<b>Discharge Rate</b> 100	<b>Discharge Volume</b> 3000
<b>End Time</b> 8:30 AM		
<b>Last Modified By</b>	<b>Last Modified Date</b>	<b>Last Modified Time</b>

## Additional Dates

This module allows you to track additional flushing dates on the same route. For each additional flushing date, you can track the Flushed By, Date, Start/End Time for the event. Additionally, the Times Flushed will get multiplied by the Discharge Rate, and the Discharge Volume will be automatically calculated for each additional event.

## Hydrants - Valves

The screenshot shows a software interface for managing hydrant flushing. At the top, there is a toolbar with various icons. Below it is a main table titled "Hydrants" with columns: Sequence, Hydrant Number, Building No, Address, and Street Name. A single row is selected, showing values: Sequence 1, Hydrant Number 00001, Building No 3401, Address COLLEGE, and Street Name COLLEGE. Below this table is a sub-table titled "Valves (2)" with columns: Valve Number, Valve Rec #, Set Valve to Text, and Bl. It contains two rows: one for Valve Number 00003 with Valve Rec # 3 and Set Valve to Text Close, and another for Valve Number 00001 with Valve Rec # 1 and Set Valve to Text Close.

	Sequence	Hydrant Number	Building No	Address	Street Name
-	1	00001	3401	COLLEGE	COLLEGE

	Valve Number	Valve Rec #	Set Valve to Text	Bl
-	00003	3	Close	
-	00001	1	Close	

The valves associated with each hydrant flushing are displayed. The Valve status, location, and Turn # and direction are tracked in this child record. The Exercised Status and Exercised Date are automatically updated with each Hydrant Flushing record.

## Hydrants - Pipes

The screenshot shows a software interface for managing hydrant flushing. At the top, there is a toolbar with various icons. Below it is a main table titled "Hydrants" with columns: Sequence, Hydrant Number, Building No, Address, Street Name, and Street Type. A single row is selected, showing values: Sequence 1, Hydrant Number 00001, Building No 3401, Address COLLEGE, Street Name COLLEGE, and Street Type. Below this table is a sub-table titled "Pipes (2)" with columns: Pipe Number, Length (ft), Diameter (in), and From End Type. It contains two rows: one for Pipe Number 00002 with Length (ft) 100.00 and Diameter (in) 30.00, and another for Pipe Number 00001 with Length (ft) 100.00, Diameter (in) 30.00, and From End Type Pump Station.

	Sequence	Hydrant Number	Building No	Address	Street Name	Street Type
-	1	00001	3401	COLLEGE	COLLEGE	

	Pipe Number	Length (ft)	Diameter (in)	From End Type
-	00002	100.00	30.00	
-	00001	100.00	30.00	Pump Station

The pipes being flushed are associated with each hydrant record. The total lengths for these pipes is what will calculate the flushed pipe length in the Hydrant Flushing History record. This value will dynamically change as pipes are added or deleted from this list.

## Direct Hydrant Flushing

The Direct Hydrant Flushing module enables users to create hydrant flushing records that only include a single hydrant. This simplifies entering single hydrant flushing information. We will look at the Direct Hydrant Flushing module as it is used in the Lucity Web interface.

Direct Hydrant Flushing is located in the Water > Water Distribution > Flushing menu.

Hydrant Number	Date Flushed	Start Time	End Time	Time Flushed	Flushed By	Flush Type Text	Discharge Rate	Discharge Volume
01878	8/15/2016	12:00 PM	12:15 PM	15.00	Flushing Crew 2	Hydrant Flush	400	6000

The Direct Hydrant Flushing view displays information for single hydrant flushing events. These track the attributes and measurements from a direct hydrant flushing. The fields displayed are customizable and easily sortable and filterable.

You can click the form button beside any record to see the detailed information for the record. Once again, this form is completely customizable, but will generally display the following information.

Hydrant Number*	01878
Date Flushed*	8/15/2016
Flush Type	1 Hydrant Flush
Start Time	12:00 PM
End Time	12:15 PM
Time Flushed	15.00
Problem 1	
Problem 2	
Problem 3	
Notes	
Loss Number	2016.08.15-HF-01878-1
Work Order Rec #	
Most Recent Inspection	<input checked="" type="checkbox"/>
Needs Repair	<input type="checkbox"/>
Flow at 20 psi	2.00
Chlorine Start	
Chlorine End	
Flushed By	Flushing Crew 2

- **Hydrant Number\*** is a required field that needs to be associated with an existing Hydrant Asset Record.
- **DateFlushed, Start Time** and **End Time** track when the flushing on this hydrant actually occurred.
- **Flush Type** is the specific type of flushing that occurred.
- **Time flushed** is a number of minutes the flushing took.
- **Static Pressure** and **Residual Pressure** allow you to track the pounds per square inch of pressure during the flushing.
- **Discharge Rate** allows you to track the number of gallons per minute of water flushed.
- **Discharge Volume** will use Time and Discharge Rate to auto calculate a number of gallons flushed.
- **Water Loss Record #** is the auto ID of a new Water Loss Record in the Lucity system. This is automatically generated when the new History record is saved, and tracks the total Volume used during the flushing.
- **Target Flush Duration** allows you to track a number of minutes of anticipated flushing.
- **# of Nozzles Used** allows you to track a number.
- **Flow at 20 psi** will allow you to track the rate of flow at 20 psi, and will automatically calculate if discharge rate and the two pressures have values.
- **Chlorine Start** and **Chlorine End** can track the Chlorine measurement of the water at the beginning and end of the flushing.
- **Problem** fields allow you to select any problems that occurred during the flushing. These use a user-defined picklist.
- **Flushed by** is a text field for tracking who did the flushing.
- **Notes** allows any additional comments or notes regarding the event.

#### Comments

Allows for the additional tracking of an unlimited number of text comments. These comments can also track who and when each comment record was created or last modified.

## Water Loss

The Water Loss module enables users to track loss event information such as location, damages, responsible parties, testing results, and work orders. As it relates to Water Flushing, an automatic water loss record is created with each flushing history record or direct hydrant flushing record created. This automatically tracks the estimated water loss as a record in this module. We will look at the Direct Hydrant Flushing module as it is used in the Lucity Web interface.

Water Loss is located in Water > Water Loss.

	Loss Number	Date	Time	Address	Street Direction	Street Name	Street Type	Street Suffix	Cross Street	Street Dir 2
	2016.08.10-HF-00110-1	8/10/2016	10:00 AM							
	2016.08.15-HF-01878-1	8/15/2016	12:15 PM							

The Water Loss view displays information any water loss events. These track the attributes details from a variety of water loss events. The fields displayed are customizable and easily sortable and filterable.

You can click the form button beside any record to see the detailed information for the record. Once again, this form is completely customizable, but will generally display the following information:

Water Loss Rec #	Loss Number*	Date	Time
<input type="text" value="1"/>	2016.08.10-HF-00110-1	<input type="text" value="8/10/2016"/>	<input type="text" value="10:00 AM"/>
Address	Street Name	AutoGenerated From	Est Water Loss
<input type="text"/>	<input type="text"/>	1 Hydrant Flush	12000
Cross Street	Street Name 2	General	
<input type="text"/>	<input type="text"/>	Employee	Loss Type
Employee	<input type="text"/>	<input type="text"/>	<input type="text"/>
Reason	<input type="text"/>	Cause	<input type="text"/>
District	<input type="text"/>	Employee	
Location	<input type="text"/>	Reason	<input type="text"/>
Storm Location	<input type="text"/>	District	<input type="text"/>
<input type="checkbox"/> Locate Needed	<input type="checkbox"/> Billable WO	<input type="checkbox"/> Damage	

When a water loss record is automatically generated from a Hydrant Flushing, the following fields are automatically populated from the flushing record:

- **Loss Number\*** fields is automatically generated based on the date and type of water loss event that created the water loss record.
- **Date & Time** are brought over automatically from the water flushing record.
- **AutoGenerated From** will be set automatically to 1 - Hydrant Flush for these types of automatic records.
- **Est. Water Loss** is automatically carried over from the total Discharge Volume of the flushing record.