

REG-U-FLO[®] VORTEX VALVES MODELING IN SWMM 5.0

June 2009

1.0 INTRODUCTION

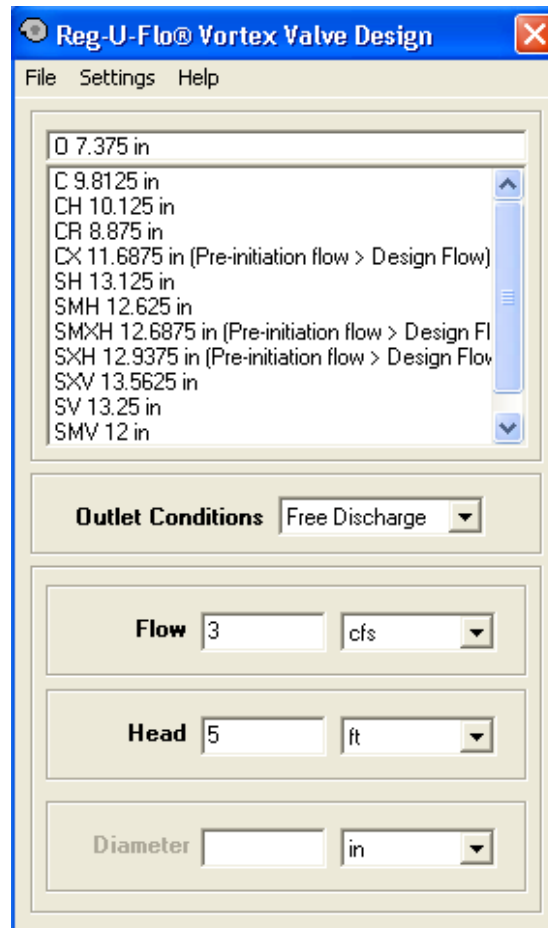
The use of outlet control systems to regulate stormwater and prevent flooding and overflows of hydraulic structures downstream is crucial. Conventional control systems include weirs, orifice plates, sluice gates, etc. Due to peak runoff discharge regulations; it is common practice for hydraulic networks to incorporate these control structures.

This document describes the modeling of outlet structures in the Stormwater Management Model (SWMM) 5 using the Reg-U-Flo® Valve. The valve is a non mechanical outlet structure that has large openings compared to traditional control systems designed to pass the same amount of flow resulting in a minimized likelihood of blockage. It has the added advantage of providing storage savings, thus minimizing land uptake and requires no power, harnessing its energy from the flow.

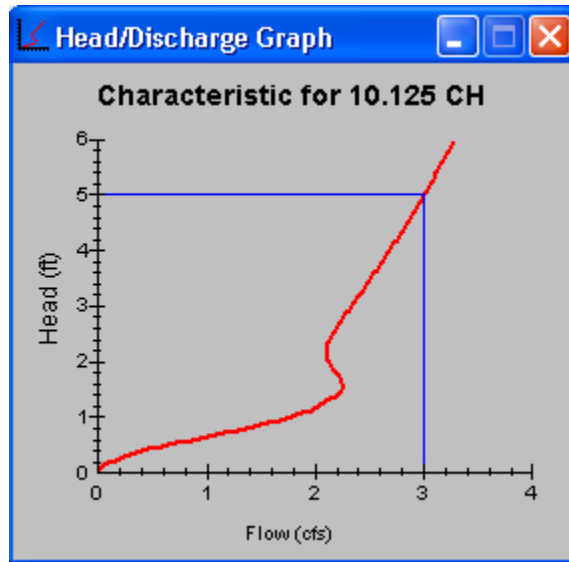
2.0 REG-U-FLO® Head/Discharge Characteristics

For effective design, the maximum head and discharge for the outlet structure needs to be known or calculated ahead of time.

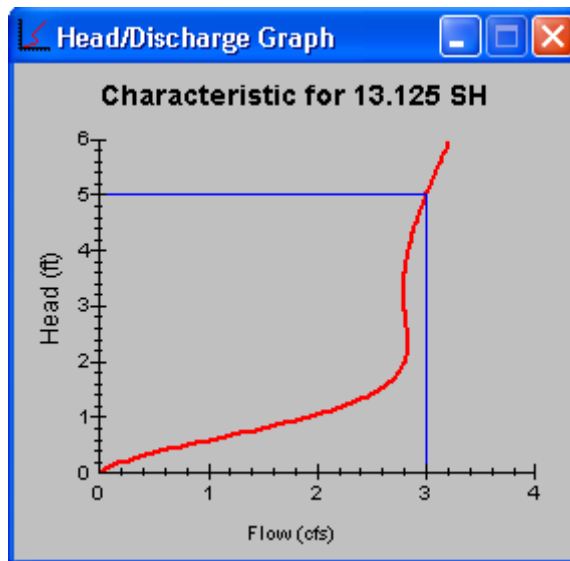
- Based on the discharge requirements of the drainage system, use the Reg-U-Flo® Vortex Valve Design Program to determine the best valve for your design project (shown in diagram below).
- Input design flow and peak head requirements to view a list of valves that meet the parameters.



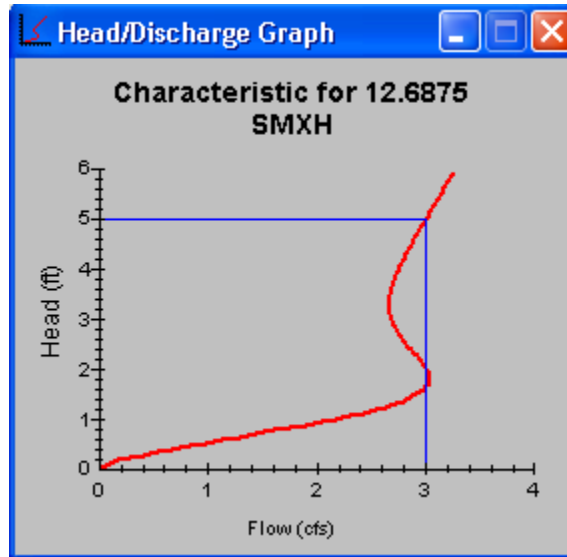
- Click on various models in the listing to view their flow vs. driving head curves.



- Select the valve with the least 'area under the curve' to minimize driving head and maximize flow until peak design flow has been reached.

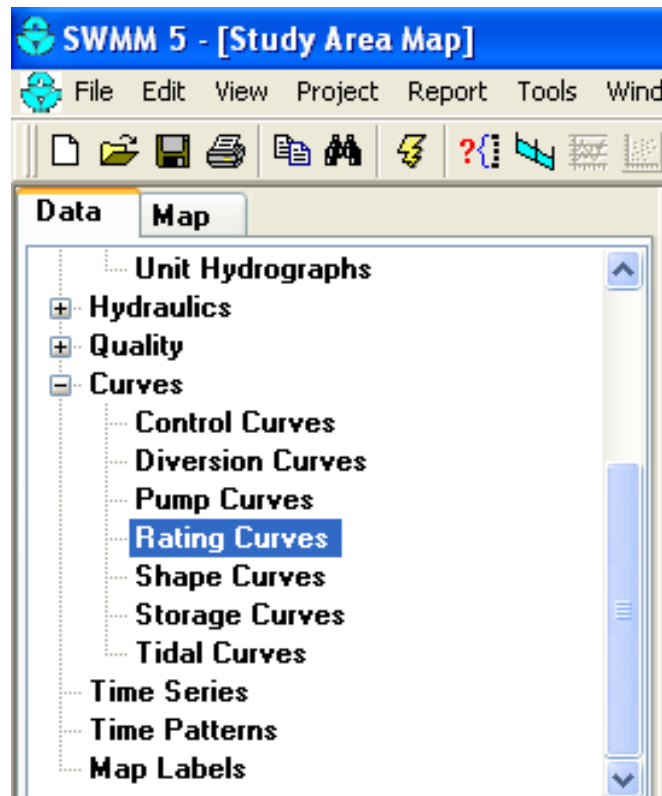


- Some valves may offer better flow characteristics yet exceed the design flow slightly during the transition to vortex flow. This is situation specific and may or may not be acceptable to use based on the application.



3.0 MODELING IN SWMM 5

- Next open your project in SWMM 5.
- Select **CURVES** under the DATA tab (left upper corner) and choose the **RATING CURVES** option.



- Create and name a **RATING CURVE** and populate the curve with the head discharge characteristics of the valve selected for the design (this may be copied and pasted from an exported spreadsheet with the valve characteristics).



Rating Curve Editor

Curve Name
RWV1

Description
CH_13.8125

	Head (ft)	Outflow (CFS)
1	0.0	0
2	.12	.039
3	.24	.173
4	.36	.4
5	.48	.707
6	.6	1.08
7	.72	1.501
8	.84	1.951
9	.96	2.412

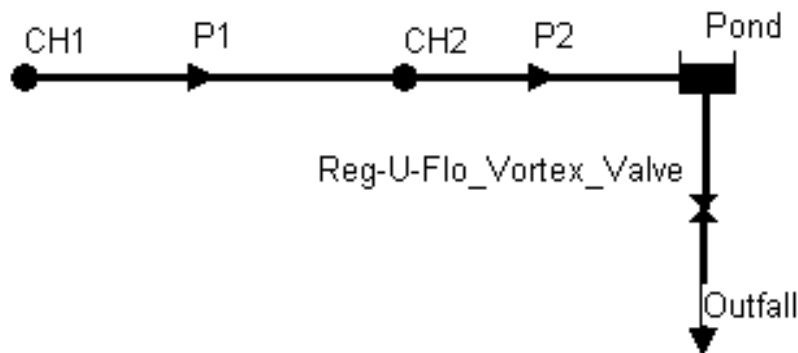
View...
Load...
Save...
OK
Cancel
Help

- In SWMM, the valve (outlet control structure) can be attached to either of the following nodes on the inlet and or outlet side: **JUNCTION**, **DIVIDER**, **STORAGE UNIT** (pond). It can also transition from any of the above named parameters to an **OUTFALL**. This is the same for the other control structures (weirs, orifices).
- Select the node that the Reg-U-Flo® Vortex Valve is to be installed onto, on the inlet and the node that the valve will be connected to on the outlet.
- Connect the two objects using the **OUTLET CONTROL**  in SWMM.
- Double click the **OUTLET CONTROL** icon  and describe its properties in the tabs provided. For the Reg-U-Flo vortex valves, select **TABULAR** under the **RATING CURVE** option choose the valve curve created in the **RATING CURVE**. The **OUTLET CONTROL** gets assigned to the head discharge characteristics of the valve selected.

Outlet RVV1	
Property	Value
Name	RVV1
Inlet Node	CMH1
Outlet Node	Det5
Description	
Tag	
Height	0
Flap Gate	NO
Rating Curve	TABULAR
Functional Curve	
Coefficient	10.0
Exponent	0.5
Tabular Curve	
Curve Name	RVV1
Name of rating curve that relates outflow to head (after specifying a curve, you can double-click to edit it)	

- Enter the height of the valve above the inlet node invert in the height box (for valves that flush with the invert of the inlet node, this value will be 0).
- If there is a flap gate at the end of the vortex valve, select YES under the flap gate option.
- You have now finished installing your Reg-U-Flo® Vortex Valve within the drainage network.
- If more than one valve is required in the drainage network, follow the same procedure to incorporate them within the network.
- You may now continue with the rest of your drainage system modeling.

An example of the layout for a simple drainage system modeled using a Reg-U-Flo Vortex Valve is shown below:



4.0 SUPPORT

For additional information, contact Hydro International at (1) 207 756 6200 or email our Engineering Design Team at stormwaterinquiry@hil-tech.com.