

StormGate[®]
Design Guide



Designing the StormGate

The StormGate is a high flow bypass used to address high-energy flows, in excess of design flows, that may occur. High flows can reduce the effectiveness of water quality facilities by re-suspending sediments and flushing captured floatables, causing a concentrated pulse of pollutants to be sent to downstream waterways.

To minimize the occurrence of pulsing, a high flow bypass can be installed upstream of water quality or pretreatment facilities to direct the high flow away from the treatment system. The StormGate uses a field-adjustable weir and an orifice in combination to direct polluted low flows to stormwater quality facilities, while allowing extreme flows to bypass the facilities.

This use of a field-adjustable weir and orifice in combination allows the StormGate to offer tighter control over system hydraulics than other high flow bypass methods. The field-adjustable weir also allows for changes to be made to the weir elevation once actual field elevations are established or if future design flows change.

Determining the need for a high flow bypass

A high flow bypass is needed when the peak conveyance flow for your site exceeds the treatment capacity or inline bypass capacity of your stormwater quality facility. You may have already discovered a need for a high flow bypass during the design of your stormwater treatment system. However, if you aren't sure if a high flow bypass is required, contact your Contech Stormwater Design Engineer, and they will help you to determine if a high flow bypass is needed for your system. Your Contech Stormwater Design Engineer will need to know the peak conveyance flow and water quality flow for your site. You should have already calculated these flows when you sized your stormwater treatment facility.

If you haven't determined the peak conveyance flow and water quality flow for your site: Calculate the water quality flow (Q_{treat}) and peak conveyance flow (Q_{peak}) using the approved hydrologic models established by your local agency. If your agency specifies a water quality volume rather than a peak flow, water quality volume requirements can be translated into a flow rate. If there are no agency guidelines, we recommend using the Santa Barbara Urban Hydrograph method.

If you have or are installing a StormFilter system, the StormFilter may be used online if the peak conveyance flow does not exceed

the internal bypass capability. A high flow bypass is recommended for use in conjunction with the StormFilter when:

- The flow through a Precast StormFilter exceeds 1.8 cfs
- The flow through a Linear StormFilter exceeds 1.0 cfs
- The flow through a Manhole StormFilter exceeds 1.0 cfs
- The StormFilter is a Precast Panel, Precast Box Culvert, or Cast-In-Place system

Note: Since flow discharges directly to the CatchBasin StormFilter, an upstream high flow bypass cannot be used. However, the CatchBasin StormFilter does have an internal bypass capacity of 1 cfs for standard units and 1.8 cfs for deep units.

The use of a high flow bypass is also recommended when pretreatment is needed.

Configurations

The StormGate is provided as a complete manhole or vault unit and is used in conjunction with other stormwater quality facilities such as the StormFilter, swales, oil/water separators, ponds, and settling manholes.

An additional advantage of using the StormGate high flow bypass in conjunction with these stormwater quality facilities is that the water quality device is offline, which allows for the bypassing of all flows in the event of facility maintenance or spill containment.

Determining system orientation and weir location

Contech Engineered Solutions offers technical assistance at no additional cost and can help you determine the required system orientation and weir location.

To determine the orientation of the StormGate and the proper placement of the weir and inlet and outflow pipes:

1. Set the low flow pipe diameter and invert elevation so that the pipe flows full from the StormGate to the treatment system during the design storm.

If the pipe is not set to flow full during the design storm, excessive flow could be directed to the treatment system during peak storm events. This will reduce the treatment system's effectiveness and negate the purpose of the StormGate. Rather than setting the pipe to flow full, an orifice plate may be used to restrict the flow to the treatment system; however, setting the pipe so that it flows full during the design storm simplifies the system and system installation.

Contech can assist you with determining the pipe diameter and invert elevation. Contact your Contech Stormwater Design Engineer for assistance.

2. Using the pipe diameter and invert elevation that you determined in Step 1, determine the hydraulic grade line in the StormGate when the design storm flow (Q_{treat}) is being directed to the treatment system.

Note: You may need to consider backwater effects on the system.

3. Specify the location of the weir in the StormGate manhole so that the weir is at the same elevation as the hydraulic grade line at Q_{treat} .
4. Calculate the hydraulic grade line in the StormGate at the peak hydraulic flow. (For example, the flow resulting from the 10-year storm event.) Verify that the peak hydraulic grade line does not cause operational problems in the collection system upstream of the StormGate.
5. Determine the size of the manhole or vault required to accommodate all flow lines entering and exiting the structure.

If the StormGate is used in a manhole rather than a vault, the StormGate weir should be placed in the center of the manhole for ease of construction. In certain cases, it is possible to offset the weir in the manhole. Please contact your Contech Stormwater Design Engineer to determine the most practical and economical configuration for your StormGate.

If you have any questions or if you need assistance with designing the StormGate, contact your Contech Stormwater Design Engineer or call 1-800-338-1122.



800-338-1122
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SUPPORT

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

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