

Village of Winnetka Stormwater Detention Guide

What is stormwater detention?

Stormwater is the excess water after rain or snowmelt that doesn't absorb into the ground. Stormwater detention is the process of capturing that excess water on a site, storing the water for a period of time, and controlling its release. Typical methods of storage include underground pipes and tanks, as well as surface ponds.



Why detain stormwater?

When areas of land are largely covered with impermeable surfaces like roofed areas, concrete, and asphalt, rainwater can't infiltrate the ground as readily, leading to rapid runoff that can overwhelm drainage systems and cause flooding.

Providing detention can ensure that the development of a site reduces the peak stormwater discharge rate, rather than increasing it. A reduction of stormwater discharge from sites increases the ability of the Village storm sewer system to contain the stormwater produced from heavy rain events, thereby reducing surface water flooding and the flood risk of properties throughout the Village.

What is the methodology for the Village detention requirements?

The Village requires that stormwater detention be installed for new homes, or when a property owner adds an increase of more than 25% impermeable lot coverage to a site. The Village detention requirements have two components: storage volume and release rate. Both components are critical for the Village to assess how property owners capture, control, and release stormwater runoff from their property. By controlling runoff from a property and reducing the rate in which stormwater is released allows for a reduction in the impacts on the Village's sewer system. By reducing the impacts to the

Village sewer system, this ensures that capacity is available to more quickly remove stormwater away from properties, thus reducing flooding overall.

Both components require use of the Rational Method, which is the simplest method to determine the peak stormwater discharge from an area. It is the most commonly used method by regulatory agencies and utilizes the following equation, known as the rational equation:

$$Q = C * i * A$$

Where Q = Peak Discharge/Runoff Rate in cubic feet per second (cfs)

C = Runoff Coefficient

i = Rainfall Intensity (inches/hour)

A = Drainage Area (acre)

Rainfall Data

The Village requires use of Bulletin 75 rainfall data. Bulletin 75 is a report by the Illinois State Water Survey (ISWS) that provides rainfall frequency data for Illinois, and it is commonly used as a standard reference in Illinois. As part of this study, scientists analyzed historical weather data and used statistical models to calculate the probability of different precipitation events. This statistical analysis generated rainfall intensities for various storm intervals, which can be input into the rational equation above to calculate the peak discharge of an area.

Statistical precipitation events are often described by their occurrence interval. For example, the 100-year storm is a flood event that has a 1% chance of occurring in any given year. The table below summarizes the probability of occurrence for different storm intervals.

Storm interval	Probability of occurrence in any given year	Percent chance of occurrence in any given year
3-year	1 in 3	33%
10-year	1 in 10	10%
100-year	1 in 100	1%
500-year	1 in 500	0.2%

Storage Volume

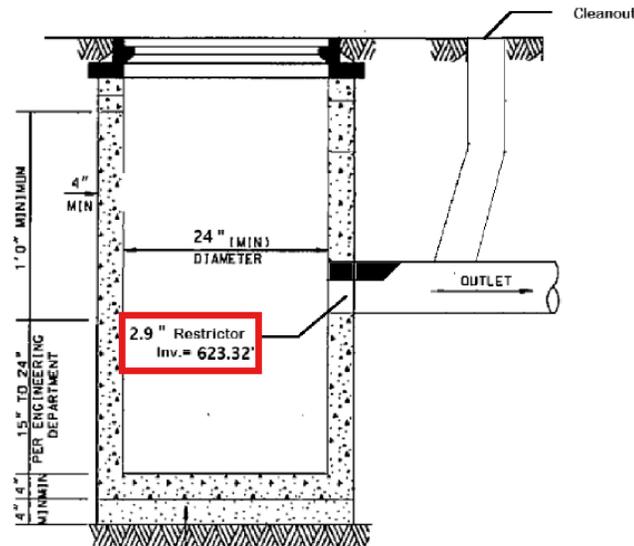
For a new home, the required detention storage volume is the difference in volume produced by the peak runoff between the existing and fully-developed condition for a 100-year storm. The fully-developed condition means the maximum impermeable lot coverage per zoning regulations, which is 50% for a residential home.

For additions or other impermeable surface improvements that trigger detention requirements, the required detention storage volume is the difference in volume produced by the peak runoff between the existing and proposed condition for a 100-year storm. However, for future development considerations, the Village Engineering Department recommends that homeowners elect to provide sufficient detention volume for the fully-developed condition as part of their construction project.

The variable that changes in the peak runoff calculation for the existing, proposed, and fully-developed conditions is the runoff coefficient. The runoff coefficient is a dimensionless coefficient relating the amount of runoff to the amount of precipitation received. For example, the more area that is permeable, the greater the ability to maintain stormwater onsite. In contrast, the more impervious cover on a site, the higher the site's runoff coefficient will be, and the quicker the stormwater will discharge from the site.

Release Rate

The release rate of a detention system is controlled by a restrictor: a small opening that is typically installed in the outflow pipe which restricts the rate at which stormwater can leave the detention system and enter the Village's storm sewer main. The image below shows how a restrictor would look inside a typical storm structure and outflow pipe.



The restrictor is sized for the allowable release rate. Per Village detention requirements, the allowable release rate is the peak runoff that would be produced from the site during a 3-year storm if the site was undeveloped. The minimum restrictor size is a 2" diameter, as a smaller restrictor will pose maintenance concerns and frequently clog, preventing the system from functioning as designed.

For further information on detention requirements, please refer to the “Public Works and Engineering Design Guidelines” and “Stormwater Detention Decision Tree,” which can be found on the [Village of Winnetka’s website](#).

Detention System Maintenance

Property owners who have a detention system should perform general maintenance to keep the system functioning properly. Some recommended maintenance items include:

- **Regular Inspections:** A detention system should be inspected at a minimum of once a year or after major rain events as necessary.
- **Cleaning:** Detention systems can accumulate sediment or debris over time. If left unchecked, this can cause clogging and loss of storage volume, which can lead to flooding. Professional cleaning typically involves use of a vacuum or water-jetting hose. Catch basins can be manually cleaned to remove any leaves, sediment, or other organic material that may have accumulated. Detention systems should be cleaned at least twice a year, or if the system reaches a sediment height between 10 and 20 percent of the pipe diameter.
- **Repairs:** Any structural issues observed in catch basins, pipes, or vaults during inspections should be repaired. Some systems utilize pumps to discharge, in which case the pumps should be confirmed to be operational and repaired or replaced if necessary.

Questions?

The Village’s Engineering staff will gladly answer any questions that you may have regarding detention requirements. Please contact Hayley Frank, Civil Engineer, at 847-716-3530 or hfrank@winnetka.org.