

## Rainfall, Storms and Flooding, Oh My!

“What is with this rain? I have never seen this kind of rain before. We are getting 100-year rain events every year – how can this be?” Feeling “flooded” with these thoughts and problems and wondering why? It might help to explain rainfall and what these storm events mean.

Storm events are classified and measured based on the 24-hour period. The various year storm events (10-year and 25-year, etc.) are based on a statistical probability of a storm of that magnitude occurring. For example a 25-year storm event has a 4% probability of occurring in any given year (100%/25-year storm event = 4%); thus a 2-year storm event would have a 50% probability of occurring in any given year. Now let us take it a step further to interpret. What does it mean when the weather forecaster says, “We had two inches of rain when the storm front went through?” In Ohio as well as in the entire country precipitation varies, but let us use Geauga County as our example. Standard storm events and their associated depth of rain are listed below:

### 24-hour storm events

2-year storm = 2.36 inches

5-year storm = 3.11 inches

10-year storm = 3.64 inches

25-year storm = 4.36 inches

50-year storm = 4.92 inches

100-year storm = 5.52 inches

Now you are probably wondering why 2.36 inches of rain (a rather substantial amount) is only considered a 2-year storm. The other piece of this puzzle is the time period in which the storm event occurs. The 2.36 inches of rain for a 2-year storm event is over a 24-hour period. As you think back to the rain events that occurred over this past spring, a 2.36 inch rain event probably occurred within an hour or less. If you put that into perspective and perform some additional statistical calculations and analysis, all of a sudden the 2-year storm is equivalent to anywhere from a 50-year storm event if it rained for an hour to a 500-year storm event if it rained for only a half hour. Many of the storms we have experienced recently are short hard rains, not an all day, steady, slow rain. Familiar with the term “flash flooding”? This is a result of these quick storms that flooding occurs because our manmade drainage systems are typically engineered to handle smaller storm events.

Generally roadside ditches, drive pipes and storm sewers are designed for a 10-year storm event while road cross culverts are designed for a 25- or 50-year storm event. So it wouldn't be that unusual to see the flooding of roadside ditches and overtopping of driveways with some of the rain events that have recently occurred. Soil and Water Conservation Districts (SWCDs) frequently get requests from homeowners to size a pipe that is crossing their driveway beyond the road right-of-way. Typically the County Engineer will size the drive pipes within the road right-of-way utilizing the accepted design practice of a 10-year storm event. When the Geauga SWCD sizes a pipe, we typically provide the flow rate of water that needs to pass for the all the storm events rather than just one storm event. Along with this list are the various pipe sizes and their associated capacities. It is up to the landowner to weigh the options regarding the size storm event they wish the pipe to handle and how often they are willing to potentially experience flooding or a backup of water. This decision comes down to cost-benefit analysis the landowner needs to assess. Obviously a larger pipe is costlier but the probability of it flooding is less. Would the landowner be willing to accept the chance of more frequent flooding to reduce the pipe size and cost? When managing your property's surface drainage it is very helpful to

understand the size of storm events and design capacity of manmade drainage structures within road right-of-ways.

It is hard to imagine that Ohio could face another “extreme weather” spring like that of 2011. For now, we will savor the warm, clear skies that summer brings. But if next April’s showers bring a 30 minute downpour and the local news reports 3 inches of rain – you will know that an over 1000-year storm just occurred.