Green Stormwater Infrastructure: Bioretention – Innovation Square

[00:06] Mark Clark: Hi, I'm Mark Clark.

Eban Bean: And I'm Eban Bean.

[00:09] Mark Clark: We're going to talk about a low impact design practice that's called bioretention. We're at an area in downtown Gainesville called Innovation Square.

[00:18] This is a redevelopment on a site that previously had no stormwater management. The water that used to run off this site entered into an urban stream, and there was quite a bit of both hydrologic and nutrient impacts on that stream.

[00:31] As part of the redevelopment, they're trying to integrate low impact design. Now this landscape's going to get very dense and so the choices of practices are going to have to fit into this landscape. But bioretention tucked into basically the access areas and the kind of urban park setting is one option. And Eban is going to tell us a little bit about what is bioretention.

[00:53] Eban Bean: Behind us is an example of an intensive bioretention cell. These are typically going to be located in a lower part of the landscape. So, it's receiving stormwater runoff from the surrounding impervious surfaces and other source areas of runoff.

[01:09] The soils are typically fairly highly infiltrating, a lot of sand content, so that water can move through it fairly quickly. If you've got very good soils, that water could even be infiltrated all the way down into the subsurface and recover that captured volume just through that infiltration process.

[01:27] In this case, we're located in an area that has clay soils not too far from the land surface. So, this system that we have behind us actually has an underdrain system. That allows for the stormwater that comes in here to pass through a depth of media or sand that filters that water.

[01:44] It takes out some of the nutrients, some of the sediments, some of the pollutants, and then it recovers that storage volume by draining through the underdrain system that ties into the stormwater network.

[01:54] They also have plants in here that can tolerate wet and dry conditions over longer periods, and they can also take up some of those pollutants and some of the nutrients to improve the water quality.

[02:06] With the underdrain system we don't have as much of a retention or volume reduction benefit, but we definitely have a detention, basically capturing that pulse of runoff that occurs and only allowing it to be released at a slow rate into the stormwater system or the receiving water body.

[02:24] Mark Clark: And a lot of the idea of these systems is really not to deal with the total of volume capture it's about the smaller storms up near the sources, trying to shave that volume off, treat it before it's sent further downstream.

[02:36] Eban Bean: That's right. And so, this space behind us in a typical urban development might have just been a grass space or a treed space that was open area and not receiving runoff from other areas. This is the way that they've incorporated it into the broader landscape here.

[02:53] Mark Clark: Let's look at a couple more details on how water actually makes it into the basin. We're down inside one of the bioretention cells. The water enters this area during a storm through culverts that might bring the water from offsite somewhere, or through innovative curb cuts where water that's coming down on that sidewalk, instead of being diverted away, gets a chance to come into the basin.

[03:16] Now this is really highly structured because of where we're at. We have vertical sides, so we have more storage in a smaller space. A lot of times this would basically just be land that would grade out to provide that sort of depressed area. But as water comes in the basin during a storm, what happens, Eban?

[03:31] Eban Bean: As this water comes in, we're standing in this first cell. This is a bioretention system that's made up of about three or four different cells. As the water comes into this first one, we might call this the forebay, and this allows for that first initial volume of water to come in.

[03:47] And if we had a small stormwater event or a runoff event, all of that water may be just contained in this first cell. If you look behind Mark and I, there's a water line that’s stained the concrete behind us. If we come over here, you can see that there is a shorter wall or an overflow weir right here.

[04:07] What that allows is when the water builds up to that certain level, it then overflows and cascades into the downstream cells.

[04:15] Mark Clark: So, this first cell captures most of your trash, perhaps floating trash, and your larger particulates, it settles out first. But as we cascade in each cell, we're getting improved water quality.

[04:26] Eban Bean: That's exactly right. So, a forebay, the concept is that you have this initial pulse of water and it forces that water to slow down and allow the solid particles to drop out and settle. You have that all focused in one location. It makes it a lot easier to maintain and remove that sediment or those particles over time, and so you don't have them distributed throughout the entire practice. So, as that water moves through this system it's getting cleaner and cleaner as it moves down the cell.

[04:53] Mark Clark: And having the vegetation in here looks nicer, it makes it a little more aesthetically pleasing, but it's actually helping us do work. It's taking up nutrients, it's providing some carbon for the microbes to do work. So, this is actually an integral part of the processes that are going on in this bioretention area.

[05:09] Eban Bean: That's exactly right. And it also helps to take up water. These plants evapotranspirate and recover some of the storage in the soil that's typically filled up by storm events that occur every so often in here.