SIM Drainfield

Onsite system designers can take a lesson from a popular video game series in learning how to 'think outside the box'

By Theo B. Terry III, R.S.


Theo B. Terry III

I have three children, and for the past 14 years my house has rarely been without the background noise of video games. One of my kids' favorites has been the SIM series: *SIM City, SIM Roller Coaster, SIM Teen,* and others.

If you aren't familiar with these, the premise is easy: Build something from scratch, and if you make the right choices during the game, you get to build bigger and better. *SIM City,* for example, allows the player to build an entire city the way he or she would like it, rather than simply letting it evolve over time.

Obviously, this power is rather heady. At the click of a button, one can choose a person's height, hair color and body build, or build a one- or two-story house. In fact, entire towns are planned "just because" the creator chooses to make them that way.

I once watched my oldest son play *The SIMS,* and could not believe the design of his dream home. It consisted of four rooms: one huge bedroom and bathroom, one kitchen with an equally huge refrigerator, and a living room with a large-screen TV and a couch. It was everything a single guy could want, with one glaring exception, at least to me: his house had no walls.

When I questioned him about this, he gave the standard teenage reply, "Just because your house has walls, it doesn't mean mine has to. I don't have to make my house the same as yours just because it's always been done that way."

Lessons learned

Talk about a defining moment! I've spent a good deal of my career in the onsite industry encouraging people to "think outside the box." I encourage my kids to think the same way, and just when I thought they never listened … Naturally, this got me to thinking about the lesson I could learn from my children's video game, and how that new-found knowledge could apply to the onsite industry.

What could a video game possibly have to do with onsite? Let's play *SIM Drainfield.* A player starts with nothing except the need to design a means to treat and disperse wastewater back to the environment. Moving from the site to the completed design, the player will face the challenges of Hydraulic Performance, Organic Loading, Surge Volume, Gas Transfer, Climatic Conditions and the Environment.

For many reasons, I predict it will be a while before *SIM Drainfield* hits the shelves of your nearest video store. But I still think the onsite industry could take some lessons from my SIM adventure.

Now, this is my kind of game! Most of the time, when I've tried to play video games with my children, I've ended up getting a pat on the head, and hearing the comforting words, "It's OK, Dad. This game is just too hard for you." But surely I can put my onsite experience to good use during *SIM Drainfield.*

The game begins at the site. As I manipulate the controller, an information box pops up, telling me I've been given a sandy loam soil. As my character moves across the site, there are several paths to choose, so I first choose the one marked "US EPA."

Here I find the information I need to advance: the daily water usage rates in the U.S. of 70 gpd per person, along with the average occupancy rate of 1.5 people per bedroom. This means I can determine the design daily flow for the house. Applying this information, I calculate a daily water usage value of 105 gpd per bedroom.

More information

Have I designed the best drainfield at this point? Not at all, because I don't have all the information I need. The path leads me to several doorways. One is marked "U of G," another "PU," and the third, "NC State."

I approach Door 1, and it swings open to reveal Dr. Larry West from the University of Georgia, who gives me an important code: the hydraulic loading rates for sandy loam. At Door 2, Dr. Brad Lee from Purdue University reminds me to not overlook the soil structure (that is, subangular blocky) in designing my system. More good advice!

Door 3 reveals Professor Emeritus Dr. Bob Rubin from North Carolina State University. Holding a sign marked "Daily Usage," he tells me, "Remember the bathtub, Theo. No matter how big it is, if the drain is plugged, it's going to fill up and overflow."

Now I've gained really valuable information from the experts behind the three doors. If I enter the hydraulic loading rates for a sandy loam soil with subangular blocky structure, I can determine the linear length of drainfield needed to address the hydraulics of the system. Using Dr. Rubin's advice, I consider, too, that I only need to figure two to three times the average daily usage figures for surge storage, rather than the six to seven times usually required.

Advice on organics

Is my perfect drainfield complete? Not yet. Just as I think this game is too easy, I come face-to-face with Organic Loading — and how it relates to biomat growth and soil clogging. But I can't combat this monster alone. I must call on the power of Dr. Kevin White from the University of South Alabama and his new research based on the mass loading of organics. I gain many points for finding this knowledge, because it provides me with often overlooked information on how to size a drainfield properly.

Whew! It's taken me a long time to reach this point in *SIM Drainfield.* Not-so-savvy players tend to miss the path, only looking at hydraulic needs in their design. Because of the information provided by the experts behind the three doors, and because of Dr. White's help, I don't forget the need to evaluate wastewater strength to make sure the drainfield is sustainable.

Using all of this knowledge helps me get to Level Two. Once my drainfield has been sized based on these two primary factors (hydraulic loading and organic loading), I decide that the criterion that is most limiting should be used to go forward with the design. Door 1 taught me that hydraulics indicate we need 500 square feet of infiltrative area to adequately disperse a given volume of wastewater.

But our battle with the Organic Loading for this same sandy loam soil indicated a need for 600 square feet of trench to successfully handle the organic load to minimize biomat buildup and allow for proper infiltration. Since 600 square feet is larger than 500 square feet, I'll choose the larger value to complete my *SIM Drainfield* design.

Lots of tricks

The game doesn't end here. As I advance through the many levels of the design process, new and sometimes tricky situations come at me. I fight a secondary attack from Surge Volume Storage within my trench when my path leads through a three-day deluge of rain, because the extra water causes my soil to lose its normal infiltrative rate.

Is this impossible to overcome? No, because I quickly remember that I'm designing the optimal *drainfield,* not storage field. And I'm no longer bound by the conventional knowledge of the past. Instead, I look to my new-found knowledge revealed behind the Three Doors.

I've made it to this point, but try as I may, I cannot complete the task. I'm missing several final, important pieces of information: Optimal Geometry (should my drainfield be long and narrow, short and wide, shallow, or deep?) and Climatic Conditions (what if my site is warm and arid, or cold and wet?) that may affect the drainfield's performance. Maybe I can't finish the game because the scientific research hasn't been completed yet.

For many reasons, I predict it will be a while before *SIM Drainfield* hits the shelves of your nearest video store. But I still think the onsite industry could take some lessons from my *SIM* adventure. I didn't try to design a system based on "the way it's always been done," but looked instead to university experts around the country and the current research being performed.

Those of us in the onsite business tend to forget that our industry is relatively young. Think of the technological advances in treating wastewater that have developed over the past couple of decades alone. Yet the process, nationwide, for sizing drainfields and approving new products and technologies is based on older data and needs some updating — based on new information and research.

Maybe it's time we look hard to find and use the key information that can help us design onsite systems properly — to minimize failures and still maintain proper public health protection. Maybe it's time we all were schooled by a video game.

Theo B. Terry III, R.S., is manager of technology with Ring Industrial Group, based in Oakland, Tenn. ■