

Retaining walls add function and character to construction projects

Home and other improvement time means another set of plans and another set of site issues. Decisions need to be made such as:

- What color should we paint the walls in the kitchen?
- When should we start?
- What kind of floor covering are we going to use?
- Tile or carpet and where?

These are all kinds of questions asked in the beginning stages of any construction project. However, there are other more important concerns, specifically:

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1) what site is the building going to be constructed on, and,

2) how do we want this building to be presented?

In other words, are we going to raise the building or are we going to dig a foot or two further down for

the foundation to allow the building to sit into the side of a hill?

My primary job at KRWA is to work with the KAN STEP program. As of February 1, there are three fire stations and two community buildings under construction. I'd like to use this article to discuss height issues and the use of retaining walls. Whether it's a KAN STEP community project or your own home, the information is common.



This limestone retaining wall was installed to enable the homeowner to gain access to the back side of their property. This wall provides a real function for this property in Marion, KS.

Know your retaining walls

There are several different types of retaining wall systems commonly used in construction. The most common type would be a wall made of concrete. When foundations are poured for a house or building it is more cost effective for the customer to have the contractor form the retaining wall with the main set of walls for the structure. This also results in a project that is more structurally sound. Of course, the site will dictate if retaining walls are necessary. Or, will the soil just be sloped away from the house? Can we find a site for an open basement and dig it into the side of a hill? These are the typical questions.

A concrete retaining wall offers an opportunity for a more decorative approach. Veneering with brick, limestone or cobblestone can really be attractive. The majority of today's residential sites utilize some type of retaining wall. It can be as simple as a decorative wall around a tree or a transition area too steep to mow. Sometimes a wall is added just for landscaping purposes and curb appeal.

Our wall is tipping!

One of the most important considerations in constructing a retaining wall is to not build it too tall for the type of material being used. Size up the job and select the correct type of

material. If a footing is required, then proper compaction of the footing is a must. Some walls require a cement footing. Depending where you are located, frost and extreme dry weather can affect the stability of the footing. Deeper is always

Depending where you are located, frost and extreme dry weather can affect the stability of the footing. Deeper is always better in such cases. The taller the wall the deeper you must go.

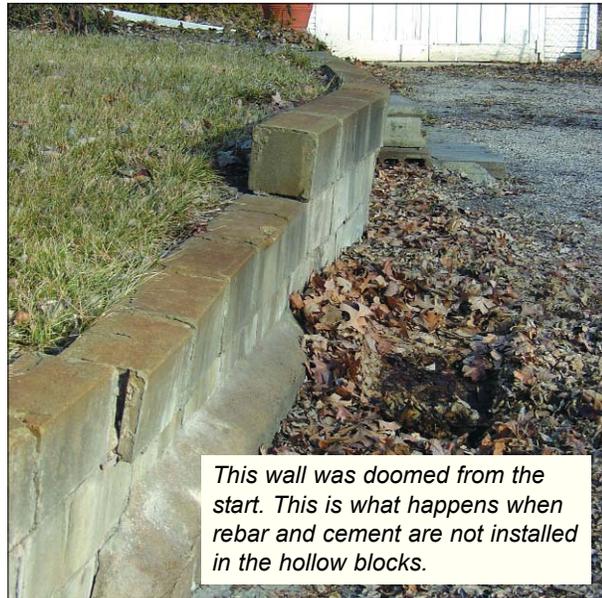
better in such cases. The taller the wall the deeper you must go. Going down to virgin soil will increase your chances for less settling. Any slumping away from weight of the wall will decrease the lifetime of your project.

Next, make sure you allow for adequate drainage. Keeping pressure from building behind

the wall will ensure your wall to stand upright and true for quite some time.

Updated block walls work

The design of retaining walls results in a variety of shapes, sizes and styles. Old railroad ties can be used to create terraces or even just a single wall. Treated lumber can be used for smaller projects. The more traditional walls are made of rock. Walls can be made of limestone, cobblestone, granite or quartzite (red and purple rocks from glacial deposit). There are many different types of block retaining walls. Hollow block is often used in the construction of foundations and mostly on



This wall was doomed from the start. This is what happens when rebar and cement are not installed in the hollow blocks.

interior walls. This type of wall should have a cement footing with rebar on sixteen inch centers and slugged full (concrete poured down the hollow cores of the block). Failure to do so will result in a wall heaving outward and eventually toppling over.

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In the last few years there has been numerous improvements in block retaining wall systems. Several new methods have been developed, including Versa-Lok, a product that uses fiberglass pins, two to a block, which effectively keeps the block above from sliding forward. The Versa-Lok system has proven to be a popular choice for retaining wall systems used on KAN STEP Projects.

Versa-Lok systems call for chat (screenings from a quarry) for the footing. Footings of chat should be six to eight inches thick and compacted with a plate tamper. Then a loose layer, no more than an inch, can be spread evenly over the footing and the first row of blocks can be imbedded. After the first row is installed it's off to the races. Just don't forget the fiberglass pins! With this type of block a set-back is established between rows. The slot the pin drops in and the hole from the block above creates a $\frac{3}{4}$ inch set back with each row. Once at the top a

thinner decorative stone can be glued into place sealing the top from the elements. Set-back is another important step to remember when building your retaining wall out of limestone or any other type of stackable material.

Solving KAN STEP problems

The community center in Goff, KS effectively used these blocks to retain the alley as well as the hill behind the building. To gain parking space the building was placed towards the northeast corner of the lot. The lot sloped severely, nearly 15



This picture of KAN STEP volunteers at Goff shows backfilling with one-inch clean rock. The rock behind the wall will help provide adequate drainage and alleviate pressure from building along the backside. This wall runs from six and one-half feet down to three feet tall.

feet, from the northeast corner to the southwest corner in a distance of about 200 feet. There was no question that a retaining wall was needed. One heavy rain and the stream of water would otherwise head right in the building. With a concrete parking lot pinning the bottom block in place and the fact that the block was brown in color, has effectively taken care of two issues. Concrete and block once again come together to assist one another. The concrete keeps the wall in place and the block provides a change and appealing look.

The Community Center in Whiting has also implemented the use of Versa-Lok block retaining wall systems. On this project, planters were built in front of the gymnasium on both sides of the main doors covering the old scarred walls; they provide an area to landscape. The block was also used to retain the dirt around an old elm tree on the south side of the community building. A sidewalk was poured along the bottom,

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which prevents the wall from pushing. With this decorative block in use there can be many opportunities for landscaping. Instead of a concrete pit you have something that looks good and is functional as well. Too much concrete is boring. Yes, I said it! Too much concrete really is boring!

Good drainage is key

No matter what type of wall is constructed, drainage and a good footing are critical. The height of a wall directly affects the size of the rock bag you should put behind the wall. A soil reinforcement fabric should be laid out under the first, second or third course of rock, block or whatever material you are using. Depending on what height you want the moisture to bleed through the wall at, one-inch, clean rock should be used for the rock bag. As a general rule of thumb, half of the wall should be a rock bag. For instance if you have a wall that is six feet tall then you should have a rock bag that is at least three feet tall. The bag only needs to be a foot to eighteen inches thick and completely encased with the soil reinforcement fabric. The fabric keeps dirt from silting through the wall but does allow water to bleed through. This in turn alleviates pressure behind the wall. Depending on your application you can raise the rock bag a course or two off the bottom as long as you leave enough space on top of the bag for surface water run off. Versa-Lok recommends no less than one foot of dirt to cover the rock bag at the surface.

As you develop your next construction project, consider the benefits that adding a retaining wall might provide, first for function and second, to add interest and appeal to the property. Done correctly, it's an investment that you will not



Walls come in different shapes and sizes. The photo of the limestone wall above shows how that wall was built to retain dirt but it also was intended to become a focal point for the front side of a residence.

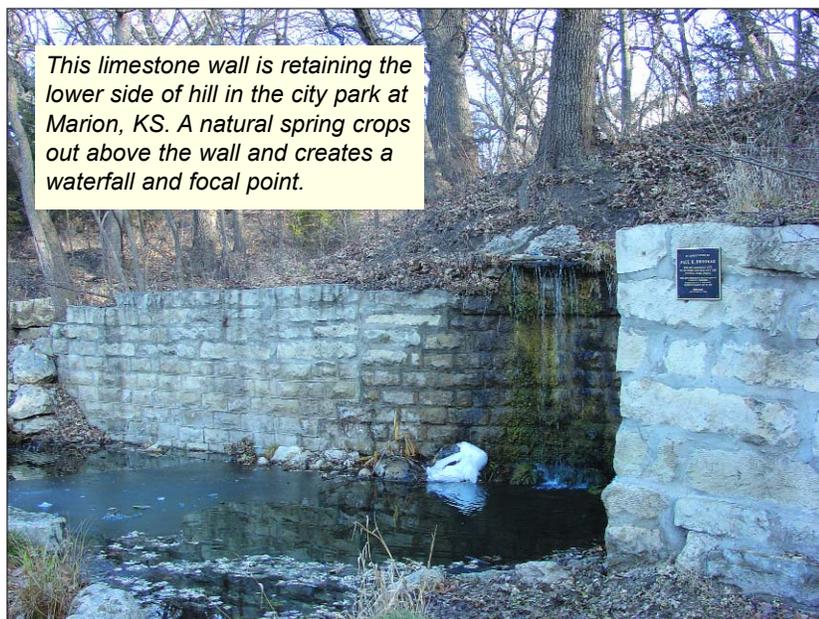


Having a level starting point is essential. The photo above shows volunteers at Whiting as they lay the first blocks.

regret. If you want to know more about KAN STEP or need advice on retaining walls, give me a call at the KRWA office. Also, I encourage you to attend the KRWA conference on March 23 - 25. There will be a special session on KAN STEP on Wednesday, March 24 at 10:45 a.m. in Room 209A. The title is on target: KAN STEP Keeps Working In Kansas.



This is a "Rock Bag" installed behind a limestone wall. The bag is used to alleviate the stress of excess moisture.



This limestone wall is retaining the lower side of hill in the city park at Marion, KS. A natural spring crops out above the wall and creates a waterfall and focal point.