

Hot, Dry Summer Reeks Havoc on Foundations and Walls

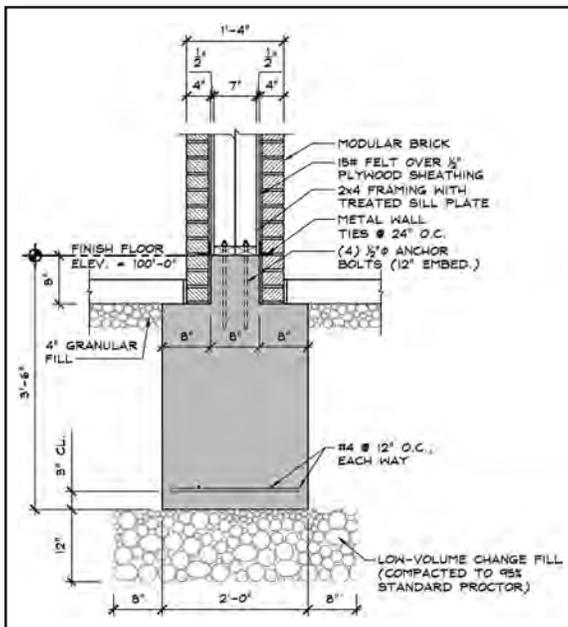
After a summer of extreme drought and heat, many problems with buildings have come to the surface. Well, not literally. Before we discuss “the surface” or the visible cracks, let’s go below the surface and talk about foundations and soil types that likely dictate how many cracks occur. Soil types greatly influence the potential for destabilized walls. This is always a concern on the KAN STEP projects that KRWA helps with.

Generally when a new home or building is constructed, there are specifications to install an adequate foundation.

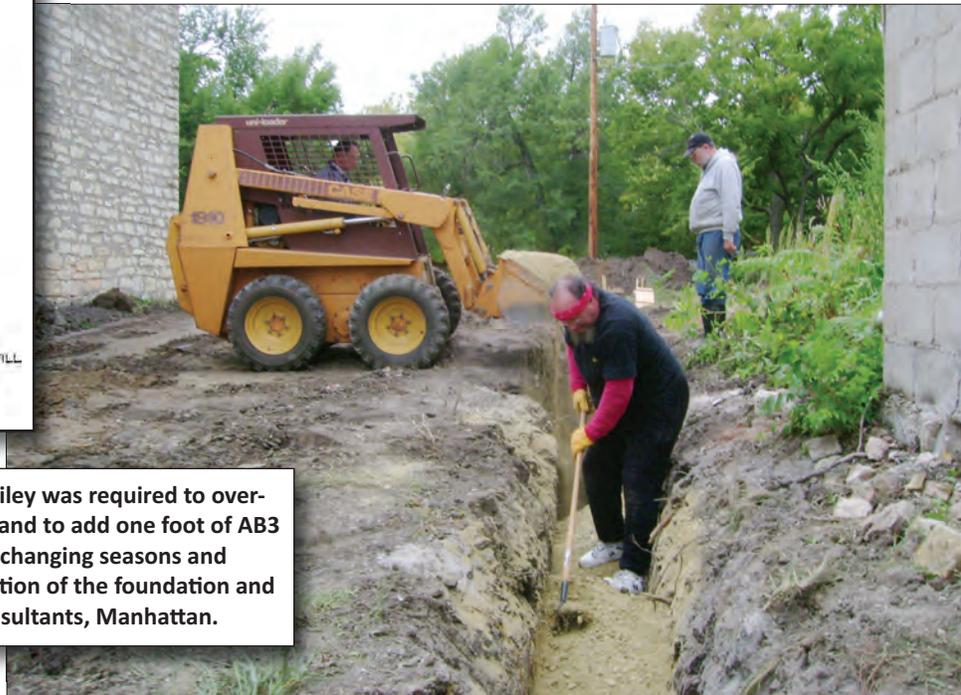
Local contractors who are in the business of excavating and installing foundations know from experience what types of soils are acceptable; they recognize those that may cause a problem in the future. They also understand how soil types change from location to location. Generally on commercial buildings, it’s advisable to have a soil proctor and/or have a soil compaction test performed. The investment is too great to have a failure later.

Why the cracks?

Cracks in walls in recently constructed homes and cracks in foundations of new and older buildings can occur for a variety of reasons. There can be differences in construction materials that change shape or size depending on the moisture content. The greatest impact however is caused by Mother Nature on expansive soils in Kansas.



The KAN STEP Library and Food Basket project in Riley was required to over-dig the footings by one foot to get to original soils and to add one foot of AB3 rock. AB3 is a rock material that will not shift with changing seasons and moisture content. The graphic shown is a cross section of the foundation and footing design by Riley’s project architects, BG Consultants, Manhattan.





The concrete floor and nearly four feet of soil was removed from the Udall Community Center as part of its renovation. The original floor had heaved nearly two inches as “fatty clay” soil under the floor absorbed water. AB3 was hauled in and packed in six- to eight-inch lifts.

In the case of the KAN STEP project at the city of Udall, Kansas, design architect Dan Hall with BG Consultants, Manhattan, recommended that the existing interior floor and upper several feet of expansive soil be removed and new non-expansive material be

imported and compacted to create a stable layer of soil. The Udall project is a renovation of a building originally constructed in the 1950s. It was quite an experience to remove the concrete floor and then enter the building with skid loaders to remove the soil under the original floor, replace it with layers of rock and compact it – and then pour a new concrete floor.

Building site development is an important aspect of any project involving new structures. The site development has to take into account the selection of the site, the design of the facility, construction, performance after construction, and maintenance.

Depending on the supply of moisture in the ground, shrink-swell soils will experience changes in volume of up to thirty percent or more. That’s according to industry studies. When expansive soils are high in moisture, they will heave, often resulting in lifting of a building or slab floor. During periods of drought, expansive soil will collapse and can result in settlement. As a result, damage can be extensive.

In my opinion, the lack of moisture is a more significant problem than anything else especially when dealing with concrete slabs and foundations. Certain precautions can be taken like putting down layers of rock and installing drain tile to alleviate excess moisture. Sealants can help reduce or eliminate leaks. Sump pits and pumps assist with removal of excess moisture during heavy rains but when there is no rain, the soil shrinks. In a sense, this shrinkage of soil compromises foundations and leaves hollow spots which transfer pressure. Because of gravity, cracks occur. When soil shrinks and pulls away, it does so with great force, often pulling down a footing with it because a footing is meant to have a footprint wider than the wall. The soils above the footing push down on the footing as well as the soils under the footing shrink away. This situation is a recipe for disaster. With luck, only some damage to sheetrock or walls will occur. But often, cracks occur in foundations or walls. If not dealt with properly, the situation can become a major failure in a wall. It’s not generally practical to stabilize the moisture contact around foundations, even if we try.

In new construction where expansive soil is a concern, the engineer or architect may require controlled pre-wetting of the soil prior to placement of the foundation. This will cause an expansion of the soil with the idea that further expansion pressure on the new foundation will be minimized.

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More about Kansas soils

Harney silt loam was adopted as the Kansas State Soil on April 12, 1990, when Governor Mike Hayden signed Senate Bill 96. Kansas is one of only seven states to have named a state soil. It took five years through a strong grassroots effort to get Harney named as the state soil.

Harney silt loam possesses the ideal qualities of a prairie soil. Prime farmland has the best combination of physical and chemical characteristics for producing food and fiber. Kansas has more acres of prairie soils than any other state. Harney silt loam covers almost four million acres in 26 west-central Kansas counties.

Kansas has more than 300 different soil types across its 52 million-acre surface area. Crop acres account for 56 percent or just over 29 million acres while range and pasture lands account for over 19 million acres or 37 percent. Nearly, 25 million of the 52 million total acres (48 percent) are considered prime farmlands.

Kansas soils directly impact the economic well being of its people providing nearly \$6 billion in annual income. Our soils are what help make us the number one state in wheat production, in grain sorghum production, in sorghum silage production and near the top in red meat production.



This sump pit and tile were installed around the perimeter of the Udall Community Center to alleviate water build up under the new concrete floor. A slab will also be poured between the community building and the neighboring building to the north to divert rainwater towards the street west of both properties and away from the buildings.

Kansas' soils move!

Similar to Udall's KAN STEP project, the situation of moving soil was encountered in the remodeling of the Horton KAN STEP community center. Horton had an existing building that had to be totally disassembled, the floor and foundation removed, soils then removed and new soil added back on the site and compacted to bring the building site to a standard for long-term suitable use as a site for a community center. The floor in the original building varied by a total of seven inches due to heaving.

Upcoming KAN STEP Projects

Several new projects have been awarded for the KAN STEP program. These include water system improvements in the city of Morrowville in Washington County and several miles of new water line for Montgomery County RWD No. 12.

Projects presently in progress include the following: renovation of the Community Center in Udall in Cowley County; renovation of the old Armory in Cherryvale in southeast Kansas to be a new community center; a new fire station in Esbon in Jewell County; a new fire station in Sawyer in Pratt County; a new Library and "food basket" in Riley in Riley County and a new fire station in West Mineral in Cherokee County. These projects and all those completed under KAN STEP are featured on the KRWA

If funding remains strong, the future is bright for KAN STEP and certainly is for the communities that benefit from this unique program.

Web site at www.krwa.net, then under "Technical Assistance". These and other KAN STEP projects are novel in that local volunteers contribute sweat equity to construct community facilities. I encourage any Kansas community to contact the Kansas Department of Commerce if interested in the KAN STEP program. Also check the Web site at www.kansascommerce.org for more.

KAN STEP has funded 77 projects totaling \$19,513,372. Volunteers have donated \$15,304,556 in labor and other services.

Pre-applications for new KAN STEP projects were due August 15. KRWA learned that the Department of Commerce received five pre-apps. Site visits were conducted and the Department has approved four to proceed with hiring an architect or engineers. The four projects are: Culver (waterlines), Jamestown (waterlines), Enterprise (waterlines) and Pleasanton (community center). Kansas Department of Commerce Field Representative Salih Doughramaji reports that a fairly large number of possible projects are also on the horizon. If funding remains strong, the future is bright for KAN STEP and certainly is for the communities that benefit from this unique program.

Shane Holthaus has been a KAN STEP Tech for KRWA since November 2002. He previously worked for 13 years for a professional contractor.

