**Unsafe sidewalks**

The most common reasons for cracking in sidewalks are the expansion and contraction in hot and cold temperatures, erosion caused by poor drainage and unstable soil conditions under the slab.

When concrete expands, it pushes against anything in its way (a brick wall or adjacent slab for example). When neither has the ability to flex, the expanding pressure can be enough to cause concrete to crack. Expansion joints are used to put space between two solid surfaces.

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**[](http://epod.typepad.com/.a/6a0105371bb32c970b0120a5633e90970c-pi)**

Why is this sidewalk buckled? All materials expand and contract with daily and seasonal temperature variations. Solid rock, or manmade substances such as concrete, or even steel, can generate huge internal forces when there isn't enough room to expand. The photo above was taken on a hot (near 100 F° or 37.4 C° summer day (July 13, 2003) in Great Falls, Montana, and the concrete sidewalk rafted as a result of the high temperatures. However, even though expansion cracks are evident, they weren't sufficient to handle the pressures of the constrained concrete.

Universities Space Research Association - Earth Science Picture of the Day

<https://epod.usra.edu/blog/2003/08/expansion-cracks.html>

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PROBLEM: If you worked for the Department of Public Works in your town or this happened in front of your house, you would need to repair the sidewalk before the neighborhood kids skating in front of your house take a headlong dive. You’ve measured the slabs in front of your house and found they are each 3 feet long; they heaved vertically 4 ¼ inches. Calculate the width of the expansion cracks needed between the slabs to prevent this from happening again.

1. Convert numbers to be used in calculating the length of the diagonal to the same units.
2. Calculate the diagonal length resulting from the heave.
3. Find the amount of spacing needed to prevent this type of cracking again.