

# Eliminating "Expansion" Joints

## Joints in Concrete Pavements: Part II of III

By Randell C. Riley, P.E.

Back in the June 2003 issue of IRMCA News I went into considerable gauding detail explaining the phenomenon of pavement expansion. To paraphrase, I told you, "Assuming durable materials are used, a concrete pavement is never any longer than the day it is built." Now, let's talk about the proper use of "expansion" joints and why you should avoid them whenever possible.

In 1940, the U.S. Bureau of Public Roads, (predecessor to Federal Highway Administration) conducted extensive tests of "expansion" joints. These tests found that "expansion" joints progressively close over the years causing greater opening at panels with adjacent contraction joints. This leads to spalling, loss of aggregate interlock and sealant failure. The conclusion of that study was that expansion joints are only needed when:

1. the pavement is divided into long panels (60-feet or more) without contraction joints in between.
2. the pavement is constructed while ambient conditions are below 40 degrees F.
3. the contraction joints are allowed to be infiltrated by large incompressible materials.
4. the pavement is constructed of materials that in the past have shown high expansion characteristics. (Ref: Proper Use of Isolation and Expansion Joints in Concrete Pavements, American Concrete Pavement Association, 1992, Skokie, IL.)

In parking lots and city streets in particular, our goal is to use aggregate interlock as much as possible, thereby

eliminating the use and associated expense of dowels and other embedded steel. To do so, we clearly do not want to include expansion joints.

But there are places in concrete pavement where a joint should be constructed that resembles the classic



expansion joint, i.e., it utilizes an expansion material and may or may not include dowels. Those locations are where it is necessary to isolate the pavement from fixed structures, light standards, manholes and other items which stick up through the pavement. In this case, the keyword is "isolate," (hence they are referred to by pavement engineers as "isolation joints.")

Isolating the pavement from these structures is necessary due to the fact that the structures usually penetrate below the frost line. The pavement

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is built above the frost line, and as the ground freezes in our sometimes bitter Illinois' winter the pavement is raised from the expansion of frozen ground. The fixed structures, with foundations below the frost line, do not move.

For those of you with concrete driveways (you all have them don't you?) you can see this phenomenon every winter as your driveway slab moves up and down relative to your garage entrance, particularly if you don't have a granular layer under the concrete. Were the slabs not isolated from the fixed structures, cracking and possible failure of the pavement slab would occur.

More information on joints and jointing can be found in the publication shown above from American Concrete Pavement Association.

Next time, joint spacing and the "tension-ring" concept in parking lot design.