Perpetual Pavements Lead to Award-winning Roads

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What is a perpetual pavement? In general, a perpetual pavement, sometimes referred to as a long-lasting pavement, is designed to make distresses at the bottom of the asphalt pavement unlikely. When distresses do occur, by design, they will initiate at the surface and propagate downward. This pattern of distress can then be corrected by periodic surface maintenance and renewal before it affects the bulk of the pavement structure.

Perpetual pavements use multiple layers of durable asphalt to produce a safe, smooth, long-lasting road. The pavement design begins with a strong, yet flexible bottom layer that resists tensile strain caused by traffic, and thus stops cracks from forming in the bottom of the asphalt pavement. A strong intermediate layer of rut-resistant material completes the permanent structural portion. The final surface is a layer of high-quality asphalt pavement such as stone matrix asphalt. Cracking is intended to be limited to the surface layer, which should be scheduled for replacement typically every 13-15 years.

According to Amy Miller, executive director of the Asphalt Pavement Alliance (APA), "the perpetual pavement concept was first articulated in 2000; however, full-depth and deep-strength asphalt pavement structures have been constructed since the 1960s and before. Those that were well-designed and well-built have been successful in providing long service lives under heavy traffic. Advancements in milling, recycling and asphalt pavement technology over the last few decades have created pavements that perform better and longer, with lower life-cycle costs than were previously possible.

"Asphalt roads can be engineered to last indefinitely with only routine maintenance and periodic surface renewal. Many engineers make final design selections by running the design through PerRoad, a design app for perpetual pavements, after initial completion of pavement design. Often, there are small adjustments to the original pavement design to transform it into a perpetual pavement."

In Hawaii, the City and County of Honolulu's "Structural Design Requirements for New Asphalt Concrete Pavements," which became effective in March 2006, is for long-lasting low-volume pavements. This new standard is getting us closer to the concept of perpetual pavements.

Prior to the change, the standard pavement section was a surface wearing course placed directly on an aggregate base course. The new standard requires a layer of asphalt-treated base between these two layers, making it like the pavement structure described above. The asphalt-treated base acts as both the bottom and intermediate layers, and the wearing course is the final layer.

In addition to the city's 2006 standard, some of the pavement designs done per the state Department of Transportation design procedure will result in very thick pavements, which are close to those required by perpetual pavements.

Has the city's new standard been effective? It has been over 10 years since the updated standard has been in place. Roads in the Ewa by Gentry residential development that were constructed using the new standard do not show any signs of cracking or other distresses. This is a positive indication that we may be on the right track to successful perpetual pavements.

On the national level, the APA gives out annual awards to recognize and celebrate perpetual pavements. The award is given to the state transportation department owners of asphalt pavements that are at least 35 years old and have never had a structural failure. The average interval between resurfacing of each winning pavement must be no less than 13 years. The road must demonstrate the characteristics expected from long-life asphalt pavements: excellence in design, quality in construction and value for the traveling public. Since the inaugural year of 2001, over 150 roads have earned this award.

Coming soon are two new awards: a "Conversion" category, for new paving over an existing road such as a concrete highway that has been cracked, seated (or rubbilized) and then overlain with hot-mix asphalt; and a "New Construction" category (Perpetual "By Design"), for new pavements (built over new or reconditioned subgrade) designed to the standards of a perpetual pavement. The APA's goal is to promote superior designed roads built today, instead of waiting 35 years to become eligible for a traditional Perpetual Pavement Award and to encourage DOTs to consider comparing their traditional pavement designs to a perpetual pavement design.

Perhaps one day, Hawaii will have an award-winning road.

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