

# **“Oil and Water Don’t Mix!”**

## **Asphalt Paving and Storm Drain Maintenance**

A community’s roads, parking lots, and driveways are one of their most expensive assets. Asphalt pavement has an anticipated life expectancy of 25 to 27 years. The actual duration of the pavement surface is directly related to how well it is designed (in terms of release of storm water and traffic load design), constructed (installed per design specifications), and maintained (ongoing maintenance). Assuming that the first two components were completed correctly, the ongoing maintenance will play an exclusive role in the overall life.

When asphalt is initially installed it is full of oil and emulsion that provides “flexibility”. The base that the asphalt is placed over is (by design) dry and dense. The purpose is for a “flexible” pavement to be supported by a compacted structural base at adequate depths relative to the amount of traffic and weight of traffic loads it will be experiencing.

Normal elements related to our climate and our daily lives strip the asphalt of this flexibility. More specifically, surface oils wash away with rain and nuisance water (landscape irrigation or other “man made” water events like washing cars or hosing off driveways) and evaporate with the sun’s heat. Surface fines (sands) that are contained by the surface emulsions as a result of these conditions also release from the pavement; leaving behind a more coarse, brittle and uneven surface.

Envision a typical kitchen sponge, that when wet, it is its greatest size and flexibility. As it dries out, reduces in size and becomes increasingly brittle. Pavement performs like that sponge. As asphalt loses oil, it loses size (hence thermal shrinkage cracking) and becomes a less flexible, more brittle surface. This is a normal occurrence. In addition, asphalt is a porous product; meaning water can and will percolate through asphalt to the sub-base and sub-grade beneath. This penetration of water can be a result of standing water. Penetration can also be a result of water intrusion thru the “thermal shrinkage cracks” that occurs as a result of age. In warmer and dryer climates, native soils tend to have higher clay content and subsequent moisture causes heaving and settlement in the soils; also subsequently permeating through the pavement’s surface. Ultimately, what occurs is the originally “flexible” pavement surface over a dry and compact surface becomes rigid and brittle over a wet unstable sub-base and sub-grade; hence asphalt failure. All of this is common. It’s how we maintain our pavement and related drainage components that will determine the performance of the pavement itself.

### **Examples of normal ongoing wear:**

- Thermal shrinkage cracking. Asphalt contains a large amount of emulsion and oil. Heat, weather and traffic combine to remove these products from the pavement surface, making pavement shrink. When pavement surface loses oil content it begins to shrink. Thermal cracking will appear at the pavement’s “weakest” locations. Cracks start as “hairline” cracks and can overtime reach widths of 3” to 4”.
- Grey discoloration and exposure of asphalt aggregates in the pavement surface. As asphalt ages and weathers it loses oil, emulsion and surface fines (sand). It loses its rich black color and lightens to grey and the “coarser aggregates” will become more prominent.

## Signs of abnormal pavement failure:

- Ponding of water. Pavement surfaces were not designed to “store” water, but are designed to be released off of asphalt via “in pavement” conveyance systems (catch basins or drywells) or “off pavement” conveyance (spillways to retention basins). It is often believed that water on pavement surfaces eventually evaporates. This is true to a degree. However, it can be expected that an equal amount of surface water percolates into the pavement sub-grade as well. This percolation can and does create unstable structural integrity in the underlying soils and consequently causes pavement to move and crack. This is commonly seen in “reflective” cracking or “alligator” cracking. The old saying “oil and water” do not mix is appropriate in asphalt as well.
- Alligator cracking of the pavement surface are strong indicators of poor sub-grade conditions. Repair of these areas should always include the examination of the sub-grade beneath the aggregate base course. Wet or unstable grade should be reconstructed to provide a dry, firm and compacted base prior to replacement of aggregate and subsequent asphalt surfacing.
- “Tearing” of asphalt. Tearing is where the pavement is cracking immediately adjacent to an unconfined edge, evidenced with cracking that runs parallel to that edge. All asphalt edges should be confined, with curb, another type of “hardscape” surface, or even a “thickened asphalt edge”. Tearing adjacent to an unconfined edge will not only allow the permeation of water, it will also continue to separate and the pavement condition will deteriorate rapidly.

## When evaluating Pavement needs:

### DO

- ✓ Keep thermal cracks filled. Strategic crack filling will ensure maximum life expectancy.
- ✓ Evaluate the oils, emulsions, and fines in the pavement surface. When there is significant loss and discoloration, it is time to seal coat.
- ✓ Create an ongoing seal coat maintenance plan and budget. The “rule of thumb” should be every 3 to 5 years depending on usage. Not all seal coat products are appropriate for all applications. Evaluating the age and conditions will determine which products will provide appropriate relief. Too much money can be spent applying an unnecessary or inappropriate product that will not provide the coverage or protection needed.
- ✓ Make sure storm and nuisance water drainage is exiting the pavement and not storing on it! Proper and ongoing maintenance of landscape common areas that border the pavement are designed to accept this run off and should not be higher than the elevation of the pavement or spillway immediately adjacent to it. Keep catch basin inlets, drywells, and adjacent storm pipe clean and free of sediment and debris.

## DON'T

- ✓ Don't allow water to "pond" on pavement surfaces for more than a couple of hours. Storm water will percolate into the sub-grade below.
- ✓ Don't let asphalt go too long without a proper crack fill and seal coat application. When asphalt becomes too brittle and there is evidence of alligator cracking, the cost of remediation goes up exponentially.

Understanding the "normal" versus "abnormal" indicators will help define the maintenance plan. No two pavements are the same. Each one should be reviewed on its own merit. When in doubt, hire a professional to determine the best solutions. Proper care will ultimately provide the longest life for a costly pavement asset.

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