

Asphalt Maintenance

Why Maintain Your Asphalt?

Asphalt pavement is basically sand, gravel and glue. The glue used to keep the sand and gravel together is asphalt, a heavy by-product of oil refining. While sand and gravel do not deteriorate significantly, the asphalt binder does quite rapidly due to oxidation, solar radiation, pollution and chemicals spilled from vehicles.

No pavement has been constructed that does not need maintenance. Many community associations find out too late that proper maintenance could have prevented costly replacements.

Maintenance is the art of keeping pavements in full service, with minimum expenses, and the least inconvenience to the public and the residence. Improper maintenance is usually worse than none at all. Preventative maintenance is a wise investment. There are several basic forms of maintenance.

1. Seal coating. This procedure will protect against oxidation and spills while making the asphalt visibly attractive. This application should be applied at least every 3 years or more frequently if use is heavy and deterioration is apparent. Applied at proper intervals, it will prolong the life of pavement indefinitely at a fraction of the replacement cost.
2. Crack Sealing. Cracks are usually caused by either a failure of the base, water damage or excessive weight on the pavement surface. Installing a hot pour mix to fill them can easily repair cracks. The crack sealer provides a waterproof bond and is rubberized to give support while the pavement expands and contracts in changing temperatures. Cracks that go unsealed will continue to allow water into the base structure, causing severe damage to the pavement as the base deteriorates. A pavement crack inspection and correction should be done annually.
3. Patching. If significant deterioration has taken place, removal and replacement of certain areas may be possible. If excessive ground water or poor soil conditions have aggravated the problem, corrections should be performed before applying the patch.

Preventative Maintenance

A well planned and funded preventative maintenance program will minimize your lifetime parking lot costs. Allowing minor blemishes in your pavement to grow into major problems will both increase your costs and lower customer satisfaction. No customer likes to hit potholes or step into a puddle of water.

Sun, rain, and wind age your parking lot. They harden the pavement, making it more brittle and likely to crack. Friction from tires rolling across the surface wears away the asphalt cement binder and line striping from the top of your pavement. Sunlight oxidizes the asphalt, both hardening it and drawing the oil out of the surface material, which reduces the effectiveness of the asphalt binder and allows aggregate to break away. Improperly drained water is the most harmful weather-related factor.

Once water penetrates a paved asphalt surface it begins to wreak havoc on the pavement base. Water usually penetrates a pavement surface through cracks. If a trouble spot turns into a pothole, the volume of water entering and damaging the base layer grows substantially. The longer cracks and holes are left uncorrected, the greater the damage to the base and the greater likelihood of future cracks and potholes. Naturally, the more cracks and potholes, the greater the repair cost. The earlier the signs of wear, especially cracking, show up in your parking lot's life, the more likely your lot suffers from a serious problem that will require repair and replacement at some point in the future.

Signs of pavement wear include:

- Fading color
- Oil spots
- A rough surface texture
- Loose or missing aggregates in mix
- Cracks that are several feet apart and give the appearance of large rectangular blocks
- Transverse cracks, mostly running at right angles from the main traffic flow
- Longitudinal cracks, running parallel to the main traffic flow
- Bird Baths
- High spots and /or rutting

What Is Your Pavement Telling You?

As the sun's affect begins to accumulate, the original dark black color of your parking lot will turn to a light black/dark gray color. Typically, your line striping will be fading out at the same rate. The loss of color tells you that significant amounts of oil have left the asphalt surface material. Oil spots are not signs of wear per se or indicators of future failure. Motor oil harms the performance of asphalt cement binder and, therefore, the strength of the surface. Oil spots indicate an unhealthy accumulation of oil, which left unchecked, will lead to more serious problems. Rough surfaces and lost aggregate (rocks) are indications of raveling. Raveling is magnified by vehicle traffic and fast moving water from rain or sprinklers.

Miscellaneous small cracks may be telling you many things about the condition of your parking lot. Usually, they are simply the result of pavement surface or base contraction and expansion. Two things to keep in mind: cracks allow water to enter and damage the subsurface, and the frequency and pattern of crack development will indicate whether they are the sign of a serious problem requiring repair of the base and replacement of the existing surface layer.

Solutions:

Seal coating

To maintain its visible impact and protect against the other effects of weather, you should have a protective surface coating applied to your pavement every few years in accordance with weather, and traffic conditions. Many different types of seal coats are available. Each one works well for some applications and less well for others. Using the lowest priced seal coat is not necessarily the best investment for your parking lot or your long-term budget. Seal coats do not stop cracks. They do not add strength to an asphalt pavement surface. They do reduce the impacts of sunlight on the parking lot. They help the pavement hold onto its oils and aggregate. Cracks need to be routed prior to applying a seal coat. The parking lot should be swept clean of any dirt. Oil spots must be heated and scraped clean. Saturated oil spots should be removed down to a depth of at least 1" and filled with an asphalt mix.

Crack Sealing

The primary reason for sealing cracks is to prevent water from entering the subsurface and causing damage. A second situation, which calls for crack filling, is when preparing surface for the placement of a fabric or an overlay. Cracks can be filled and sealed with two different techniques. The best approach is to use an injection nozzle that leaves the sealing fluid slightly below the top of the pavement. The more economical approach is to spread crack sealer with a spray nozzle/squeegee that leaves a three inch wide band centered over the crack. The principle advantage of the injection nozzle is that tires do not come into contact with the sealer and, therefore, will not be able to pull it up, which can happen with the banded approach. The injection nozzle also increases the probability that the filler/sealer penetrates the crack well to better withstand the shearing forces and will likely form a crack in itself over time.

In order for either method to work well, small cracks must be routed out to at least 1/2". The sealer used should have an adhesive quality to it so that it will provide a superior water barrier. The crack should be cleaned out with compressed air. Crack filling should not be performed during wet weather. Cracks less than 1/8" can be suitable covered with a sealcoat.

As a property manager or owner, here is something you need to remember-asphalt wears out. This is a given. It loses its color, it cracks, it hardens, and it has occasional potholes. Asphalt is an asset that requires consistent maintenance to ensure reliable service.

Maintaining an attractive and smooth asphalt parking lot requires investment in asphalt preventative maintenance and repair. The speed at which your pavement wears out will be a function of vehicle traffic volume, quality of design, quality of installation, weather, and, last but not least, quality and timeliness of asphalt maintenance. Combining any one of the first four elements with poor asphalt maintenance is a recipe for pavement failure.

Your asphalt parking lot will eventually show signs of deterioration from one or more of the following conditions:

- Pavement wear
- Pavement distress
- Pavement failure

Allowing pavement wear to continue unchecked will lead to distress. Ignoring distress greatly increases the likelihood of failure to the pavement. Timely response to your parking lot's warning signs is the most cost effective approach. It also signals that your company is interested in its clientele's well being and that it pays attention to even the small details of superior customer service.

Repairs

Your customers and employees expect a smooth driving pavement surface. Therefore, pavement distress must be addressed quickly. Pavement distress in parking lots is common after several years of moderate to heavy use. Pavement distress comes in many different disguises but ultimately results in pavement surfaces that no longer drain properly, have potholes, or have a rough texture in places.

The principle difference between pavement distress and pavement failure is the frequency of the problem. Relatively isolated problems can be resolved by spot repair. Non –structural problems can usually be patched and overlaid without digging out the existing parking lot. If your parking lot needs a new surface and the storm drainage cannot be properly worked out, then removal of the existing pavement surface will be required prior to putting down a new pavement surface.

Once pavement becomes distressed, it should be repaired. If these areas are not repaired, it will lead to more serious pavement failure and damage to cars and drivers. Potholes and rutting are two types of pavement distress signals.

Failed pavement requires removal and replacement. If pavement problems were caused by poor design, improper installation, or material deficiencies, distress symptoms will keep returning and it is likely that more extensive repairs will be needed to correct the problems permanently.

Signs of pavement Distress:

- Waves in the pavement surface.
- Ruts in the wheel paths
- Water or mud pumping to surface
- Potholes
- Alligator cracking in isolated areas
- Wrinkling or tearing of the surface layer

What Is Your Pavement Telling You?

Waves in the pavement are called corrugation, shoving or wash boarding.

They show up most commonly where cars and trucks are stopping and starting.

The appearance of waves indicates that the asphalt surface material is not exactly correct. The material may be defective due to excessive asphalt cement, an incorrect match between cement type and climate, and insufficient aggregate. Basically the rock in the mix is not performing its job properly. A somewhat related and occasional companion to corrugation is flushing.

Flushing is the name given to the dynamic that produces a smooth, shiny surface in the wheel paths. If this is going to happen to your lot, it will usually crop up in the first few years. Flushing is a material problem frequently caused by excessive asphalt cement in the mix, similar to corrugation. Flushing is very difficult to correct without removing the defective material and replacing.

Ruts in the wheel paths look like waves in the pavement running in the direction of the traffic. The condition is conveniently referred to as rutting. The presence of rutting tells you the pavement design/installation was insufficient to withstand the actual traffic loads. Rutting is a structural failure. Rutting can pose a serious driving hazard due to its sudden affects on the car's direction. It will also force water to collect in the low points creating a possibility of hydroplaning.

The presence of water or mud pumping to the surface usually indicates a pothole is on its way. The water and mud are coming from below the paving surface. They are carrying away the structural foundation to the asphalt pavement. Once the structural base has been sufficiently weakened, the pavement surface will collapse and you will be left with a pothole. All three conditions indicate that you have a water problem. Water is penetrating the surface somehow and eroding the structural support of the pavement. Until the conditions which are allowing the water penetration are resolved, the pothole will keep returning.

Numerous small cracks are called alligator cracks and tell you that either: one of the asphalt layers is too thin, the compaction is inadequate, or water penetration has deteriorated the pavement's structural strength. Excessive bending of the surface creates the cracks. Hardening of the pavement accelerates the cracking.

When your pavement surface wrinkles or tears, it is telling you that the bond between the base and the surface failed. The two must stay "glued" together to perform properly. The bond may fail for several reasons, but if your parking lot has a weak bond the symptoms will usually show up within the first year of operation. Typically, bond failures results from an installation error, but can be due to a major structural flaw.

Solutions:

Cut and Patch

The following technique applies for the majority of the problems described in this section including potholes. The only difference for potholes is that instead of cutting the edges, you need them cleaned up vertically to remove all loose material from the edge. If your parking lot's problems are of sufficient magnitude and appearance is valued, you should consider having a new pavement surface laid over the repaired pavement areas. Drainage performance will be superior on a new, smooth overlay.

When the areas needing repair total less than 15% of the overall parking lot, spot repair should be your approach. If the entire parking lot suffers from structural under design or significantly poor installation, then you may need to consider replacement of the base and pavement surface. If more than 15% of the pavement area requires repair, you may need to consider replacement of the pavement surface combined with spot repair of the base.

For maximum longevity, the edges of the deteriorated pavement areas should be saw cut to ensure the crack left by the patch minimizes water penetration. Once the patch perimeter has been marked and cut, all loose asphalt material and debris should be removed down to a solid base. All dust should be swept out and blown out of the hole. Tack oil should be applied and asphaltic material installed in lifts to ensure proper compaction (slightly convex to avoid ponding). A 4 inch band of tack material should be applied around the edge of the patch to ensure against moisture intrusion. A roller or compaction plate should be used compacting the edges first then proceeding with proper compaction techniques to correct density.

Overlay

Once the problem spots have been properly repaired to attain a suitable structural support for your parking lot's vehicle traffic, a new pavement surface can, and often should be laid over the existing pavement surface. A new pavement overlay will allow the installing contractor to control the water flow over the parking lot thereby minimizing future water related pavement problems. The existing pavement surface should be swept clean and a tack coat applied to bond the new pavement surface to the old pavement surface.

If the old pavement surface contains several cracks, a crack retardant fabric should be placed between the old and new pavement surfaces. Without the crack retardant fabric the cracks will be quickly reflected from the old pavement surface into the new pavement surface. Not only would the visual appearance be less than acceptable to you, water would now have quick access to the subsurface again. Crack retardant fabric will not prevent all reflecting cracking, or other cracking, but it will greatly diminish them and slow down the rate of creation.

For an explanation of the difference between pavement failure and pavement distress please refer to our pavement maintenance **301: Repair page**. The main difference between pavement distress and pavement failure is the magnitude of the problem. Generally, the problems and symptoms are similar, but more area is affected.

Pavement failure is uncommon during the early years of the parking lot unless there is a structural problem. Failure generally occurs later in the life cycle of pavement (10 years plus) and normally when preventative maintenance has not been performed or heavy traffic use occurs. A common contributor to pavement failure is improper design for type of weight and traffic the parking lot area receives.

Pavement failure means that your parking lot cannot be brought back to an acceptable condition through spot repairs and an overlay. A failed parking lot usually requires the removal and replacement of both the base and the pavement surface. Sometimes the base still remains in relatively good shape and just the pavement surface needs to be removed and replaced. The less you have to remove the lower your immediate repair cost.

One guideline to remember, if the problems are serious and the base is the cause, only removing the pavement surface will not buy you much time. The base's flaws will recreate the surface symptoms relatively quickly and within a few years you will be back to where you are right now.

