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ASPHALT CRACK SEALING, BLOG

# Different Types of Cracks and How to Resolve Them

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When installed and properly maintained by a

professional contractor, asphalt pavement should theoretically last for a very long time.

Occasionally, however, pavement crack sealing and asphalt repairs will be necessary. The repair methods depend on the type of damages you're dealing with. To help simplify matters, we've created an extensive guide to help you identify the different types of cracks and the most effective solutions to repair them.





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slick when wet, which can cause extremely hazardous driving conditions, especially in the rain or snow.

**Cause:** Adding an excessive amount of bitumen (binder) into the aggregate and failing to mix it in properly.

**Solution:** To correct minor bleeding, paving contractors typically lay down stone screenings or coarse sand which absorbs the excess binder. They can also use a motor grader to cut off the excess binder or a heater planer to remove the excess binder. In some cases, asphalt resurfacing may also be necessary if these solutions result in a rough and unusable surface.

## Joint Reflection Cracking

Joint reflection cracks are fractures that occur in a flexible overlay such as asphalt that covers a rigid paving material such as concrete.

**Cause:** Excessive moisture and varying thermal temperatures can cause the pavement subgrade to shift over time, especially if it hasn't cured properly. Consistent usage and the application of load-bearing vehicles can also indirectly contribute to the formation of joint reflection cracks and pavement deterioration.

**Solution:** Minor cracks (localized cracks that are less than a half inch wide) can be filled in. Severe cracks, however, need to have the entire damaged surface area removed. The underlying asphalt needs to be compacted before the surface layer can be replaced with a stronger overlay.

## Alligator Fatigue Cracking

Alligator cracking is a group of interconnected cracks that resemble the dry, cracked skin of an alligator. Tertiary cracking typically starts from different directions until the lines are joined together.

**Causes:** Weak structure, miscalculating the load the pavement will hold on a regular basis, weak surface, poor drainage, a thin surface aggregate, or a combination of all of these defects.

**Solution:** Considering most alligator cracking is a foundational issue, the weakest structural points need to be identified so that a full-depth patch can be applied.



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rectangles. They usually occur on long stretches of road but can also sometimes occur in areas that don't get a lot of traffic.

**Cause:** Use of low quality bitumen (binder) that's incompatible with local climate conditions. When asphalt is incapable of adjusting to temperature and humidity changes, it fails to expand and contract as needed, causing it to dry out and crack.

**Solution:** Minor cracks can be repaired with crack sealing, but severe cracks require an asphalt overhaul in which the damaged asphalt is completely removed, and a new overlay is applied.

## Depression

Depressions are large or small indents and dips in the pavement where water and debris collect, usually following rain or snowfall.

**Cause:** Poor compaction and using low-quality subgrades during construction. Over time, the weight of large and small vehicles can force the asphalt to sink lower and lower due to excessive air pockets and lack of durability. If ignored, depressions can eventually become potholes.

**Solution:** Damaged subgrades should be removed and replaced with a more structurally sound and thoroughly compacted aggregate to avoid future issues. The new subgrade can be patched up and should be allowed to cure for about 24 hours before resuming usage.

## Corrugation and Shoving

Corrugation and shoving is when the asphalt develops a wavelike formation across the surface area that's perpendicular to the direction of traffic. This usually occurs on parts of the asphalt that get a lot of stop and go traffic or braking.

**Cause:** Lack of structural integrity, unstable asphalt, low quality or poorly compacted aggregates, too much moisture in the mixture, and mix contaminations, combined with constant stop and go traffic, hard braking, and excessive tire pressure.



**Solution:** Minor, localized corrugation and shoving can be repaired by removing the distressed and damaged pavement, then patching it up. Extensive corrugation and shoving require the removal of the surface and base of the damaged asphalt and replacing it with a stronger overlay.



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application direction.

**Cause:** Subpar construction and misplacement of joints (they should be placed outside of the wheel path to prevent consistent exposure to heavy loads).

**Solution:** Minor cracks can be filled in, but severe cracks, however, need to have the entire damaged surface area removed.

## Water Bleeding and Pumping

If asphalt is excessively permeable, water can easily penetrate the surface. Building up over time, an abundance of water can cause a massive overflow that looks like bleeding or pumping from the ground up.

**Cause:** Inadequate compaction during construction, insufficient aggregate mixing, a low-quality or broken-down drainage system, and high water levels.

**Solution:** If poor drainage or high water levels are to blame, then the drainage system needs to be repaired or reconfigured. If low-quality aggregate mixing is the issue, then applying a slurry or fog seal can prevent more moisture from penetrating the asphalt surface.

## Polished Aggregate

Polished aggregate is a portion of the asphalt that has become smooth over time, which poses potential safety hazards because it reduces tire traction and can espouse a slick and glassy surface texture, especially in damp conditions.

**Cause:** Gradual wear and tear due to consistent use by heavy weight-bearing vehicles.

**Solution:** Applying a bituminous surface treatment, skid resistant slurry seal, or surface overlay to create a rougher and more angular blacktop.

## Transverse Thermal Cracking



Transverse cracking, also known as thermal cracking, is when the crack formations are perpendicular to the centerline or direction of application of the pavement.



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**Solution:** For minor transverse cracking, use a highly durable and efficient sealer to block off moisture from penetrating the surface. For larger and more severe cracks, it may be necessary to remove the damaged asphalt and replace it entirely.

## Potholes

Potholes are large circular depressions in asphalt pavements that extend deep beneath the surface of the subgrade and are surrounded by sharp edges, along with interconnected alligator cracking.

**Cause:** The longer cracks, particularly fatigue cracks, are left untreated, the more they break off into chunks of asphalt and spread throughout the pavement. Consistent vehicular and foot traffic can contribute to further deterioration of the asphalt.

**Solution:** Remove all of the damaged chunks of asphalt and patch up the hole with a strong aggregate.

## Stripping

Stripping is the gradual deterioration of bonding between the asphalt binding agent (bitumen) and the aggregates. It usually begins at the foundational layer of the asphalt pavement and slowly works its way up over time.

**Cause:** Stripping from the bottom-up is difficult to identify as it usually appears as other problems including shoving, corrugation, rutting, cracking, or raveling. To determine the exact cause of the problem, a cylindrical core must be carved into the problem area to see how far down it goes.

**Solution:** The entire affected pavement surface and subsurface area needs to be excavated and replaced with a stronger and more impenetrable aggregate. Drainage issues also need to be dealt with at this time to prevent further moisture retention.

## Raveling



Raveling occurs when individual particles or pieces of aggregate are loosened and become dislodged from the surface of the pavement, leading to internal destruction as water and loose



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apart. Aggregate segregation, a coat of dust on top of the aggregate particles, inadequate compacting during installation, and mechanical dislodging are also culprits.

**Solution:** For small, localized raveling, the damaged pavement can easily be repaired with a slurry or fog seal. If the raveling area is widespread, this could indicate that the damages go much deeper than the surface. The entire affected asphalt needs to be removed and replaced.

## Rutting

Ruts are linear depressions that are gradually made along the wheel paths of asphalt pavement. There are two types of rutting: mix rutting and subgrade rutting. Mix rutting only occurs on the surface of the asphalt pavement when depressions are apparent in the wheel path. Subgrade rutting is when the depressions run a lot deeper beneath the surface of the asphalt pavement, usually caused by frequent use by heavy load-bearing vehicles.

**Cause:** Natural wear and tear over the lifespan of the asphalt pavement combined with inadequate compaction, mixture, and design during construction.

**Solution:** Pavements with severe rutting can be repaired by leveling them out and applying an overlay.

## Slippage Cracking

Slippage cracks typically take on a crescent shape and go in the direction of traffic. If neglected, they can quickly turn into a much bigger problem—potholes.

**Cause:** Poor-quality hot mix asphalt, improper bonding between the surface layer of asphalt and subgrade combined with consistent hard braking and sharply turning wheels can cause slippage cracking.

**Solution:** Remove the damaged asphalt, replace it with a stronger aggregate, and let it cure completely before using.

For more information on the different types of cracks, contact the crack sealing experts at **Sure-Seal Pavement Maintenance Inc.!**

