



July 2016



Welcome to the seventh edition of Highways Matters.

In the last edition of Highways Matters, I made a passing reference to potholes and said that a future edition would cover the issue more extensively. Well, this is that edition! Here you will find an explanation of how potholes form, what we do to prevent that happening and some of the programmes of work that we have lined up for this year.

I hope that the last edition gave you some food for thought in that not every bit of missing road surface is considered to be a pothole. However, as our roads are mainly damaged by water penetration of the road surface, it's important that we have a range of programmes of work to help keep potholes at bay.

If you have missed earlier editions of Highways Matters, you can now find these on the Suffolk County Council website by visiting the [Highway Maintenance pages](#).

Potholes

Central government loves to refer to potholes as often as possible when it comes to talking about highway maintenance. It is a subject that grabs everyone's attention and can spark debate quite easily because we've all come across them.



But where do they come from? To understand the answer to that question, you have to understand a bit about road construction.

There are only two basic types of road construction:

- rigid: made out of concrete – usually reinforced by an embedded steel mesh
 - flexible: made out of a combination of aggregate (i.e. stones of different sizes) and bitumen (the 'glue' that holds the aggregate together)
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Rigid Roads

A rigid road is formed from a series of concrete slabs and can only be laid in relatively short sections.

Between these rigid slabs are flexible joints that compress when the concrete expands in the heat of the summer, and stretch to ensure there is no gap when the concrete shrinks in the cold of the winter. This means that the intensity of the bump that you feel when you drive over these joints changes during the course of the year.



Although you don't tend to get potholes in concrete roads, they can start to break up by cracking along a weak part of the concrete, or because the material that it has been placed on is shifted by the flow of water beneath the concrete slab.

From a maintenance perspective, concrete roads are arguably less of a problem – but they are significantly more costly to provide in the first place. The machinery needed to create concrete roads is large and expensive to use, so it is only cost effective to produce concrete roads on a large scale.

Concrete roads in Suffolk can be found as dual carriageway (e.g. on the A12 near Kessingland) or lots of adjacent urban roads (e.g. in Ipswich). The main focus for concrete road maintenance is the timely renewal of the joints.

Flexible Roads

Flexible roads are a completely different matter though. The principle is that the aggregate provides strength and the bitumen provides the road with the ability to expand and contract without cracking. This means that it can be laid in a continuous layer without the need for specially constructed joints.



A flexible road tends to have three main layers – a surface course at the top, a binder course in the middle and a base course below. [Click here to read more about flexible roads.](#)

When a tyre passes along a rigid road, the concrete doesn't move. When a tyre runs along a flexible road, the bitumen is compressed and then expands back to its original size once the tyre passes. The heavier the vehicle, the greater the compression.

Over time, normally around ten years, the road surface course gets tired of repeatedly expanding and contracting, and the surface course becomes stiffer and stiffer. When tyres continue to run over this surface layer, it stops compressing and expanding and starts to crack instead – road failure has started, as shown above!

Road failure - what can be done?

So, before it gets any worse, there are two things that can be done. One solution is the bitumen is treated so that it can continue to compress and expand for a little longer, through a process of bitumen injection and rejuvenation. We are exploring the potential of these treatments at the moment for possible future use.

The more normal approach is for the surface layer to receive a thin top-up, overlaid surface:

- a **micro-surface** of aggregate bound together by bitumen in a layer about 20mm thick
- or **surface dressing** of 6mm or 10mm granite chippings stuck to the road surface with a very thin bitumen layer

These top-up surfaces can expand the life of the road surface for up to ten more years and are effective, low-cost maintenance treatments. Timing is the key for when these treatments are applied – the best time being between April and August.

The freeze/thaw cycle

If this protective work is not done, the surface cracks are attacked during the winter. Water gets into the crack and, when temperatures drop below zero, the water turns to ice which occupies a bigger volume. This expansion fragments the road surface material. [Click here to see how the freeze/thaw cycle affects the road surface.](#)

When the temperatures rise, the ice thaws and passing traffic pulls the material out of the crack which can then fill with more water. The expansion of the crack continues through this freeze/thaw cycle.

What happens if protective work is not done?

When the crack in the surface layer gets to the binder course, two things can happen:

- The road surface breaks up over a wider area just at the top layer. This is called delamination and is shown in the picture on the right. This may look unsightly but these are not regarded as potholes.
- The crack starts to penetrate the binder course – the point at which we consider a pothole is forming.



Delamination is more likely to occur if there is a poor bond between the top surface course and the underlying binder course. For delaminated road surfaces, it is unlikely that there will be any quick intervention with temporary material as this isn't cost effective and won't be durable.

The rate at which the freeze/thaw cycle impacts upon the surface course is slow because it is a strong layer. However, the impact on the binder course is much faster and needs tackling far quicker, particularly through the winter.

Patching or planing?

If the surface material has just eroded at the surface course at isolated points, road patching is carried out – and restores the integrity of the surface course. Surface dressing or micro-surfacing can still be carried out to a road that has been pre-patched in this way. However, if the surface course is riddled with cracks and failures, the road will probably need to have the



entire failed surface course removed (by a process called planing, as shown in the image on the right) and a new surface course laid. As the work is more intensive, the cost is higher.

Making potholes safe - temporary or permanent repairs?

If a programme of patching work can be carried out in one location, it is more cost-effective than carrying out small amounts of patching work in lots of places. The latter will happen if the road surface is allowed to deteriorate too much and too deeply – defect response patching will then occur instead of planned patching. In the vast majority of cases, we aim to effect a right first time permanent repair to the road.

However, if the penetration of the binder course is really severe (i.e. a deep and wide pothole) on a really busy road, there may be no other option than to carry out a temporary reinstatement to make the pothole safe. This is particularly the case if traffic management, such as temporary traffic lights or even a road closure, is needed to carry out that permanent repair.

It may also be a case of carrying out that temporary reinstatement more than once, particularly if a permanent repair cannot be carried out. This may be the case if the road is part of a temporary diversion route for other works so a road closure would cause too much disruption.

Future maintenance work

In a previous edition of Highways Matters, you will have seen details of how to access Suffolk Highways' programmes for grass cutting and weed spraying. Those programmes have been updated on a regular basis to demonstrate progress, although having one of the wettest months of June in history has hampered progress at times.

We have made a concerted effort to pull together into one document as many programmes of work as possible at this stage.

The [Programmes of Work](#) section on our website has details of all of the highways work planned throughout the county. As part of this the [Forward Programme 2016](#) shows a list of schemes, sorted in alphabetical order by parish that include:

- Road resurfacing
- Pre-surface dressing preparation
- Surface dressing
- Highway drainage
- Road markings

Additional surface dressing and drainage improvement schemes are now being designed and, once they are ready for implementation, the dates for works implementation will be added to the list.

Publishing our 2016/17 works programme is a significant step forward from our previous position of having no visibility of our programmes on our website - and our intention is to provide outline programmes of work for the years ahead as soon as we can.

We hope that you find the latest information on our website and in this newsletter to be helpful.

If there is something in particular you feel would be useful to know more about, please let the communications team know at communications.team@suffolk.gov.uk and it will be covered in a future edition.



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