

# Roads and Footways - Asset Management and Maintenance



## Purpose

This is a short document to outline Kent County Council's approach to prioritising repairs to Kent's roads and footways, the maintenance techniques we have available and when and why they are used.

## National and Local Context

Our local highway network is the most valuable asset we own in Kent – a like-for-like replacement would cost around £19.8bn – and one of the largest in England. It plays a vital part in delivering Our Vision in Kent County Council's Strategic Statement *Increasing Opportunities, Improving Outcomes* which sets out our ambitions towards 2020. Our highway network enables safe and reliable journeys and in doing so supports social and economic prosperity. It also facilitates the transport of services essential to health and wellbeing, including emergency services, medical services, food transportation etc.

Our highway network is made up of a number of different assets, including 250,000 roadside drains, 120,000 streetlights, 1,500 bridges, 700 sets of traffic lights and two tunnels. However, our biggest highway assets, in terms of size and value, are our 5,400 miles of roads and 3,900 miles of footways.

Like most local authorities, Kent is facing significant challenges in maintaining a safe and reliable highway network during a time of diminishing resource, ageing assets and increasing public expectation. The rate at which local roads in England are deteriorating far exceeds the rate of investment from central government. This is a national issue but arguably affects Kent more than most given the scale of our highway network and proximity to London, the Dartford crossings and continental Europe. The current estimated backlog for road maintenance in Kent is £584m and for footway maintenance is £83m.

## Asset Management Approach

In the current financial climate, and given other national priorities, it is unlikely that funding for local road and footway maintenance will significantly increase in the coming years. It is therefore important that Kent fully embeds the use of asset management principles and latest best practice into its management of highway maintenance going forward, so that it can manage/optimize asset condition using available resource. As a forward thinking authority, we are already doing much of that and are committed to further embedding asset management principles into our day-to-day management of our roads. This includes understanding their lifecycle cost so that we can make informed investment decisions, maximise efficiency and value-for-money, and ensure that we have well-managed highway infrastructure that is fit for purpose, not only now but for future generations. The County Council has recognised the challenge ahead and has adopted an Asset Management strategy called [Implementing Our Approach to Asset Management in Highways](#) to address this issue.

Asset Management is about using an appropriate level of information to inform decision-making around investment in different highway assets. It is about understanding the assets we manage, their condition and how they will deteriorate, and using that information to prioritise and develop maintenance plans and forward works programmes. It is also about how we prioritise highway maintenance across different highway assets.

The capital grant from central government for highway asset maintenance in 2017/18 is around £28.5m, and that is for maintaining all highway asset groups. Using asset management

methodology and an analysis of priority, we have allocated that resource across asset groups. Around £13m has been allocated for road resurfacing and applying protective treatments, and around £1m for footway reconstruction and protective treatments, with the remainder being allocated to other asset groups such as drainage, structures and streetlighting. That level of Government funding in roads and footways enables Kent to treat around 2-3% of the road network and less than 1% of the footway network each year, which is why we need to use asset management methodology to inform our investment options. We do our best to keep the rest of the network in as safe a condition as possible by regular inspections, reacting to customer faults and undertaking pothole and patch repairs.

### **Prioritising Road and Footway Investment**

Kent has to carefully prioritise the maintenance works it does on our roads and footways to ensure the most benefit to Kent's highway network overall. To do this we consider the condition of roads and footways, alongside factors such as the cost of the works, the amount/type of vehicular/pedestrian traffic they carry, their importance to Kent's economy and any safety hazards that may be present. KCC regularly surveys its road and footway network within Kent, using mechanical and visual means, to ensure the highway remains safe for all road users. One of the mechanical surveys we carry out identifies sections of road that have poor skid resistance, cracking, low texture and other general condition factors. Other surveys look at general condition with a view to modelling and forecasting future deterioration.

The data is then analysed and this gives us a ranking output such as worst first priority and economic ranking priority. KCC's asset management tool recommends which treatment would be best suited to the road or footway depending on the current condition. KCC also seeks where possible to address local priorities and concerns.

Each year, we have to report our road condition levels to the Department for Transport using nationally agreed condition criteria so we can see year on year how our investment is doing and compare ourselves to other local authorities.

### **Our Approach to Road and Footway Maintenance and Materials**

The approach Kent takes when deciding where to invest its finite resource is to use the most appropriate surfacing treatment in the right place at the right time based on sound engineering information and in line with the prioritised investment approach as noted above. The majority of maintenance carried out on our roads and footways is planned capital maintenance such as applying specialist treatments to extend the life of these assets or replacing failed surfaces.

### **Extending the life of roads and footways by repairing and overlaying on top of what is already there**

The majority of existing road and footway surfaces are constructed using bitumen-based materials in the form of asphalt. Over time, these degrade because of oxidation, sunlight damage, movement, roadwork reinstatements or age, which leads to a loss of structural integrity. This will in turn lead to cracking and other surface defects allowing water to get into the road or footway surface and ultimately result in potholes. Much of that failure can be delayed by the use of surface treatments to seal the surface and extend the life of the road or footway. Consequently, we spend at least half of our funding on this type of work. This means we can improve a larger proportion of the network. The main types of surface treatment we use are explained below.

#### Surface Dressing

Surface dressing is an extremely cost effective way of maintaining a road. It restores skidding resistance and seals the road surface to prevent water ingress into the road structure. Hot bitumen is sprayed onto the road and chippings are then applied and rolled in. The road is then swept to remove excessive chippings. It is generally used on busy rural or urban roads and lasts 8-10 years. This is our most cost effective resurfacing treatment, at around £4 per square metre.

### Micro Asphalt

Micro Asphalt is more expensive than surface dressing, at around £8 per square metre. However, it is more "robust" on difficult sites and may be appropriate in some urban areas. It can be laid by a surfacing machine and can improve the road shape slightly. This process is not thought of as adding any significant strength to a road, but like surface dressing, by sealing a sun-damaged and deteriorating surface it will extend the life of the road surface, improve its appearance, and improve skid resistance. Micro Asphalt should last for around 10-12 years.

### Slurry Surfacing

Slurry surfacing is a bitumen emulsion with a fine aggregate layer. On roads, it can only be used to restore some skid resistance and seal the surface. It is a temporary preventative maintenance treatment for minor roads, and has a life expectancy of approximately five years. KCC mainly use slurry surfacing on footways, as this is a cheap and very quick solution for minor defects. On footways, it should last for around ten years.

## **Replacing failed surfaces by renewing one or more layers**

In some cases, the condition of the road or footway surface has deteriorated beyond the use of a life extension treatment. The only solution in those cases is to replace one or more of the top asphalt-based layers with a new material. The material we select will depend on the type and use of road/footway, as explained below.

### Dense Bitumen Macadam (DBM)

This material containing 6mm stone chippings is what we use on new and existing footway reconstruction. We also use 10mm stone on low speed, low stress roads. It is laid 20-30mm thick and typically costs £25 per square metre.

### Hot Rolled Asphalt (HRA) with pre-coated chippings

This is the preferred material on heavier trafficked roads. There can however be problems, especially during maintenance, providing sufficient road width to accommodate the chipping spreader, safety zones and passing traffic lanes. It is normally laid 35-40mm thick and costs around £25 per square metre.

### Hot Rolled Asphalt (HRA)

This is a very stiff material and is only be used if the base is structurally sound. It is therefore unsuitable for streets where there are multiple utility trench reinstatements. It is not suitable for reactive hand layed repairs. It is also not recommended for roads with speeds greater than 40 mph or where high grip levels are required. It is normally laid 35-40mm thick and costs around £25 per square metre.

### Stone Mastic Asphalt (SMA) and Thin Surfacing

An alternative to HRA. SMAs and Thin Surfacing can be laid as thin as 25mm and up to 40mm. They are permeable and are therefore not recommended for use on structures or where the asphalt layer below the top layer (known as the binder course) is cracked or crazed and therefore in need of waterproofing. In such situations, the binder course is also replaced. These are suitable materials in built up areas due to low noise characteristics. They are available in three stone sizes - 14mm, 10mm and 6mm. The smaller the aggregate size the quieter the tyre noise generated. A suitable material where high grip levels are required because the thin layer reduces the quantity of higher cost stone needed. Costs range from £25 to £35 per square metre.

### Shallow Retread and Deep Recycling

Shallow Retread consists of pulverising and remixing the top 75mm of the road surface in-situ. Deep Recycling consists of the same approach but you can go up to 300mm deep, this would be the preferred option for roads that are structurally poor. Foamed bitumen, bitumen emulsion and/or cement is then added to it as a binding agent. After reshaping the road, the revitalised material is compacted by rolling. A surface dressing is then applied to seal the road surface. To produce a more durable and improved running surface a conventional surface course can be applied on top instead. This method is environmental friendly and cheaper than full reconstruction but its use is limited. Due to the size of plant required and the process of this treatment, it is usually only used in rural areas. Costs range from £18 per square metre for Shallow Retread to £45 per square metre for Deep Recycling.

### Full Reconstruction

Full reconstruction of a road is the most costly treatment; it involves the removal and replacement of all the existing carriageway construction layers. Costs can vary from £100 per square metre up to £300 per square metre depending on the location, existing condition and proposed construction.

### **Concrete Roads**

Whilst the majority of our roads are asphalt-based, around 5.5% are made of concrete. The maintenance of concrete roads presents significant challenges for local authorities. Joint failure, cracking, steel reinforcement corrosion, slab settlement are some examples of concrete failure. The majority of concrete failures are expensive to resolve, therefore KCC is always looking at innovative ways to deal with these issues.

Many concrete roads in Kent were constructed in the 1950s and 1960s. They have stood the test of time, lasting 50 or 60 years, and have therefore provided great value for money. Whilst many are visually poor, they are structurally sound and not unsafe. Historically, we have often over-laid concrete roads with bituminous material in order to improve their visual appearance and ride quality. That is unsustainable and is not effective asset management. Our current approach is that we will limit overlaying concrete roads to those sites where this is needed for structural or grip reasons. Where it is not, localised concrete repairs may be considered appropriate.

### **Road Noise**

Road noise is typically caused by roughness-induced vibration or air squeezing between road surface and tyre, and this will vary between different materials and resurfacing techniques. When laid, surface treatments tend to be noisier than other conventional materials. SMA or Thin Surfacing can be known to reduce noise. This is due to the flat, machine laid surface and uniform negative surface texture which means the surface type is significantly quieter than conventional surfacing such as HRA.

It ought to be borne in mind, however, that our selection of material type is based on the type of road, speed and surroundings. Whilst the County Council recognises the distress that road noise can sometimes cause, it is not a factor that the County Council can afford to consider when deciding which material to use to maintain a road. That is because it is important that we choose the right materials for the condition of the road and to maximise value for money. We do not undertake any surfacing works or erect noise barriers purely for noise reduction reasons as this would take resource away from locations that have failed or are failing.

### **Coloured Surfacing**

A variety of non-black asphalts have been laid on Kent's roads and footways for a number of years. They are usually used to highlight a hazard, junction, speed gateway or have been placed for decorative purposes i.e. through villages or towns. Non-black asphalts are much more expensive than standard asphalts and are difficult to maintain. Potholes can occur later and are repaired using black asphalt as it is not economical to obtain non-black asphalts in small amounts.

Notwithstanding the cost of non-black asphalt and the challenges of maintaining them later, it is clear that they are required in some limited circumstances. However, going forward, this will need to be balanced against the lifecycle cost of the asset, and alternative designs and materials considered, as the continued use of these materials on the scale that has been used in recent years is unsustainable in asset management terms.

### **Conservation and Heritage Areas**

The way in which we maintain our road and footway assets can also be affected by conservation and heritage considerations. All conservation areas that we are required to work within are looked at on a case-by-case basis, balancing our duties under the Highways Act 1980, available resource, the nature of the work involved, and the nature and character of the area. We look to engage with the relevant District Authority to discuss options with their conservation teams and where possible find a mutually agreeable solution to the work required.

This approach, whilst respectful of conservation restrictions, can be time consuming; however usually a mutually acceptable solution can be agreed. Any such agreement must represent a fair and appropriate balance between our duties under the Highways Act, the costs of the works required, and the nature of the conservation being sought.

### **High Friction Surfacing (HFS)**

Surface treatments and conventional asphalt surfaces can provide very high levels of skid resistance initially, but they generally cannot cope with the extremely high stresses generated on the approaches to certain junctions, roundabouts, pedestrian crossings etc. Although conventional bituminous road surfaces are better able to cope with the stresses in such situations, the skid resistance they can provide is limited by the properties of the naturally occurring aggregates used in those materials. When we need a high grip level, we select a proprietary HFS system using a 'man-made' aggregate called Calcined Bauxite which has extremely high grip levels. HFS provides a high level of skid resistance and so enhances safety and reduces accidents for high risk sites. High risk sites are generally defined as:

- approaches to major junctions;
- approaches to pedestrian crossings when pedestrians or other vulnerable road users may misjudge the speed of the traffic, for example near schools or where children cross, near public houses or where the approach speed is high;
- sites with gradients steeper than 10% if other hazards are present; and
- bends with a risk for loss of control such as an adverse camber or the geometry of the bend is potentially hazardous for the traffic speed.

Each Local Authority has its own Skid Resistance Policy that defines the way the Investigatory Level (a level when the roads requires investigation) is determined for a site.

In addition to being used as an accident remedial measure, HFS has increasingly been used for other purposes such as decorative use. Its effectiveness in terms of impact on road users has arguably been diluted as a result. HFS is expensive to first lay and to later maintain. In high stress locations, a newly laid surface may only last five years, and at present the County Council is not able to resource a programme to renew these on a cyclical basis. Instead, we rely on mechanical surveys to identify sections of main roads that have low skid resistance and prioritise maintenance on that basis. When doing so, we now consider whether there are alternatives to re-applying HFS.

Notwithstanding the cost of HFS and the challenges of maintaining it later, it is clear that it is needed in some circumstances to address safety issues on our network. Our current approach is to balance that against the lifecycle cost of our roads and consider alternative designs and materials, as the continued extensive use of these materials is unsustainable in asset management terms.

## Potholes

Given the size of Kent's highway network, recent winters and increasing traffic volumes, it is inevitable that potholes will occur. Accordingly, in addition to planned capital maintenance of our roads and footways, we carry out a significant programme of work each year to repair potholes and other defects. Our highways crews are working hard to improve the quality of road surfaces and make road travel safer. We regularly check Kent's roads and footways for potholes and other defects. When we find a problem we log it for repair. Busy routes are inspected more frequently; quieter routes are inspected less often, therefore we value help from local residents, communities and road users to identify faults. This is best reported via our KCC website ([www.kent.gov.uk/highways](http://www.kent.gov.uk/highways)) where the location of the fault can be pin-pointed on a plan and an individual fault reference number is provided to allow the progress of the fault to be tracked.

Our priority is to identify and repair potholes that we consider to be safety critical - in broad terms, that means potholes that are 50mm deep on roads and 20mm deep on footways, though other factors will influence that judgement. For example, a 40mm pothole in the wheeltracks of a fast sweeping bend would likely be considered safety critical too. Our inspection manual sets out how we do this in a consistent way across the county and risk assess and prioritise repairs. We are currently reviewing new national guidance called 'Well-managed Highways Infrastructure' to see if we can improve our current approach.

We aim to make a permanent, quality repair by cutting out a small section of the road around the hole, clearing out the old material and filling it with new material. If a road has lots of potholes we may need to complete a larger patch or resurface the whole section. We aim to repair potholes within 28 days, or two hours if it is an emergency. Larger jobs make take longer to arrange, particularly if we need to close the road to carry out the repairs.

For emergency potholes, we sometimes make an instant repair by quickly filling the hole. This is to make the road/footway safe whilst we schedule a full permanent repair to prevent potholes from forming in the future. We are working with our contractors to find quicker and more efficient ways to fill in potholes, and to ensure these repairs last as long as possible.

## **Conclusion**

Our highway team works hard to keep the road and footway network as safe as possible and use countywide surveys to ensure that the investment we make in larger works does as much as we can to extend the life of Kent's important highway network. However the County Council is responsible for the maintenance of 5,400 miles of roads and associated assets and with an estimated value in excess of £19.5bn, our highway network is our most valuable asset. Despite significant investment over the years, our highway assets are continuing to deteriorate. An ever increasing number of repairs, renewals and improvements are required and the countywide maintenance backlog for our roads alone is estimated to be £584m. We use the maintenance techniques outlined in this report to make the best use of every pound we invest.