To: Sevenoaks JTB
By: Byron Lovell, Pavement Asset Engineering Team Leader - Highways
Date: 18 September 2023
Subject: Kent's Concrete Roads

Summary

This paper describes the concrete road asset in Kent, Kent County Council's approach to maintain it and an update on current ongoing innovation trials.

Background

1. Members of the Sevenoaks JTB. has requested information on Kent's concrete road network, what types of treatments we currently use, any trials which are taking place across the county and the expected timescales for repairing our worst concrete roads.

2. The Kent road network represents around 8700km of mainly flexible bituminous construction. A small but significant part of the network (5.5%) is concrete construction or covered concrete. The extent of the Kent concrete roads network and its condition represented by the length and value of schemes identified by Kent's routine surveys. The summary table below shows a number of key information points taken from the more detailed data.

	Classified Roads	Unclassified Roads	Totals
Length of Concrete Roads (km)	36	442	478 (5.5% of network)

3. 292.1km (61%) is made up of covered concrete and the remaining 185.5km (39%) is concrete. Almost 442km (92.5%) of the 478km of concrete construction forms part of the unclassified network with a further 20.2km (4.2%) being C roads. The remaining 3.2% is made up of 11km (2.3%) of A roads and 4.4km (0.9%) of B roads.

4. Sevenoaks has 54 concrete roads totalling 9.5km, around 1.2% of road network in the district (803km total).

Discussion

5. Concrete in its nature is a very durable material with an excellent design life. Majority of the concrete roads in Kent were laid post WWII in the 1940s and 1950s. Therefore, some of the concrete in Kent has been down for up to 70 years+.

6. This is a reason we are now seeing a handful of concrete road failures, they have reached the end of their design life. That, along with the increased traffic loadings over the past few decades and water ingress into the subgrade, has contributed to asset failure. Concrete roads are disproportionately expensive to maintain compared to asphalt roads.

7. In the late 1990s and early 2000s, a high number of concrete roads were covered using a micro surfacing treatment. At the time this was seen as a good idea as it increased the skid resistance of the concrete and it aesthetically looked better.

8. Years later we are now seeing failures of that treatment where we get delamination of the micro treatment causing an uneven ride and although structurally the concrete is sound, aesthetically it looks poor. Example below:

9. To resolve the above issue there are two options currently being trialled across Kent. The first is Concrete Rehabilitation by RoadTech. This method involves fine milling the carriageway removing the thin layer of delaminating surface exposing the concrete. The joints are repaired and sealed, and it is left as a concrete surface. The milling process also removes a fine layer of concrete meaning the skid resistance is improved. This treatment is more suitable for concrete carriageways with a very thin layer where existing crossovers and drainage gullies will not require resetting following the works. Typical treatment cost is £30/£35 per square metre.

10. The second method to be trialled in Azalea Drive, Swanley and Heather Drive, Dartford is called MilePave by Miles Macadam. This treatment is an overlay treatment but using a Grouted Macadam Surface Course. The process is like Concrete Rehabilitation whereby the existing layer of failed overlay is removed, but instead of being left as concrete, the joints are treated and repaired and then a surface course, generally laid between 30mm and 50mm is laid and sealed and reinforced with an asphaltic grout. This is to stop water ingress into the joints and subgrade beneath the concrete slab. This material is an industry best practice treatment that has been given British Board of Agreement (BBA) and is part of the Highway Authorities Product Approval Scheme (HAPAS) which means rigorous testing has been carried out, therefore eliminating the risk of early life failures like the previous overlay treatment did in the late 1990s and 2000s. This treatment is more suited to carriageways whereby the overlay is thicker and as a result would mean drainage and cross overs and kerbs would require adjusting following the works. Typical treatment cost is £30/£35 per sqm.


11. The only other treatment avaiable for concrete is full removal and reconstruction. This is when the eixsting concrete has totally failed and cannot be maintained any longer. The process for this is to remove and replace with either a flexible (tarmac) construction or a rigid (concrete) construction. This process is very expensive and can cost between £200 and £300 per sqm. Example of a failed concrete slab below. If this type of work proves necessary, it would mean having to divert resource away from other maintenance, meaning less maintenance overall.

12. From the 5.5% of the network that is concrete, only 0.4% of the concrete is on A, B and C roads, the remaining 5.1% is minor unclassified residential roads.

13. With the limited funds we have available for highway maintenance and repair, we have to carefully prioritise the works we do to ensure the most benefit to Kent's road

network. To do this we need to consider the condition of the road, alongside factors such as the cost of the works, the amount/type of traffic it carries, its importance to Kent's economy and any safety hazards that may be present.

14. Residential concrete roads do not compare favourably in priority terms with other roads across the County. Although, if these trials prove to be a success there is potential to look at expanding our annual concrete roads programme going forward.