Green Pavements 1 Webinar – Questions and Answers 3/15/2022

The questions submitted during the webinar follow with answers that our speakers have provided.

Key resources available include:

- https://intrans.iastate.edu/app/uploads/2018/03/Sustainable_Concrete_Pavement_508.pdf
- https://www.fhwa.dot.gov/pavement/sustainability/hif15002/hif15002.pdf
- https://www.cement.org/docs/default-source/cement-concrete-applications/pca_roadmap-to-carbon-neutrality_jan-2022.pdf?sfvrsn=33d8fcbf_2

1. How about using RCC for pavements where applicable? At least 10% less cementitious materials, no reinforcement, etc. Significant sustainability benefits.
   Yes, that is an option
2. In Mexico we are limited to blended cement pozzolan and we need alternatives like you infer.

   And

   The availability of classified fly ash is getting harder as the coal fired plants are shutting down. Is there any attempt to incorporate coal bottom ash into concrete mixes? Is there any guidance on this topic please? (NSW)

   We are all struggling with that one. The best hope in the US is harvested fly ash - https://intrans.iastate.edu/app/uploads/2020/09/use_of_harvested_fly_ash_TB.pdf. There is some discussion about bottom ash but nothing has been standardized yet. ASTM has recently adopted a standard for ground glass as a pozzolan.
3. Peter you mentioned that paving industry is ready for Type IL but ready mix is not quite as ready, can you elaborate?

   I think it is driven more by the agencies specifying the concrete. The paving industry seems to have accepted TIL while the structural community is still skeptical.

   The other dynamic at play is that discussions with specifiers within a DOT organization address pavements and transportation structures across the entire state, and this often trickles down to the local agencies. Architects and other specifiers on the vertical construction side don't seem to be as connected through a unified specification, and the outreach and education with these groups requires additional effort.
4. Angela, you mentioned FHWA only considers cradle to gate in EPDs. Is the main challenge for gate to grave mainly documentation over the long use period?

   Yes – it seems straightforward to quantify the environmental impacts of the cradle to gate steps, and this is largely because the approach originated from the LEED program, where the cradle to gate impacts needed to be measured for the concrete material as a first step before the entire building was evaluated as a whole through the LEED rating system. We need to expand our focus to that approach with horizontal

applications, and there are several programs that have been developed to look at the entire life cycle of a pavement system.

5. When grinding existing concrete, does the residue have to be treated as hazardous materials due to absorption of oils/fuels from vehicle traffic?

   No. There have been a number of chemical analysis conducted by universities and DOTs that show that the levels of contaminants in the slurry byproduct are trace and not actionable. The pH (at 12.5) however can exceed Federal levels that require handling slurry as a hazardous waste if not treated before discharge. This is rare however as most slurry measures between 9 and 11. In cases where slurry has elevated pH levels, contractors simply "sweeten" the cooling water with sodium bisulfate prior to entering the grinding equipment.

   This document from the International Grooving & Grinding Association (IGGA) includes explanations and references from several studies completed on CGR: https://www.igga.net/wp-content/uploads/2020/05/Concrete_Grinding_Residue_AKA_Slurry.pdf

6. Can grinding waste be recycled into new concrete if not contaminated or is it too cost prohibitive.

   The fine particle size of grinding waste tends to make it unsuitable for use as an ingredient in concrete. More common reuse strategies include using the slurry byproduct as fill, soil stabilization (as a lime substitute), agricultural lime and as waste water treatment additive.

7. Are there any LCA studies that have focused on the impact of adding aggregate types (for well graded) and reducing cementitious?

   A study was reported by Alauddin Ahammed (Concrete Pavement Life Cycle Environmental Assessment & Economic Analysis: A Manitoba Case Study. Symposium: Pavement Life Cycle Assessment Symposium 2017, April 12-13, 2017, Champaign, Illinois"

8. Would you be able to provide the documents that you referenced in your presentation regarding PLC and the decrease in carbon footprint but no decrease in quality?

   Roads & Bridges article: https://www.roadsbridges.com/performance-enhancing

   PCA State-of-the-Art Report on Use of PLC
   http://www2.cement.org/pdf_files/sn3148.pdf

   MAP Brief on PLC after 10 years in the field:
   https://intrans.iastate.edu/app/uploads/2019/10/MAPbriefOctober2018.pdf