Review of: "Effective use of Waste Materials: A Case Study of Utilization of Fly Ash in Flexible Pavement Structures"

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Potential competing interests: No potential competing interests to declare.

- Abstract is very generic and poorly written. It comes with direct objectives and the observations from the study with future scope.
- Concrete and asphalt concrete both are different, please check.
- Not right selection of graphical abstract. It should be purely based on the pictures. However, it seems like an outline of the study.
- In the graphical abstract, it was mentioned that fly ash in asphalt concrete leads to lower voids and higher asphalt requirement. Not right. Both statements are at opposite poles.
- Page 3, 2nd paragraph, why not abbreviations for oxygen, silicon, and aluminium?
- Page 3, 2nd paragraph, what is the meaning of ordinary cement?
- There are several studies that perform chemical characterization of cement and fly ash, which again indicates the suitability of fly ash as a replacer of cement. Better to add those figures and studies.
- Page 3, Paragraph “The prime difference between the classes is the proportion of silicon dioxide (SiO2) and aluminium oxide (Al2O3). Class ‘C’ contains approximately 60% (38% and 19%), while class ‘F’ contains 80% (55% and 25%) of these elements. Class ‘C’ is used for soil stabilization while class ‘F’ is used in applications with concrete” should be rewritten.
- Page 5, Paragraph 3, gives better results. Please be particular.
- Page 5, Paragraph 3, which chemical stripping agent? Please be particular.

Other than this, some of the major concerns with the paper;

- Lack of Comprehensive Analysis: The text provides an extensive compilation of studies on the use of fly ash in soil stabilization, but it lacks critical analysis and synthesis of the findings. A more thorough examination of the strengths and limitations of these studies, including factors such as sample size, methodology, and applicability to real-world conditions, would enhance the credibility of the review.
- Inconsistencies in Findings: There seems to be inconsistency in the reported findings across different studies. Some studies suggest significant improvements with fly ash addition, while others indicate limited effectiveness or even adverse effects. Addressing these discrepancies and discussing potential reasons behind them would provide readers with a clearer understanding of the overall efficacy of fly ash in soil stabilization.
- Limited Discussion on Environmental Impact: While the text briefly mentions the environmental benefits of using fly ash

to mitigate pollution, it overlooks potential environmental concerns associated with fly ash utilization, such as leaching of heavy metals into the soil and groundwater contamination. A more thorough examination of these environmental risks and mitigation strategies would provide a more balanced perspective on the use of fly ash in soil stabilization.

- Incomplete Assessment of Practical Challenges: The text acknowledges the cost-effectiveness of fly ash compared to other stabilizers like lime and cement, but it fails to adequately address practical challenges associated with fly ash utilization, such as availability, transportation, and compatibility with different soil types. Providing insights into these practical considerations would help readers assess the feasibility of implementing fly ash-based soil stabilization techniques in diverse geotechnical contexts.
- Limited Discussion on Long-Term Performance: Many of the studies cited in the text focus on short-term laboratory experiments or field trials, but there is limited discussion on the long-term performance and durability of soil stabilized with fly ash. Long-term monitoring and evaluation of stabilized soil structures are essential to assess their sustainability and resilience over time. More emphasis on long-term performance data would strengthen the reliability of the conclusions drawn from these studies.

Addressing these critical comments would improve the comprehensiveness and rigor of the discussion on the use of fly ash in soil stabilization and provide readers with a more nuanced understanding of its benefits and challenges.