

## Software Development for AASHTO and Ethiopian Roads Authority Flexible Pavement Design Methods

**Authors :** Amare Setegn Enyew, Bikila Teklu Wodajo

**Abstract :** The primary aim of flexible pavement design is to ensure the development of economical and safe road infrastructure. However, failures can still occur due to improper or erroneous structural design. In Ethiopia, the design of flexible pavements relies on doing calculations manually and selecting pavement structure from catalogue. The catalogue offers, in eight different charts, alternative structures for combinations of traffic and subgrade classes, as outlined in the Ethiopian Roads Authority (ERA) Pavement Design Manual 2001. Furthermore, design modification is allowed in accordance with the structural number principles outlined in the AASHTO 1993 Guide for Design of Pavement Structures. Nevertheless, the manual calculation and design process involves the use of nomographs, charts, tables, and formulas, which increases the likelihood of human errors and inaccuracies, and this may lead to unsafe or uneconomical road construction. To address the challenge, a software called AASHERA has been developed for AASHTO 1993 and ERA design methods, using MATLAB language. The software accurately determines the required thicknesses of flexible pavement surface, base, and subbase layers for the two methods. It also digitizes design inputs and references like nomographs, charts, default values, and tables. Moreover, the software allows easier comparison of the two design methods in terms of results and cost of construction. AASHERA's accuracy has been confirmed through comparisons with designs from handbooks and manuals. The software can aid in reducing human errors, inaccuracies, and time consumption as compared to the conventional manual design methods employed in Ethiopia. AASHERA, with its validated accuracy, proves to be an indispensable tool for flexible pavement structure designers.

**Keywords :** flexible pavement design, AASHTO 1993, ERA, MATLAB, AASHERA

**Conference Title :** ICCIE 2024 : International Conference on Construction and Infrastructure Engineering

**Conference Location :** Vancouver, Canada

**Conference Dates :** May 20-21, 2024