***ABSTRACT***

*There are different methods for flexible pavement design starting from the earliest CBR method till AASHTO and ERA methods are more utilized. At this time in Ethiopia mostly used the ERA design method however the AASHTO design method also used. In addition to that on the ERA design method procedures and some considerations used from the AASHTO design method. As long as both methods applied, does these design methods should be used interchangeably for the design of roads? The objectives of this project were to quantify the differences in pavement thickness resulting from use of the two methods, examine differences in predicted pavement performance for pavement designs considered equal within the ERA and AASHTO methods and also to evaluate the effect of assumed drainage conditions on the pavement structures designed using the AASHTO method and relate this effect to the ERA method. Further to evaluate the cost and economic selection of thickness of different pavement structures and different materials.*

*This paper mainly focused on comparing the ERA and AASHTO pavement thickness design procedures. In the ERA design method for design the sub grade strength and traffic class are used, and in the AASHTO design method the critical factors traffic class, reliability, standard deviation, serviceability, drainage and resilient modulus are used. The design comparison includes the road design Afdera – Irebti Junction – Ertale Junction –Ahmedela road was located in Afar Region.*

*Generally, the pavement structures designed by the ERA procedure are thicker than those designed by the AASHTO procedure. This increase in thickness results in improved fatigue performance for the pavement designed according to the procedure. The fatigue performance of the pavements is extremely sensitive to the asphalt concrete thickness. It is shown that due to the differences between the design procedures they should not be used interchangeably.*

*This paper demonstrates the ability of the mechanistic-empirical pavement analysis and design procedure to quantitatively evaluate the effects of pavement structure, materials selection, and sub grade strength on a specific mode of pavement distress. It is recommended that ERA move towards implementation of fatigue analysis and design procedure for the design of asphalt concrete pavements to be more economical. But consideration of the lane distribution factor for the design of ESAL and also the effect of drainage for granular base and sub base layers is necessary.*

*Key words: pavement thickness, pavement performance, drainage conditions and material cost*