

Simplified Equations for Moment and Shear in Bridge Girders Resulting from AASHTO Truck Loading

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Abstract – In bridge analysis, bridge designers require the maximum loads applied on bridge traffic lanes in order to determine the appropriate structural design including materials, and girder spacing and cross-section sizes for the bidding procedure. In order to achieve that, designers have to go through an iterative trial and error process which takes a considerable amount of time and may result in overestimation at the bidding stage. In the case of bridge design, there are no such tables which hinders the preliminary assessment of project value and bid cost. As such, this paper outlines a research conducted to develop traffic load equations and tables based on the 2020 AASHTO LRFD Bridge Design Specifications. By utilizing this method, engineers will save time in the design process, and reduce project bid cost by minimizing overdesigned and overestimated structural section sizes for project tender documents. In this research, moving load equations and tables were created based on single-lane bridge models for single span and two-span bridge configurations in SAP2000 software. Truck load arrangements, based on AASHTO LRFD design specifications, were applied and results obtained using moving load approach. Finally, the data generated from the parametric study was used to develop empirical expressions for design moment (M_T) and shear (V_T) for the use by bridge designers.

Keywords: AASHTO LRFD, Finite Element Modelling, Bridge Analysis, Load Calculation, Moving Loads, Parametric Study, Project Bid Process, Ready-made Load Tables.