ABSTRACT

Milutinovic, Goran V. M.S.C.E., Purdue University, December 2016. New Screening Method for Overweight Vehicles. Major Professors: Mark Bowman and Arun Prakash.

Throughout the U.S., state agencies are issuing an increasingly large number of permits for overweight vehicles every year. There are various methods used by state agencies to process permit requests; the Indiana Department of Transportation employs a screening process that consists of the Tennessee Formula (allowable weight is determined and checked, for every axle group) in combination with the Gross Vehicle Weight limit. If a permit truck satisfies these two screening criteria, it is permitted; otherwise, it is further processed with refined analyses. The Tennessee Formula is based on Allowable Stress Design. However, most design and evaluation conducted today is by either Load Factor Design (LFD) or Load and Resistance Factor Design (LRFD). As a result, there were cases observed when the load effects produced by a truck that would be permitted by the Tennessee Formula actually exceeded the load effects produced by the set of rating vehicles (which is considered a minimum threshold that each non-posted bridge must have). Consequently, a different approach for evaluating overweight vehicles is presented herein. Load effects from the set of rating vehicles and typical permit vehicles were directly compared. As a result, the screening vehicles – with defined ranges of axle

weights and axle spacings – were developed and recommended for permitting decisions. In other words, a permit truck can be safely permitted as a single-trip, “point-to-point” permit if its axle weights and axle spacings fall within proposed screening vehicles ranges. This screening method is safe since it is based upon the state legal loads, simple to use since it can be easily employed by nontechnical personnel, and practical since a large number of actual permit trucks fall within proposed ranges of the screening vehicles. Finally, the implementation of the proposed method by Indiana Department of Transportation (INDOT) was discussed. Also, the long-term solution of the problem (where each permit request is automatically analyzed for every bridge on permit truck route) was explored and presented.