

TECHNICAL SUMMARY

Evaluation of LADOTD Traffic Load Data for Determination of Traffic Load Equivalency Factors

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INTRODUCTION

The Louisiana Department of Transportation and Development (LADOTD) has traditionally made use of AASHTO guidelines for estimating the number of ESALs that a pavement is designed to carry during a specified design period or to estimate the number of ESALs that are represented by the vehicles in a known mixed traffic stream. Traffic conditions and growth patterns can vary greatly, influenced by such factors as regional economics, industrial density, truck weight law, and industry changes in trucking technology. Further, traffic characteristics can also change dramatically over time. All of this highlights the need for each state to conduct its own comprehensive program of traffic counting, vehicle classification, and truck weighing with a high focus on historic analysis to facilitate sound engineering design and rehabilitation judgement.

Louisiana has responded to these needs by establishing a traffic monitoring program, compliant with FHWA incentives, that is designed to collect and manage the traffic data needed for the design and management of LADOTD's network of current and future highways. In the early 1980s, the availability of this database helped make it possible to develop the Load Equivalency Factor (LEF) tables currently used by the department (this, partly in response to a process review by the FHWA) and currently serving as an integral part of LADOTD's highway design practice.

The 1980 LEF tables were developed using what was, at the time, recognized as a comparatively limited database. This, along with the fact that the tables are now considered to be out of date, has led to a need for their revision. Traffic monitoring, at present, is much better established and has produced raw data of greater volume and quality than was previously available.

OBJECTIVE

The primary objective of this research was to revise Louisiana's LEF tables and to quantify traffic growth trends if possible. Conducting a statistical analysis on the table's supportive database was also an objective intent on examining the relative precision and accuracy of each of the terms found in the revised tables.

RESEARCH APPROACH

The FHWA's Traffic Monitoring Guide (TMG), along with the HPMS Field Manual, were fundamental to developing a proper understanding of the limitations of traffic monitoring procedures and to illustrate the statistical significance of the databases they produce and utilize. In addition, the AASHTO Guide For Design of Pavement Structures was the primary source of methods used to establish required objectives.

Raw data necessary for the investigations were drawn from LADOTD's Weigh-In-Motion (WIM) and Traffic Volume Monitoring (TVM)

programs. Researchers also used computer data processing to expedite the investigative process as much as possible and the FHWA's Vehicle Travel Information System (VTRIS) software for primary calculations.

Revised LEF tables and associated significance figures were developed. Findings indicated that the 15-year-old tables did require revision, being in some cases significantly lower than the revised figures. In conjunction with this, a full statistical analysis of all representative LEF data was also carried out to quantify the significance of the derived LEF table figures. Trend figures could not be accurately calculated due to a shortfall in relevant data.

CONCLUSIONS

Load Equivalency Tables derived from 1997, 1998, and 1999 WIM data have been established. Figures are considered reasonable when used in conjunction with developed statistical figures.

A comparison of Load Equivalency Table figures resulting from this research to those currently used by LADOTD indicate that the current Load Equivalency Factors are under-specified.

The revision of the LEF tables were shown to have a minimal effect on pavement thickness calculations.

The statistical analysis indicated that axle and vehicle weights often varied considerably from their representative median weights. This fact calls into question the assumption associated with the LEF table approach to highway design which asserts that median values can act as global representations of field conditions.

Attempts at establishing vehicle volume growth rate factors indicated that available sources of raw data are too limited to produce conclusive results.

RECOMMENDATIONS

The revised LEF Table figures are considered implementable if used in conjunction with the related statistical analysis. Also, as a matter of practice, figures will need continual revision if they are to continue to be considered compliant with LADOTD policy.

The recommendation is that the procedures and software utilized during this research become integrated into future highway design procedures as a matter of convention. In particular, FHWA's VTRIS software and AASHTO's DARWin software are indicated.

Inadequacies in Louisiana's current LEF tables must be addressed. It is recommended that an ongoing program be established and dedicated to the continual verification and re-establishment of load equivalency figures.

Although the growth trend investigation results were found to be inconclusive and trends appeared to be divergent, it is further recommended these trend studies continue. If divergence proves to be correct, once historic data has been collected, it is then recommended that the problem be examined more completely.

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