

Key Points:

Project Number:

609-13-803

Start Date:

January 1, 2014

Duration:

30 Months

Project Cost:

\$193,411.20

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MECHANISTIC-BASED PAVEMENT DAMAGE AND ASSOCIATED COST FROM OVERSIZE AND OVERWEIGHT VEHICLES IN NEVADA

By: Lindsey Costello



PROBLEM

Every year, over 40,000 Oversize/Overweight (OS/OW) vehicle permits are issued by NDOT and the DMV. These large and heavy truck operations can lead to a rapid deterioration of the roadway system; hence necessitating additional resources to maintain the conditions of the roadway pavements at the acceptable level. NDOT is increasingly challenged by inadequate funding from traditional federal and state fuel taxes and other fees (e.g., vehicle permit fees) required for maintaining the transportation network.

OBJECTIVE

The focus in this proposal is on cost of pavement damage from OS/OW vehicles and to flexible pavements since they constitute more than 97% of Nevada's highways.

METHODOLOGY

Task 1: Identify and Collect the Typical Types and Configurations for OS/OW Vehicles in Nevada

The research team will be classifying Nevada's OS/OW Vehicles by attributes like weight, length, and wheels and dividing these into lettered Classes. Among many documents, the classification used by other states will also be a very valuable resource. Special attention will be given to the neighboring states.

Task 2: Literature Review of Procedures used to Estimate the Pavement Damage

Cost of OS/OW Vehicles

Reports will be reviewed thoroughly along with other available literature to identify the "most significant" factors from OS/OW vehicle loading that directly correlate to

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pavement damage and the methodology used.

Task 3: Applicability of Existing OS/OW Vehicle Pavement Damage Cost Models to Nevada

Specific attention will be given to identify the attributes that dictate the applicability of these studies for Nevada roadways and conditions.

Task 4: Interim Report

An interim report that summarizes all the findings of Tasks 1-3 will be prepared. The report will be submitted to the NDOT project panel for review and comments.

Task 5: Development of Pavement Damage Prediction Models for Nevada

Critical inputs to pavement damage estimation are the appropriate pavement responses, which are to be computed by 3D-Move software. 3D-Move will use all classes of OS/OW vehicles identified in Task 1 along with representative Nevada material properties. Typical Nevada material properties and common damages seen in Nevada will be considered.

Task 6: Synthesis of Pavement Damage for Representative Nevada Routes

Initial phase of this task will be the investigation of whether the increased damage potentials from OS/OW vehicles is sensitive to various routes or highways in Nevada. In addition, the role of existing pavement condition on the damage potential will also be explored. Other important considerations such as the role of seasonal changes (e.g., hot Las Vegas weather in summer, spring thaw in the north, etc.) will also be probed.

Task 7: Cost Attributed to OS/OW Vehicles Travels in Nevada

The research team proposes to study the advantages and disadvantages of different cost allocation methods and in consultation with NDOT to arrive at a decision on the most desirable and equitable method of allocating the cost of damage associated with the OS/OW vehicles that are permitted.

Task 8: Final Report

A Final report document will be compiled encompassing Tasks 1–7. A draft copy of the report will be submitted to NDOT for their review and comments.

IMPLEMENTATION POTENTIAL

It is well known that adding more payload to a given truck will normally increase pavement damage (pavement damage increases exponentially with axle weight) and can have substantial pavement costs. However, switching to a heavier truck with additional axles may leave pavement damage about the same or slightly reduced. It becomes important for both the highway agency and the trucking industry, to appropriately quantify the fair cost of pavement damage caused by OS/OW vehicles. This can help to optimize the OS/OW vehicle configuration. The attributed cost will also help the state DOT to better estimate the necessary funds for associated pavement maintenance and repairs.

