WEB-BASED TRAFFIC ROUTING ASSISTANCE TOOL TO REDUCE PAVEMENT DAMAGE

OVERVIEW
Routing and permitting of oversize and overweight (OS/OW) vehicles is a significant issue that needs to be addressed not only in Texas but across the country, as most OS/OW loads travel multiple states before reaching their destination. With the recent growth in energy-related products in Region 6 (such as wind turbines), coordinated efforts toward efficient planning and routing of the OS/OW loads are becoming increasingly important from the standpoint of both pavement preservation and traffic management.

This SPTC project aims to:
1. develop an open source web GIS-based routing assistance tool to optimize the OS/OW routes based on the historical and expected heavy traffic levels and pavement conditions, and
2. evaluate the impact of OS/OW loads to highway pavements and use performance models to predict the service life of the pavements.

The initial focus of the project was placed on developing an open code, web-based routing tool with consideration of the existing pavement conditions. The tool was developed using the ArcGIS Web App Builder (WAB), JavaScript, and HTML5/CSS3. Its main function includes an open code software structure, a routing model providing route information based on the inputs of vehicle type, pavement condition, and the construction information. Figure 1 depicts the interface of the web-based routing tool.

Since it is open-sourced, it is available readily and flexible. Users can easily customize it according to their needs. Secondly, an analytical model was developed to evaluate the impacts of OS/OW loads to pavements based on the inputs of the existing pavement condition, climate zone, loads of the OS/OW vehicles, as well as the maintenance and rehabilitation history. This task includes consolidating datasets, finding the most accurate regression function, and obtaining the pavement performance model under different scenarios. Three case studies were designed to validate these functions, which include using the same OS/OW level load in different climate zones, using different OS/OW level loads in the same climate zone, and estimating pavement service life reduction at different OS/OW level loads.

For illustrative purpose, the regression curves in Figure 2 show the relationship between road age and the pavement condition score for high OS/OW traffic load in four climate zones.

![Figure 1 Main Interface of Web-based Routing Tool](image)

![Figure 2 High OS/OW in Different Climate Zones](image)
Figure 3 shows the road life reduction curves for different OS/OW traffic loads in the same climate zone. These pavement performance models provide a basis for the development of an optimal routing strategy to reduce pavement damage from OS/OW vehicles.

APPLICATION
The integrated information on climate, OS/OW traffic loads and frequency, and the existing pavement condition in this tool not only enables optimal routing of the OS/OW vehicles but also, through the analytical models, provides quantitative analysis of the impact of the super loads on pavements.

BENEFIT
The architecture of the product was designed with consideration of open source application. In addition to its integrated structure and analytical functions, it is an open code software and thus readily available and easy to customize. The product provides transportation agencies with a web-based tool for optimal routing of the traffic with oversized and overweight loads and analytical models for the assessment of the impacts resulting from these loads.

ABOUT THE RESEARCHERS
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