EIN6905 - Project proposal

Optimize Bridge Inspection Interval

Description:

The US Department of Transportation and Federal Highway Administration requires routine inspections to monitor bridge deterioration. Typically, bridge inspections are conducted every 24 months. This timeframe was determined solely based on engineering judgment.The objective of this project is to understand the bridge conditions and to forecast bridge deterioration and determine the optimal inspection intervals for both cost savings and avoid bridge failures.

Dataset:

From the US Department of 'Federal Highway Administration (FHWA)' website.

Problem Statement:

The United States has more than 735,000 bridges, which are critical components of the US transportation system. The National Bridge Inspection Standard (NBIS) developed by the Federal Highway Administration (FHWA) requires regular and periodic comprehensive inspection of these bridges, that addresses all elements of a bridge, including substructure and superstructure. The typical inspection interval is 24 months but can be extended to 48 months for short-span bridges (typically less than 150 ft) in good condition with low average daily traffic. For certain bridges with existing damage, a shorter inspection interval may be requested by owners. However, the majority of the bridges in the US are inspected based on the 24-month interval. Based on the NBIS procedure, whenever a bridge is inspected, a rating condition from 1 to 9 is assigned to the bridge.

The 24-month routine inspection interval was determined by the FHWA in the 1970s solely based on engineering judgment, regardless of the current condition of the bridges. This uniform interval approach has resulted in a very costly and inefficient process. Many bridges in proper condition do not need to be inspected every 24 months. On the other hand, some bridges with a high deterioration rate may need a shorter inspection period. The FHWA's need to be especially conservative was understandable in the 1970s when it developed the NBIS and initiated the bridge inspection process. Today, however, the availability of historical records of bridge conditions allows the creation of a systematic process based on historical deterioration data to empirically determine the inspection interval which will result in both cost savings and avoid the risk of bridge failures.

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