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8. ABSTRACT

The project described herein has led to a convenient, computer-based expert system for identifying and evaluating potentially effective erosion and sedimentation control measures for use in roadway construction throughout Iowa and elsewhere in the Midwest. The expert system is intended to be an accessible and efficient practical resource to aid state, county, and municipal engineers in the selection of the best management practices for preventing unwanted erosion and sedimentation at roadway construction sites, during and after construction.

The expert system is based on a comprehensive review of the literature on erosion and sedimentation control methods (ESCMs). The literature includes diverse in-house manuals, information on state-DOT websites, as well as an array of publications from various agencies (state, and federal government) and industry, design manuals, federal and national guidelines, and specialized computer programs. In addition, surveys of state DOTs within the U.S. Great Plains and Upper & Middle Mississippi Valley Regions, and of Iowa County engineers were conducted. The literature review and the surveys led to the expert system, which comprises a structured synthesis of information on ESCMs. It provides information on the principal technical, implementation, economic, and operational efficiency considerations.

A notable finding of the literature review and the state DOTs survey is the identification of numerous in-house manuals developed by the various agencies directly involved with mitigating erosion and sedimentation concerns. The manuals are mainly in hardcopy format, though some are in an electronic format. The literature review and survey revealed that, although extensive ESCM literature exists, much of it is not organized to enable effective use by highway engineers. This finding motivated the project investigators to initiate and develop a contemporary, computer-based expert system.

The expert system is a comprehensive "inference engine" that will assist state, county, and municipal engineers in the selection, design, construction, inspection, and maintenance of ESCMs for a particular roadway construction situation. The expert system was designed to ensure that selected ESCMs take into account site characteristics, the lifetime of the planned method, and Iowa's Midwest environment. The expert system can be further developed by refining its database content and by adapting the current inference engine for web-based environment. Those further steps were beyond this first phase of the Project.

The project also led to a significant shortlist of ESCM research needs. Among them is the need to better take into account the impacts on ESCMs of frigid winter conditions. In this regard, a common concern is the establishment of protective vegetation to mitigate erosion and sedimentation concerns at roadway construction sites.

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