Hydrologic Estimates Using the Watershed Modeling System (WMS)

Problem:
The determination of peak flows and hydrographs that are used in the design of highway structures requires the transportation hydraulic engineer to employ a variety of techniques to develop their estimates. The results of these techniques are a function of basin parameters such as: drainage basin size, elevation, orientation, and other physical parameters. Historically, these physical characteristics have been determined by manually delineating the basin area and determining other key parameters from one or more topographic maps.

Perspective:
The Internet has made information readily available that can be used in conjunction with available computer technology to assist the hydraulic engineer in completing routine hydrologic computations.

Solution:
A computer program called the Watershed Modeling System (WMS) is available to hydraulic engineers to automatically delineate drainage basins and determine nearly all of the key parameters necessary to computer a peak flow or hydrograph. Detailed digital elevation data is available for the entire United States that makes it possible for the technology to be applied in any location. In addition, land use and soil type maps are also available electronically, which makes it possible to develop the supporting data for virtually all industry standard hydrologic models. This data can be directly transferred to WMS where the hydrologic computations are performed and the results analyzed.

Benefits:
The Watershed Modeling System (WMS) provides an efficient and accurate solution to the hydrologic problems encountered by hydraulic engineers. It is estimated that by using WMS that a project can be completed in 20 percent of the time that it would take to perform the computations manually. In addition, the results are reproducible which means that if the same data is used, the same results will be achieved regardless of who is performing the computations. An additional advantage is that the results are more accurate because the opportunity for error is reduced. Accurate hydrologic results lead to properly designed structures that are safer for the traveling public and require less maintenance for the managing agency.

Implementation:
Training for this market ready technology has been provided in about 15 States and the technology is being actively used in about 20 States. The goal is to eventually have all States use this technology.

Additional Resources:
Hydraulic Design Series - 2, Highway Hydrology, Second Edition, FHWA-NHI-02-001
WMS Version 7.0 Software, Help Files, and Tutorials
http:/www.aquaveo.com/wms
NHI Course Number 135080, Hydrologic Analysis and Modeling With WMS

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