The Donald M. Burmister Lecture

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Bridge Scour Predictions

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Interschool Lab (Schapiro Center Room 750)

The lecture starts with a discussion of the fundamental concepts in soil erosion. Why and how does a soil particle or block of soil particles erode away? How did the Colorado River dig the Grand Canyon, a 1600 m deep hole? How did the Niagara Falls regress 10 km? What soil properties are most influential in erosion resistance? How can one measure erodibility? These are questions which are addressed in that first part.

In a second part, the research work leading to the equations to predict the depth of scour around bridge supports is described including large scale laboratory experiments and numerical simulations. Dimensional analysis is used to optimize the form of the equations which are presented including their advantages and limitations. The equations are evaluated by comparing them to a number of databases of measured scour depths both in the field and in other laboratory studies.

In a third part, a number of case histories are presented to illustrate the application of the fundamental concepts to erosion studies including the Woodrow Wilson bridge in Washington DC, The Normandy Cliffs site of World war II in France, The Brazos River meander migration in Texas, and the New Orleans levee failures.

The late Prof. Donald M. Burmister (1895-1981) is one of the pioneers in the field of Soil Mechanics and Geotechnical Engineering. He established the Soils Laboratory at Columbia University in 1933. He was a faculty member for 34 years before retiring in 1963. During his tenure at Columbia University, he investigated earthworks and foundations for over 400 projects. Most notably among these were the Brookhaven National Laboratory, the Throgs Neck, Tappan Zee and Verrazano Narrows Bridges, the First New York World Fairs at Flushing Meadows, and the reconstruction of the White House in 1950. He has developed several soil testing methods and his soil classification system is still widely used. He also contributed to the first use of digital computer in conjunction with his theory of the layered pavement system.