

CASE HISTORIES IN SOIL AND ROCK EROSION

Woodrow Wilson Bridge, Brazos River Meander, Normandy Cliffs, and New Orleans Levees

The 9th Ralph B. Peck Lecture

By

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ABSTRACT:

This lecture presents four case history examples of erosion processes. Because the topic of soil and rock erosion is relatively underdeveloped in geotechnical engineering, an introduction precedes the case histories to describe some fundamental aspects of erosion. Erosion involves the soil or rock through its erodibility, the water through its velocity, and the geometry of the obstacle through its size and shape. Knowledge of these three components is needed for any erosion problem to be studied and solved. A set of fundamental issues are addressed in a first part including an erodibility classification for soils and rocks, an explanation of the stresses imposed by the water on the soil-water or rock-water interface, and an explanation of how the geometry impacts the problem. The Woodrow Wilson Bridge case history outlines a new and less conservative method to compute the scour depth and gives examples of bridge scour calculations. The Brazos River meander case history outlines a new method to predict meander migration and gives an example of migration calculations. The Pointe du Hoc case history gives an explanation of a process of rock cliff erosion. The New Orleans levees case history gives an example of erosion of levees by overtopping and proposes an erosion design chart for levee overtopping. Whenever possible the results are presented in a probabilistic fashion. All case histories make use of the EFA, an apparatus developed to quantify the erodibility of a soil or rock and to give the constitutive law for erosion problems: the erosion function. The power point slides for the lecture including many photos of the case histories are available at <http://ceprofs.tamu.edu/briaud/> under "Lectures" and the video (DVD) of the lecture is available from the author, free of charge.