

Multipurpose Detention Pond Design for Improved Watershed Management in New Korean Developments

Daeryong Park¹

Department of Civil Engineering, Colorado State University

Sukhwan Jang

Department of Civil Engineering, Daejin University, Pochun-city, Kyungki-do, 487-711, KOREA

Larry A. Roesner

Department of Civil Engineering, Colorado State University

Abstract. Peak-flow attenuation is important in urban stormwater management because urbanization increases stormwater runoff in both magnitude and volume which may result in flooding in downstream areas. In the United States, the standard practice is to shave the peak flow after development so it does not exceed predevelopment peak flows for specified design-storms. Detention basins are used to capture high runoff rates from postdevelopment and control the peak rate of their outflow using orifices and weirs. However, the use of detention basins in Korea is not used in new development due to the high cost of land. As a result, many existing urban areas in Korea experience an increased frequency of flooding due to urbanization upstream in the watershed.

This study investigates how the design of detention ponds, orifices and weirs could be used to reduce the peak flows from a new 10 hectare development in the Ulsan-Hwabong region of Korea. The development seen in this region is typical of new development being constructed on the fringe of existing urban areas in Korea. In this study, the volume and land area required for the detention pond was determined for the control of postdevelopment outflow peaks of the 2-year, 10-year and 100-year design storms. The latest updated version of the Stormwater Management Model (version 5.006a) was used in the detention pond modeling. This study also illustrates how the land required for the detention of larger less-frequent storms could also be used for other purposes such as recreational facilities or playgrounds. Employing this land for multiple uses may prove a cost-effective way of reducing flood damages in existing urban areas resulting from new upstream development.

¹ Department of Civil Engineering
Colorado State University
Fort Collins, CO, 80523-1372
Tel: (970) 491-2838
e-mail: Dae.Park@colostate.edu