ANALYZING STORMWATER RUNOFF DECREASE EFFECTS BY USING POROUS PAVEMENTS

JAEEUNG YI[1], WOON GWANG YEO[2] and MUN MO KIM[3]

[1]Associate Professor, Department of Civil Engineering,
Ajou University, Suwon, 442-749, Korea
(Tel: +82-31-219-2507, e-mail: jeyi@ajou.ac.kr)
[2]Professor, Department of Civil Engineering, Myongji University, Yongin, 449-728, Korea
(Tel: +82-31-330-6007, e-mail: yeo@mju.ac.kr)
[3]Associate Professor, Department of Civil Engineering,
Shingu College, Songnam, 462-743, Korea
(Tel: +82-31-740-1340, e-mail: munmo310@shingu.ac.kr)

In Korea, flood damages keep increasing in urban areas, despite the efforts the central government and local governments made such as construction of flood control reservoirs, levees and channel modifications. Especially, floods of Northern Kyonggi-Do occurred in 1996, 1998, and 1999 consecutively caused enormous damages to life, property and income. Rapid urbanization of Northern Kyonggi-Do is considered one of the main reasons of continuous flood occurrences. In this area, several alternatives are being tried to mitigate flood damages.

As one alternative to alleviate damages caused by stormwater runoff, the effects of runoff quantity reduction are analyzed when porous pavement is used. Porous pavements with various depths, general pavement and an artificial rainfall generator are installed for laboratory experiments. Runoff changes are analyzed according to the various rainfall durations. The rainfall intensity of 150 mm/hr is generated for 30 minutes, 60 minutes, and 120 minutes. For porous pavements with 80 cm thickness, 100%, 93%, 56% of discharge is infiltrated through soil, respectively. For porous pavements with 20 cm thickness, 81%, 32%, 28% of discharge is infiltrated through soil, respectively. It is demonstrated that the porous pavements are able to decrease the runoff. Also, they are able to delay the time when peak discharge occurs. Accordingly if porous pavements can be used broadly, flood damage alleviating effects will be obtained by decreasing total and peak runoff as well as delaying peak time.

REFERENCES

Field, R., Tafuri, A. N., and Masters, H. E., 1977. Urban Runoff Pollution Control Technology Overview. Environmental Protection Agency, 00/2-77-047, Environmental Protection Technology Series, Mar.

Kuo, J.-T., Yen, B. C. and Hwang, G.-P., 1991. Optimal Design for Storm Sewer System with Pumping Stations. Journal of Water Resources Planning and Management, ASCE, Vol. 117, No. 1, pp. 11-27.

Olsen, J. R., Beling, P. A., Lambert J. H., and Haimes, Y. Y., 1998. Input-Output Economic Evaluation of System of Levees. Journal of Water Resources Planning and Management, ASCE, Vol. 124, No. 5, pp. 237-245.