Title: Management of Storm Water for Drainage of Azimput, BUET and Lalbagh Area of Dhaka City

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ABSTRACT

In the recent years, it has become a common picture in Azimpur, BUET and Lalbag that if there is a rainfall of moderate to severe intensity, major portion of the area goes under water. This study focuses on the flooding caused by high intensity storm runoff that inundates these areas for several days mainly due to lack of proper drainage system and inefficient management.

Selection of study area is guided by the availability of surface runoff and short duration rainfall data of the urban catchments. Delineation of the catchment was based on storm sewers of DWASA, street map of DCC, Google Earth Image, previous study and field observation. Since the land is very flat, the catchment boundary depends very little on the topography.

Mike SWMM rainfall runoff Model is a popular, effective and useful tool, which can support planning and management for making effective decision. In this study Mike SWMM runoff module is used for runoff generation and Extran module is used for simulation of the surface flow.

In this study two catchments are delineated for simulation of old and new storm sewers by Mike SWMM model. One catchment is the old storm sewer of BUET and the other is the newly constructed storm sewer which goes through BUET, Dakeshwari Mondir and part of Azimpur and Lalbag areas. BUET catchemnt is divided into 17 subcatchments to simulate the old storm sewer network. Calibration and verification is possible for sub-catchment no-6 of old storm sewer network for the year 1996. Measured runoff and rainfall data is found only for this subcathcment for the year 1996. SWMM Extran block run was not possible for lack of data on the old storm

sewer. New storm sewer goes through the part of the BUET catchment. So, catchemnt boundary for new storm sewer is different from old storm sewer catchment. This catchment is divided into 63 sub-catchments.

I-D-F curve is used to generate 5 minutes interval rainfall data with a statistical return period of 2, 3, 5 and 10 years. Cumulative rainfall of 2, 3, 5 and 10 years return period is accordingly 81.57 mm, 91.90 mm, 105.94 mm and 123.58 mm.

Rainfall and storm sewer discharge data for the 1996 monsoon at BUET catchment was collected from a provious study (chowdhury et al., 1998). The information on the drainage network (secondary and primary/trunk drain) of the model area were collected from DWASA. Old network data is not available and recently installed sewer system drawing is available for the BUET catchment. It includes detailed information about the dimension and bottom elevation of the pipes, location and size of the manholes and catchpits.

A set of small, medium and large storms were selected from monsoon 1996 and divided into two sub-sets of equal size, one for calibration and the other for verification. Root mean square errors for calibrated storms are according 3.5%, 12.07% and 16.10% and correlation coefficients (R^2) are 0.917, 0.951 and 0.913.

Old storm sewer network surface flow simulation is not possible because of lack of sewer data. Subcatchment parameters of the old storm sewer of BUET catchment is used in the new storm sewer catchment. SWMM Extran Block is used to test the capacity of newly constructed storm sewer. Although in the Master Plan (JICA, 1992) the rainfall intensity with a 5-year frequency was recommended to design the storm sewer, it is inadequate to handle the 2 year frequency rainfall.

Planning, design, operation and maintenance of urban drainage systems are a great challenge to urban authorities in developing countries because of unplanned development activities. Short design return periods are sometimes necessary because of the prohibitive cost of building a drainage system to cope with all monsoon storms. Integrated approach is needed among the government agencies to stormwater management, and public participation based on awareness of the purpose and function of the drainage infrastructure.